SPECIAL THANKS

SPECIAL THANKS TO STSA
64TH ANNUAL MEETING CORPORATE SUPPORTERS

PLATINUM
Medtronic

GOLD
Johnson & Johnson Medical Devices

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Edwards Lifesciences
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FUTURE MEETINGS

November 7–10, 2018
Omni Amelia Island Plantation Resort
Amelia Island, FL

November 6–9, 2019
JW Marriott Marco Island Beach Resort
Marco Island, FL

November 4–7, 2020
Loews Royal Pacific Resort at Universal Orlando Resort™
Orlando, FL

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THE ANNALS OF THORACIC SURGERY
G. Alexander Patterson, St. Louis, MO
WEDNESDAY, NOVEMBER 8, 2017
3:30 pm – 6:00 pm  Registration – Level 2

THURSDAY, NOVEMBER 9, 2017
6:30 am – 5:00 pm  Registration – Level 2
6:30 am  Continental Breakfast – Cibolo Canyon Ballroom Foyer
7:00 am – 7:50 am  Ethics Debate
Battling the Chimera: How Much Disclosure of Rare Risks Is Necessary?
Cibolo Canyon Ballroom 1-3
7:00 am – 7:50 am  Basic Science Forum
Begonia-Bottlebrush
8:00 am – 10:30 am  First Scientific Session – Cibolo Canyon Ballroom 5-6
10:30 am – 11:00 am  Break & Visit Exhibits – Cibolo Canyon Ballroom Foyer
10:00 am – 12:00 pm  Exhibits Open – Cibolo Canyon Ballroom 7-11
11:00 am – 12:20 am  President’s Invited Lecturer
Pedro del Nido, MD
Picking Your Battles: Clinical Life vs. Research and the Cardiothoracic Surgeon
Cibolo Canyon Ballroom 5-6
11:20 am – 12:00 pm  Presidential Address
David R. Jones, MD
Bending the Curve: The Importance of Expertise
Cibolo Canyon Ballroom 5-6
12:00 pm  All Attendee Luncheon – Event Lawn 1
1:30 pm – 2:00 pm  Dessert Served in the Exhibit Hall – Cibolo Canyon Ballroom 7-11
1:30 pm – 3:30 pm  Exhibits Open – Cibolo Canyon Ballroom 7-11
2:00 pm – 3:00 pm  Second Scientific Session – Cibolo Canyon Ballroom 5-6
3:00 pm – 3:30 pm  Break & Visit Exhibits – Cibolo Canyon Ballroom 7-11
3:30 pm – 5:30 pm  Third Scientific Session – Cibolo Canyon Ballroom 5-6
5:30 pm – 6:30 pm  2017 Cardiothoracic Surgery Jeopardy Competition for North America
Rounds 1 & 2 – Cibolo Canyon Ballroom 5-6
6:00 pm – 7:00 pm  Residents Reception – Sunflower-Wisteria
7:00 pm – 9:00 pm  President’s Mixer – Event Lawn 2

FRIDAY, NOVEMBER 10, 2017
6:30 am – 4:45 pm  Registration – Level 2
6:30 am  Continental Breakfast – Cibolo Canyon Ballroom Foyer
7:00 am – 8:30 am  Fourth Scientific Session A – Simultaneous Subspecialty Breakout Sessions
Adult Cardiac Breakout – Cibolo Canyon Ballroom 5-6
Thoracic Breakout – Cibolo Canyon Ballroom 1-3
Congenital Breakout – Begonia-Bottlebrush
7:45 am – 12:00 pm  Exhibits Open – Cibolo Canyon Ballroom 7-11
8:30 am – 9:00 am  Break & Visit Exhibits – Cibolo Canyon Ballroom 7-11
9:00 am – 10:00 am  Fourth Scientific Session B – Simultaneous Subspecialty Breakout Sessions
Adult Cardiac Breakout – Cibolo Canyon Ballroom 5-6
Thoracic Breakout – Cibolo Canyon Ballroom 1-3
ECMO Breakout – Begonia-Bottlebrush
10:00 am – 10:30 am  Break & Visit Exhibits – Cibolo Canyon Ballroom 7-11

SATURDAY, NOVEMBER 11, 2017
7:30 am – 11:00 am  Registration – Level 2
7:30 am  Continental Breakfast – Cibolo Canyon Ballroom Foyer
8:00 am – 9:15 am  Postgraduate General Session: Special Topics in Cardiothoracic Surgery
Cibolo Canyon Ballroom 5-6
9:15 am – 10:25 am  Postgraduate General Session: Maximizing Leadership Potential in Your Practice
Cibolo Canyon Ballroom 5-6
10:25 am – 11:10 am  Postgraduate Subspecialty Breakout Sessions
Adult Cardiac Breakout – Cibolo Canyon Ballroom 5-6
Thoracic Breakout – Cibolo Canyon Ballroom 1-3
Congenital Breakout – Begonia-Bottlebrush
Interdisciplinary Care Provider Breakout – Azalea
11:40 am  Program Adjourns

Kent Trinkle Education Lectureship – Cibolo Canyon Ballroom 5-6
Marc R. Moon, MD
Four Score and Seven Years Ago: The Wash U Experience Training Thoracic Surgeons
10:50 am – 11:00 am  Break & Visit Exhibits – Cibolo Canyon Ballroom 7-11
11:00 am – 12:00 pm  Fourth Scientific Session C – Simultaneous Subspecialty Breakout Sessions
Adult Cardiac Breakout – Cibolo Canyon Ballroom 5-6
Thoracic Breakout – Cibolo Canyon Ballroom 1-3
Congenital Breakout – Begonia-Bottlebrush
Transplant Breakout – Azalea
12:00 pm  Lunch on Own
Resort restaurant Cibolo Moon is offering a special menu for STSA attendees. Lobby restaurant Crooked Branch offers a variety of grab ‘n go options. Sample menus are available at Registration.

Interdisciplinary Care Provider Luncheon – Iris
Early Practitioners Luncheon – Lily
Exhibits Open – Cibolo Canyon Ballroom 7-11
12:45 pm – 3:30 pm  Break & Visit Exhibits – Cibolo Canyon Ballroom 7-11
1:00 pm – 1:30 pm  Update on Practice Management Expert Panel
Cibolo Canyon Ballroom 5-6
2:30 pm – 3:00 pm  Harold Urschel History Lectureship
Stephen Yang, MD
Leadership Potential in Your Practice
Postgraduate General Session: Maximizing Leadership Potential in Your Practice
Cibolo Canyon Ballroom 5-6
3:00 pm – 3:30 pm  Break & Visit Exhibits – Cibolo Canyon Ballroom 7-11
3:30 pm – 4:30 pm  Fifth Scientific Session – Cibolo Canyon Ballroom 5-6
4:30 pm – 5:15 pm  STSA Annual Business Meeting
STSA Members Only – Cibolo Canyon Ballroom 1-3
4:30 pm – 5:00 pm  2017 Cardiothoracic Surgery Jeopardy Competition for North America
Final Round – Cibolo Canyon Ballroom 5-6
7:00 pm – 10:00 pm  Annual Awards Dinner – Cibolo Canyon Ballroom 5-6

Program Adjourns
STSA Golf Outing
See page 9 for details
SCHEDULE OF ACTIVITIES

THURSDAY, NOVEMBER 9

Spouse/Guest Hospitality Suite – Sunday House – Level 3
Time: 8:00 am – 12:00 pm
STSA is providing a complimentary hospitality room for spouses and guests to mingle and make plans for exploring San Antonio.

All Attendee Luncheon – Event Lawn 1
Time: 12:00 pm (Followed by dessert in the Exhibit Hall)
Cost: Complimentary

Residents Reception – Sunflower-Wisteria – Level 3
Time: 6:00 pm – 7:00 pm
Residents, fellows, and medical students attending the meeting are invited to join STSA leaders for this hour-long networking event. Spouses/guests are welcome.

President’s Mixer – Event Lawn 2
Time: 7:00 pm – 9:00 pm
Cost: Complimentary
Attendees receive two tickets with registration. Additional tickets may be purchased for $25.00. Visit the registration desk for details.
Gather with fellow meeting attendees for an evening of networking and fun.

FRIDAY, NOVEMBER 10

Spouse/Guest Hospitality Suite – Sunday House – Level 3
Time: 8:00 am – 12:00 pm
STSA is providing a complimentary hospitality room for spouses and guests to mingle and make plans for exploring San Antonio.

Annual Awards Dinner
Reception: 7:00 pm - 8:00 pm – Cibolo Canyon Ballroom Foyer
Dinner: 8:00 pm - 10:00 pm – Cibolo Canyon Ballroom 5-6
Cost: $100.00 per adult / $40.00 per child (ages 12 and younger)
Join fellow meeting attendees and their families for the always memorable Annual Awards Dinner, complete with a cocktail reception, dinner, awards and entertainment. We have shortened the award presentations to maximize the time to socialize and enjoy your friends at the STSA. Exciting entertainment with a local flare has been added to this year’s program. Although black tie is always in fashion, you are welcome to wear cocktail attire. Be comfortable and have fun!

SATURDAY, NOVEMBER 11

Spouse/Guest Hospitality Suite – Sunday House – Level 3
Time: 8:00 am – 12:00 pm
STSA is providing a complimentary hospitality room for spouses and guests to mingle and make plans for exploring San Antonio.

Golf Outing
Location: TPC San Antonio AT&T Canyons Course (on property)
Time: Tee times begin at 1:00 pm
Cost: $175.00 (Price includes greens fees, golf cart and practice balls. Lunch is on own.)
Advanced registration is recommended. Subject to cancellation if registration is insufficient. Registrants will be notified in advance and refunds will be issued if this event is cancelled.
A Peter Dye-crafted par-72 course sits on a great piece of land which provides panoramic views of an adjacent 700-acre nature preserve. The design, which measures more than 7,000 yards, is true to nature and the flow of the land. The dramatic elevation changes and hill country views make this course not only challenging, but breathtaking as well.
Please note the following dress code: Men must wear collared shirts with long pants or Bermuda length shorts. Ladies must have a collar or sleeves on their top. Dresses, shorts or skirts of appropriate length are allowed. Only soft-spiked shoes are allowed on the course.
Rental clubs are available for $45.00, and soft spike golf shoes may be rented for $15.00. Rental items are not included in the costs noted above.
Rental items are not included in the golf outing cost. Confirmed golfers will be contacted after advance registration closes on October 9 to collect rental needs.

ONSITE FITNESS & RECREATION

LANTANA SPA
STSA guests are eligible for a 15% discount on spa treatments at the JW Marriott’s own Lantana Spa. The onsite spa boasts 30 treatment rooms, three relaxation lounges, outdoor adults-only spa pool and whirlpool, aromatherapy steam rooms, saunas, luxurious locker rooms, and a state-of-the-art fitness center (available to all resort guests), featuring a variety of fitness classes. To schedule discounted spa treatments, call the spa directly at 210-276-2300 and mention STSA. Visit www.jwlantanaspa.com to browse treatment options.
Resort guests not scheduled to receive spa treatments may request a day pass. Lantana Spa offers a limited number of day passes for $15, on a first-come, first-serve basis. It is recommended that guests call when the spa opens at 7:00 am to secure a day pass. A day pass is not required to use the fitness center.

RIVER BLUFF WATER EXPERIENCE
Surrounded by 600 acres of picturesque rolling oak-covered hills, the JW Marriott’s 9-acre water park, River Bluff Water Experience offers fun for all ages. Make memories with your family as you splash down rapid river rides, exciting slides and a 1,100-foot lazy river. The River Bluff Water Experience is complimentary for all hotel guests.

CHILDREN’S ACTIVITIES
The Range Riders Kids Club invites children ages 4 to 12 to experience a fun-filled day of supervised entertainment, such as stimulating arts and crafts, water activities, and exciting games. Range Riders is open from 11:00 am to 4:00 pm and costs $15 per child, per hour. The Range Riders Kids Club is conveniently located at the River Bend Pavilion, within River Bluff Water Experience. Advance registration is not required.
In addition, a full schedule of family-friendly activities offered by the resort will be provided upon your arrival. Activities include animal encounters, cookie decorating, jumbo backyard games, dreamcatcher making, rubber duck racing, painting, magic shows, and more. Costs range from complimentary to $65 per person. Advance registration is not required.
CHILDCARE SERVICES
The JW Marriott San Antonio Hill Country Resort & Spa recommends the following childcare providers:

Northside Sitters
210-710-7940
www.northsidesittersclub.com

Time Out Sitters
210-325-2812
www.timeoutsitters.com
CONTINUING MEDICAL EDUCATION (CME) OVERVIEW

DISCUSSION OF PAPERS
Each session has a limited amount of time reserved for discussion. Please review the program outline carefully to determine if you have a particular interest in some of the topics, then be prepared to discuss them at the meeting. If you wish, you may request a copy of the manuscript in advance of the meeting by contacting the author directly. Assigned discussants are limited to two minutes and two questions.

PRESENTATION AND PUBLICATION
Authors of oral presentations are required to submit a manuscript for consideration for publication in *The Annals of Thoracic Surgery* before noon on Saturday, November 11, 2017. Manuscripts must be submitted via *The Annals* online manuscript submission system at www.editorialmanager.com/annals/default.aspx. A paper copy of the manuscript will not be accepted for consideration. Primary authors and co-authors that are delinquent in submitting their manuscript to *The Annals* on time will not have abstracts considered by the Program Committee of the STSA for two (2) subsequent meetings.

ACCREDITATION
The Southern Thoracic Surgical Association is accredited by the Accreditation Council for Continuing Medical Education (ACCME) to provide continuing medical education for physicians.

The STSA designates this live activity for a maximum of **17 AMA PRA Category 1 Credits™**. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

STSA CME MISSION
The continuing medical education mission of the Southern Thoracic Surgical Association is to design and deliver high-quality, practical, innovative, and scientifically rigorous educational programming at its Annual Meeting in the areas of cardiovascular, general thoracic, and congenital heart surgery, as well as ethics and professionalism, leadership, and practice management.

Such educational programming is meant to advance the overall competence of cardiovascular, general thoracic, and congenital heart surgeons, and ultimately to help them improve their patient outcomes and promote patient safety.

Continuing medical education activities are presented in a variety of formats at an STSA Annual Meeting; these include [but are not limited to] presentations of peer-reviewed scientific abstracts, updates on relevant scientific research, didactic presentations, debates, video presentations, and sub-specialty-specific break-out sessions. All educational sessions include the opportunity for questions, answers and discussion to further support the educational needs of the meeting attendees and the program learning objectives.

STSA educational activities are developed and provided with the intent of confirming an existing knowledge base, imparting new knowledge, enhancing competence in the content areas covered, and addressing identified professional practice gaps. The expected results include participants’ reporting greater confidence in their clinical care skills and a willingness to change their behavior or adapt new strategies as appropriate.

ELECTRONIC CME EVALUATION
The STSA 64th Annual Meeting evaluation and CME credit claim process is electronic. Registrants who wish to receive CME credit for sessions they attend will be required to complete the electronic evaluation for the session. This is the only way physicians can earn CME credit for their attendance. Using the electronic evaluation system, registrants can complete the meeting evaluation, claim CME credit, and print CME certificates. Certificates of Attendance are also available for non-physician attendees.

The electronic evaluation provides attendees the opportunity to offer feedback to the STSA Council and Program Committee regarding content offered, including information about applicability of the content to current practice, quality of the material presented, and recommendations for future programming. This information is invaluable in the planning of future STSA educational programs.

In addition to being useful for program planning, program evaluation and future needs assessment are important components of the requirements that the STSA must meet to maintain accreditation through the Accreditation Council for Continuing Medical Education (ACCME). It is by meeting the requirements set forth by the ACCME that the STSA is able to award CME credit for educational programming.

The electronic evaluation can be completed by meeting registrants onsite at computer kiosks located in the Cibolo Canyon Ballroom Foyer.

Attendees can also access evaluations by visiting the online evaluation website through personal computers or handheld devices. In order to make this process more convenient for attendees, the meeting evaluations will be available online through Friday, December 1, 2017.

Attendees can log in to the evaluation website with the following information:
- **Username:** E-mail Address (note, your username is the e-mail address that you used to register for the Annual Meeting)
- **Password:** STSA User ID (your user ID is printed on the bottom or your meeting badge)

This process will allow STSA to maintain an electronic record of CME earned by physicians. Files will be maintained for a minimum of six years. Any questions regarding this procedure should be directed to STSA Headquarters at (312) 202-5892 or via e-mail at stsa@stsa.org.

STSA POLICY REGARDING DISCLOSURE
The Southern Thoracic Surgical Association will seek thorough financial and commercial disclosure information, according to ACCME requirements and recommendations, from all presenters, discussants, and moderators participating in an STSA Annual Meeting. Failure or refusal to provide disclosure information automatically disqualifies participation. All disclosure information will be communicated to the learners through appropriate means, including but not limited to the Annual Meeting Program Book.

STSA leadership, planning committee members, and staff will also provide disclosure information to be kept on file and communicated to meeting attendees through the STSA Annual Meeting Program Book.

All abstracts and disclosure statements will be reviewed approximately three (3) months prior to the Annual Meeting by staff for unidentified conflicts of interest. Any such potential conflicts will be brought to the attention of the STSA President, Council Chair, and CME Committee Chair for review and resolution. Any potential conflicts of interest must be resolved before presentation. If a conflict is deemed unresolvable, the paper cannot be presented at the Annual Meeting.

The STSA Disclosure Policy (as outlined on page 358) will be communicated to the learner via the Annual Meeting Program Book.
STSA EDUCATION DISCLOSURE POLICY
As a sponsor of continuing medical education accredited by the Accreditation Council for Continuing Medical Education (ACCME), the Southern Thoracic Surgical Association requires that any individual who is in a position to control the content of an educational activity must disclose all relevant financial relationships (including known relationships of his or her immediate family, department, and partners) with any healthcare-related business or other entity whose products or services may be discussed in, or directly affected in the marketplace by, the educational content. The ACCME defines a “relevant financial relationship” as a relationship of any amount occurring within the previous twelve (12) months. The question of whether a disclosed conflict situation could represent undue influence on the educational activity by a commercial interest, or whether the disclosed information is sufficient to consider an abstract, presentation, or other educational enduring material to represent potentially biased information must be resolved prior to an individual’s involvement in STSA educational programming.

Required disclosures include (1) financial interest of any amount (e.g., through ownership of stock, stock options, or bonds) (2) the receipt of any amount of cash, goods or services within the current 12-month period (e.g., through research grants, employment, consulting fees, royalties, travel, or gifts) or (3) a non-remunerative position of influence (e.g., as officer, director, trustee or public spokesperson).

NOTE: To avoid confusion with regard to the question of “relevance,” STSA requires that anyone in a position to control content (planners, speakers, authors, volunteer leaders, staff) must review the content they are addressing and disclose relationships with companies that have a material interest in the content being covered regardless of the division of the company for which that relationship exists. For instance, if a speaker will be referencing a product made by the X division of ABC company, but his relationship is with the Y division, he must still disclose the relationship. EXCLUDED from this disclosure requirement are blind trusts or other passive investments such as mutual funds.

In the case of a financial or other relationship disclosure, the company, product/service, and specific nature of the relationship must be noted. Disclosure is mandatory for any person involved in the planning, management, presentation, and/or evaluation of STSA educational activities.

Failure to disclose relevant financial relationships disqualifies the individual from being a planning committee member, a teacher, or an author of CME materials, and this individual cannot have any responsibility for the development, management, presentation, or evaluation of STSA CME activities. This requirement is intended neither to imply any impropriety of such relationships nor to prejudice any individual presenter or author. It is merely to identify such relationships through full disclosure, and to allow the STSA to assess and resolve potential influences on the educational activity prior to the planning and implementation of an educational activity. All abstracts and presentations are reviewed for potential conflicts of interest. All conflicts of interest must be resolved prior to presentation. Any abstract/paper with a conflict that is deemed unresolvable will not be presented at the Annual Meeting. If no relevant financial relationships exist, the individual must indicate this on the disclosure form.

Additionally, the fact that the presentation, paper, or other educational product describes (a) the use of a device, product, or drug that is not FDA approved or (b) an off-label use of an approved device, product, or drug must also be disclosed. This requirement has been adopted in response to FDA policy and recent case law involving medical societies, and is not intended to prohibit or inhibit independent presentation or discussion regarding the uses of devices, products, and drugs as described in (a) or (b) above.

For live presentations, all disclosures must be stated orally or on a slide at the beginning of the presentation and will be noted in published material related to the activity. Slides, handouts, and other materials utilized as part of an educational activity cannot contain any advertising, trade names or a product group message. Speakers are required to disclose that they have nothing to disclose if this is the case.

Authors listed with a D next to their names have indicated, in accordance with the ACCME Standards and the STSA Disclosure Policy, that they have a financial or other relationship with a healthcare-related business or other entity to disclose; or their paper’s content describes the use of a device, product or drug, that is not FDA approved, or the off-label use of an approved device, product or drug. Please refer to the Relationship Disclosure Index on page 358 for a listing of all disclosure information.

OVERALL MEETING OBJECTIVES
To present recent advances in research, surgical techniques, patient management, and the diagnosis and treatment of cardiothoracic disease to cardiothoracic specialists and related health care professionals; and to provide a forum for cardiothoracic surgeons and related healthcare professionals to exchange ideas through open discussion periods and question-and-answer sessions related to the practice of cardiothoracic surgery.

After attending the STSA Annual Meeting, participants should have a broader understanding of new and standard techniques and current research specifically related to adult cardiac surgery, general thoracic surgery, congenital heart surgery, and related transplant procedures. Attendees can utilize knowledge gained from the STSA Annual Meeting to help select appropriate surgical procedures and interventions and integrate state of the art knowledge into their own practices.

TARGET AUDIENCE
The STSA Annual Meeting is intended for all professionals involved in delivery of cardiothoracic care with particular emphasis on cardiothoracic surgeons. Cardiothoracic residents, fellows, nurse practitioners, research scientists, and other health care professionals may also benefit from various sessions and interactions with cardiothoracic colleagues.

SPEAKER READY ROOM
The Speaker Ready Room is located in Cibolo Canyon Ballroom 4. Speakers are requested to go to this room upon arrival, or at least four hours prior to the opening of their session to upload slides. Speakers will not be allowed to bring their laptop to the podium.
THURSDAY, NOVEMBER 9, 2017

7:00 am – 7:50 am
Cibola Canyon Ballroom 1-3
Educational Objectives: Upon completion of this program participants should be able to:
• Assess how to manage potentially contaminated heater-coolers;
• Distinguish whether to disclose to patients the extremely low risk of infection from M chimaera.

CME Credits Available: 1.0

7:00 am – 7:05 am
Case Introduction: Battling the Chimera: How Much Disclosure of Rare Risks is Necessary?
Moderator: *Robert M. Sade, Medical University of South Carolina, Charleston, SC

7:05 am – 7:20 am
Pro: *Richard L. Prager
University of Michigan, Ann Arbor, MI

7:20 am – 7:35 am
Con: *Gregory D. Trachiotis
George Washington University, Washington, DC

7:35 am – 7:50 am
Discussion

*STSA Member D Relationship Disclosure
THURSDAY, NOVEMBER 9, 2017

7:00 am – 7:50 am
Begonia-Bottlebrush
(Presentations are limited to five minutes, followed by three minutes of discussion open to the audience.)

CME Credits Available: 1.0
Moderator: D*Min P. Kim and *T. Brett Reece
Resident Moderator: Xiaoying Lou

7:00 am – 7:08 am (page 48)
1B. Programmed Death Ligand 1: A Step Toward Immunoscore for Esophageal Cancer
Conor F. Hynes1, Dong H. Kwon1, Chaitanya Vadlamudi1, Alexander Lofthus1, Aya Iwamoto1, Jeffrey J. Chahine1, Sameer Desale1, *Marc Margolis1, Bhaskar V. Kallakury1, Thomas J. Watson1, Nadim G. Haddad1, D*M. Blair Marshall1
1MedStar Georgetown University Hospital, Washington, DC; 2MedStar Health Research Institute, Hyattsville, MD

7:08 am – 7:16 am (page 50)
2B. Extended Brain Death Impairs Outcomes in Swine Lung Transplantation
David J. Hall, Eduardo Fontena, David C. Holden, Joshua M. Pickering, *Thomas M. Beaver, Lyle L. Moldawer, Tiago N. Machuca
University of Florida, Gainesville, FL

7:16 am – 7:24 am (page 52)
3B. Upregulation of Beta Common Subunit by Diazoxide Enhances Anti-apoptotic Effects of Erythropoietin in Mouse Model of Spinal Cord Ischemia and Reperfusion Injury
Katsuhiro Yamaka, Mohamed Eldeiry, *Muhammad Aftab, Lisa S. Foley, Joshua Mares, Xianzhong Meng, Michael J. Weyant, Joseph C. Cleveland, *David A. Fullerton, *T.B. Reece
University of Colorado, Aurora, CO

7:24 am – 7:32 am (page 54)
4B. Correlating Oxygen Delivery on Cardiopulmonary Bypass With the Neurological Injury Biomarker UCH-L1
J. Trent Magruder1, *Charles Fraser1, Joshua C. Grimm1, Todd C. Crawford1, Alejandro Suarez-Pierre1, Ronald Hayes2, Claude Beaty2, Michael V. Johnston1, *William A. Baumgartner1
1Johns Hopkins School of Medicine, Baltimore, MD; 2Banyan Biomarkers, Alachua, FL; 3University of Michigan, Ann Arbor, MI

7:32 am – 7:40 am (page 56)
5B. The Association of Novel Cardiac Biomarkers and 1-Year Readmission or Mortality After Cardiac Surgery
1Johns Hopkins All Children’s Heart Institute, St. Petersburg, FL; 2Johns Hopkins Medicine, Baltimore, MD; 3Yale School of Medicine, New Haven, CT; 4University of Michigan, Ann Arbor, MI; 5Medical College of Wisconsin, Madison, WI; 6Carolina HealthCare System, Charlotte, NC; 7The Dartmouth Institute for Health Policy & Clinical Practice, Lebanon, NH

STSA 64th Annual Meeting

7:40 am – 7:48 am (page 58)
6B. Thoracic and Cardiovascular Surgeons Achieve High Rates of K Award Conversion into R01 Funding
University of Virginia, Charlottesville, VA

7:50 am – 8:00 am
Break
Cibolo Canyon Ballroom Foyer

*STSA Member  D Relationship Disclosure
THURSDAY, NOVEMBER 9, 2017

8:00 am – 10:30 am
Cibolo Canyon Ballroom 5-6
(Presentations are limited to seven minutes, followed by two minutes of discussion from a selected discussant and an additional six minutes of discussion open to the audience.)

CME Credits Available: 2.5
Moderators: *David R. Jones and D*Daniel Miller

8:00 am – 8:15 am (page 60)
1. Favorable Early and Midterm Outcomes of Transcatheter Aortic Valve Replacement in Patients With Bicuspid Aortic Valve: A Single Center Study
Discussant: D*Vinod H. Thourani, MedStar Heart Institute, Washington Hospital Center, Washington, DC

8:15 am – 8:30 am (page 62)
2. Long-term Results for Clinical Stage IA Lung Cancer – Comparing Recurrence and Survival Between Lobectomy and Sublobar Resection
Discussant: Elizabeth A. David, UC Davis Medical Center, Sacramento, CA

8:30 am – 8:45 am (page 64)
3. Pulmonary Arteriovenous Malformation Regression Following a Fontan is Associated With Angiopoietin-2 Driven Angiogenesis Inhibition
Minoo N. Kavarana, Robert Stroud, Rupak Mukherjee, Jeffrey A. Jones, Scott M. Bradley, Medical University of South Carolina, Charleston, SC
Discussant: Sunjay Kaushal, University of Maryland Medical Center, Baltimore, MD

8:45 am – 9:00 am (page 66)
4. A Novel Risk Score Predicts In-hospital Mortality After Operative Repair of Stanford Type A Acute Aortic Dissection
Mehrdad Ghoreishi, Eric Wise, Luqman Croal-Abrahams, Charles Drucker, Richa Kalsi, Nandakumar Menon, Salva Hassan, Robert Crawford, D*Bradley S. Taylor, University of Maryland, Baltimore, MD
Discussant: Himanshu J. Patel, University of Michigan, Ann Arbor, MI

9:00 am – 9:15 am (page 68)
5. Safety of Next Day Discharge Following Lobectomy: Have We Broken The Speed Limit?
Stephen Greer, *Ashley D. Miller, Jeremiah Smith, D*James R. Headrick, Jr., ACTVS, Chattanooga, TN
Discussant: Robert J. Cerfolio, New York University, New York, NY

9:15 am – 9:30 am (page 70)
6. Transcatheter Versus Surgical Aortic Valve Replacement in Patients With Prior Mitral Valve Surgery
1Emory University, Atlanta, GA; 2MedStar Heart Institute, Washington Hospital Center, Washington, DC
Discussant: Thomas E. MacGillivray, Houston Methodist, Houston, TX

9:30 am – 9:45 am (page 72)
7. Implementing a Thoracic Enhanced Recovery Program: Lessons Learned in the First Year
*D*Mercedes A. Harrison, Bethany Sarosiek, Traci Hedrick, A. Sasha Krupnick, *Christine Lau, Robert Thiele, Dustin Walters, Randal Blank, *Linda W. Martin, University of Virginia, Charlottesville, VA
Discussant: Betty C. Tong, Duke University Medical Center, Durham, NC

9:45 am – 10:00 am (page 74)
8. Predictors of Failure of Medical Management in Uncomplicated Type B Aortic Dissection
Xiaoying Lou, D*Fazan M. Duwayri, *Edward P. Chen, William D. Jordan, Jessica Forcillo, D*Bradley G. Leshnower, Emory University, Atlanta, GA
Discussant: Andrea J. Carpenter, University of Texas Health Science Center, San Antonio, TX

10:00 am – 10:15 am (page 76)
9. The Relationship Between Pre-operative Aortic Arch Dimensions and Late Outcome Following Coarctation Repair in Infancy via Lateral Thoracotomy
Preeti Ramachandran, Philip Khoury, Robert Beekman, Erik C. Michelfelder, D*James S. Tweddell, James Cnota, Pediatric Cincinnati Children's Hospital Medical Center, Cincinnati, OH; 2CS Mott Children's Hospital, Ann Arbor, MI; 3Sibley Heart Center, Children's Healthcare of Atlanta, Atlanta, GA
Discussant: Robert Dabal, University of Alabama, Birmingham, AL

10:15 am – 10:30 am (page 78)
10. History and Evolution of the STSA President's Award for Best Scientific Paper
*Constantine Mavroudis, Johns Hopkins Children's Heart Surgery Florida Hospital for Children, Johns Hopkins University School of Medicine, Orlando, FL

10:00 am -12:00 pm
EXHIBITS OPEN
Cibolo Canyon Ballroom 7-11

10:30 am -11:00 am
Break – Visit Exhibits
Cibolo Canyon Ballroom 7-11
GENERAL SESSION

11:00 am – 12:00 pm
Cibolo Canyon Ballroom 5-6

CME Credits Available: 1.0
Moderator: *S. Adil Husain

11:00 am – 11:20 am
President’s Invited Lecturer: Picking Your Battles: Clinical Life vs. Research and the Cardiothoracic Surgeon
*Pedro del Nido
Boston Children’s Hospital, Boston, MA

11:20 am – 12:00 pm
Presidential Address:
Bending the Curve: The Importance of Expertise
*David R. Jones
Memorial Sloan Kettering Cancer Center, New York, NY

12:00 pm – 1:30 pm
All Attendee Luncheon
Event Lawn 1

1:30 pm – 3:30 pm
EXHIBITS OPEN

1:30 pm – 2:00 pm
Dessert in the Exhibit Hall
Cibolo Canyon Ballroom 7-11

SECOND SCIENTIFIC SESSION

2:00 pm – 3:00 pm
Cibolo Canyon Ballroom 5-6
(Presentations are limited to seven minutes, followed by two minutes of discussion from a selected discussant and an additional six minutes of discussion open to the audience.)

CME Credits Available: 1.0
Moderators: *S. Adil Husain and *Richard L. Lee

2:00 pm – 2:15 pm (page 80)
11. Amiodarone Protocol Provides Cost Effective Reduction in Postoperative Atrial Fibrillation
University of Virginia, Charlottesville, VA
Discussant: *Thoralf M. Sundt, Massachusetts General Hospital, Boston, MA

2:15 pm – 2:30 pm (page 82)
12. Outcomes of an Intensive, Pre-Operative Smoking Cessation Program
Kayla Fay, Joseph Phillips, Timothy Millington, David Finley
Dartmouth-Hitchcock Medical Center, Lebanon, NH
Discussant: *Daniel L. Miller, WellStar Health System, Marietta, GA

2:30 pm – 2:45 pm (page 84)
*Dawn S. Hui, Katie Tichich, *Richard L. Lee
St. Louis University, St. Louis, MO
Discussant: *Robert S. D. Higgins, Johns Hopkins University School of Medicine, Baltimore, MD

2:45 pm – 3:00 pm (page 86)
Adriana G. Ramirez1, Fidele Byiringiro2, Nebil Nuradin1, Robinson Ssebuufu3, George J. Stukenborg4, Georges Ntakiyiruta2, *Thomas M. Daniel1
1University of Virginia, Charlottesville, VA; 2University of Rwanda Teaching Hospital, Kigali, Rwanda; 3University of Rwanda Teaching Hospital, Kigali, Rwanda; 4Kampala International University, Ishaka-Bushenyi, Uganda
Discussant: *M. Blair Marshall, MedStar Georgetown University Hospital, Washington, DC

3:00 pm – 3:30 pm
Break – Visit Exhibits
Cibolo Canyon Ballroom 7-11

*STSA Member D Relationship Disclosure
THIRD SCIENTIFIC SESSION

3:30 pm – 5:30 pm
Cibolo Canyon Ballroom 5-6
(Presentations are limited to seven minutes, followed by two minutes of discussion from a selected discussant and an additional six minutes of discussion open to the audience.)

CME Credits Available: 2.0
Moderators: *Richard K. Freeman and *John H. Calhoon

3:30 pm – 3:45 pm (page 88)

15. Genetic Syndromes and Extracardiac Anomalies are Associated With Inferior Single Ventricle Palliation Outcomes
Emory University, Atlanta, GA
Discussants: *Jeffrey P. Jacobs, Johns Hopkins All Children’s Hospital, St. Petersburg, FL

3:45 pm – 4:00 pm (page 90)

16. Surgeon Led CT Screening for Lung Cancer: A 10-Year Process
D*Daniel L. Miller, Vickie J. Beckler, Aaron A. Cann, Gerald A. Helms, *William R. Mayfield
WellStar Health System, Marietta, GA
Discussants: *Lisa M. Brown, UC Davis Medical Center, Sacramento, CA

4:00 pm – 4:15 pm (page 92)

17. Does Mitral Valve Calcium in Patients Undergoing Mitral Valve Replacement Portend Worse Survival?
Mayo Clinic, Rochester, MN
Discussants: D*Edward Y. Sako, University of Texas, San Antonio, TX

4:15 pm – 4:30 pm (page 94)

18. The Role of Post-operative Radiation Therapy (PORT) Following Induction Chemotherapy and Resection in Patients With Stage III (N2) Non-Small Cell Lung Cancer
Memorial Sloan Kettering Cancer Center, New York, NY
Discussants: Mark W. Onaitis, University of California, San Diego, CA

4:30 pm – 4:45 pm (page 96)

19. A Propensity Matched Analysis of Robotic, Minimally Invasive, and Conventional Mitral Valve Surgery
*Robert B. Hawkins1, *J.H. Mehaffey1, *Wiley Nifong1, D*W. Randolph Chitwood1, Mohammed Quader2, D*Andy Kiser2, D*Alan Speir3, D*Gorav Ailawadi2, Marc Katz4
1University of Virginia, Charlottesville, VA; 2East Carolina University, Greenville, NC; 3Virginia Commonwealth University, Richmond, VA; 4INOVA Heart and Vascular Institute, Falls Church, VA; 5Medical University of South Carolina, Charleston, SC
Discussants: Joseph F. Sabik, University Hospitals Cleveland Medical Center, OH

4:45 pm – 5:00 pm (page 98)

20. Patient Outcomes After Stent Failure for the Treatment of Acute Esophageal Perforation
St. Vincent Hospital and Health System, Indianapolis, IN
Discussants: *Daniela Molena, Memorial Sloan Kettering Cancer Center, New York, NY

5:00 pm – 5:15 pm (page 100)

21. Use of a Bare Metal Stent in Addition to a Covered Endograft for Management of Complicated Acute Type B Aortic Dissection Offers Positive Remodeling for the Thoracoabdominal Aorta
Ibrahim Sultan, Keith Dufendach, Dhaval Trivedi, Rachel McGargle, Andrew D. Althouse, Floyd Thoma, Forozan Navid, D*Thomas G. Gleason
University of Pittsburgh, Pittsburgh, PA
Discussants: D*Anthony L. Estrera, Memorial Hermann Hospital, Houston, TX

5:15 pm – 5:30 pm (page 102)

22. Timing and Risk Factors Associated With Venous Thromboembolism Following Lung Cancer Surgery
Daniel C. Thomas1, Brian N. Arnold1, Frank C. Detterbeck1, Daniel J. Boffa1, Anthony W. Kim1, Justin D. Blasberg1
1Thoracic Surgery, Yale School of Medicine, New Haven, CT; 2University of Southern California, Los Angeles, CA
Discussants: *Virginia R. Litle, Boston Medical Center, Boston, MA

2017 Cardiothoracic Surgery Jeopardy Competition for North America
Rounds 1 & 2
5:30 pm – 6:30 pm
Cibolo Canyon Ballroom 5-6

6:00 pm – 7:00 pm
Residents Reception
Sunflower-Wisteria

7:00 pm – 9:00 pm
President’s Mixer
Event Lawn 2
27. Functional Outcomes of Non-aneurysmal Type I Bicuspid Aortic Valve Repair With Annular Stabilization: Subcommissural Annuloplasty Versus External Subannular Aortic Ring
Hanjia Ko, Joseph E. Bavaria, Caroline Komlo, Yianni Augoustides, Melanie Freas, Mary Siki, Karianna Milewski, D*Wilson Y. Szeto, Nimesh Desai, Prashanth Vallabhajosyula
University of Pennsylvania, Philadelphia, PA
**Discussants:** *Marc R. Moon, Washington University, St. Louis, MO

8:15 am – 8:30 am (page 114)

28V. Open Surgical Repair for the Removal of an Atrial Septal Amplatzer™ Device Eroding the Aortic Root
D*Joseph S. Coselli, D*Scott A. LeMaire, D*Ourania Preventza, *Kim I. de la Cruz, Cristian Rosu, *Gregory Pattakos, Scott Weldon
Baylor College of Medicine, Houston, TX

**THORACIC BREAKOUT** Cibolo Canyon Ballroom 1-3
(Presentations are limited to seven minutes, followed by two minutes of discussion from a selected discussant and an additional six minutes of discussion open to the audience.)

**Moderators:** *Daniela Molena and *Jennifer Marks
**Resident Moderator:** *David Hall

7:00 am – 7:15 am (page 116)

29. Risk Factors for Occult N2 Disease in Patients With Non-Small Cell Lung Cancer
Adam R. Dyar1, D*Robert J. Cerfolio2, R.W. King1, Asem F. Ghanim1
1University of Alabama, Birmingham, AL; 2New York University, New York, NY
**Discussants:** *Matthew J. Bott, Memorial Sloan Kettering Cancer Center, New York, NY

7:15 am – 7:30 am (page 118)

30. Current State of Empyema Management
Tara R. Semenkovich, D*Margaret A. Olsen, Varun Puri, *Bryan F. Meyers,
*Benjamin Kozower
Washington University, St. Louis, MO
**Discussants:** *William R. Mayfield, WellStar Health System, Marietta, GA

7:30 am – 7:45 am (page 120)

31V. Hybrid Superior Sulcus Tumor Resection
Jordan Hoffman, D*John D. Mitchell
University of Colorado, Denver, CO

7:45 am – 8:00 am (page 122)

32. Excess Cost of Complications and Their Predictive Factors After Esophagectomy in the SEER-Medicare Database
1Emory University School of Medicine, Decatur, GA; 2Rollins School of Public Health, Emory University, Atlanta, GA
**Discussants:** Brian E. Louie, Swedish Cancer Institute and Medical Center, Seattle, WA

8:00 am – 8:15 am (page 124)

33. Assessing the Clinical Feasibility of Implementing a Novel Assessment of frailty, the Electronic Rapid Fitness Assessment in Diverse Thoracic Surgery Clinics
Memorial Sloan Kettering Cancer Center, New York, NY
**Discussants:** *Linda W. Martin, University of Virginia, Charlottesville, VA

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*STSA Member  D Relationship Disclosure  V indicates STS/CTSNet surgical video
34. Comprehensive Program for Air Leak Prevention and Management After Lobectomy for Lung Cancer is Associated With Reduced Length of Stay
Jessica Mayor¹, Donald R. Lazarus¹, Roberto F. Casal², Shuab Omer¹, Ourania Preventza¹, Katherine Simpson¹, Ernesto Jimenez¹, Lorraine D. Cornwell¹
¹Baylor College of Medicine, Houston, TX; ²MD Anderson Cancer Center, Houston, TX
Discussant: *John A. Howington, Saint Thomas Health, Nashville, TN

Tara Karamlou¹, Jorge Arango², Lucia Mirea¹, Monique Riemann¹, David Adelson¹, ²Richard Towbin¹, John Negro¹
¹Phoenix Children's Hospital, Phoenix, AZ; ²Barrow's Neurologic Institute, Phoenix, AZ
Discussant: *James S. Tweddell³, ⁴Cincinnati Children's Hospital Medical Center, Cincinnati, OH

36. Use of Septal Myectomy in Subaortic Stenosis Membrane Resection: The Effect on Recurrence Rates Requiring Reoperation
Alyssa A. Mazurek, Sunkyung Yu, Ray E. Lowery, Richard Ohye
University of Michigan, Ann Arbor, MI
Discussant: *Joseph A. Dearani, Mayo Clinic, Rochester, MN

37. Neonatal Systemic Pulmonary Shunts: Is the Configuration of the Shunt a Risk Factor?
*Joseph Caspi
Louisiana State University, New Orleans, LA
Discussant: *T.K. Susheel Kumar, Le Bonheur Children's Hospital, Memphis, TN

38. Liberal Use of Delayed Sternal Closure Following Pediatric Cardiac Surgery is Not Associated With Increased Morbidity
Ram Kumar Subramanyan¹,², Nigel Scott², Winfield J. Wells¹,², Vaughn A. Starnes¹,²
¹University of Southern California, Los Angeles, CA; ²Children's Hospital, Los Angeles, CA
Discussant: *S. Adil Husain, University of Texas Health Science Center, San Antonio, TX

39. Porcine Small Intestine Submucosa Patch is a Suitable Material for Norwood Arch Reconstruction
Roni Jacobsen¹², ¹Michael E. Mitchell¹², Ronald Woods¹², Shagun Sachdeva¹², ¹James S. Tweddell³, ⁴
¹Children's Hospital of Wisconsin, Milwaukee, WI; ²Medical College of Wisconsin, Milwaukee, WI; ³Cincinnati Children's Hospital Medical Center, Cincinnati, OH; ⁴University of Cincinnati, Cincinnati, OH
Discussant: *Brian E. Kogon, University of Mississippi Medical Center, Jackson, MS

40. Less is More in Post Pediatric Heart Transplant Care
R.E. Edens, Samantha Wagner, Michelle Staron, Jennifer Maldonado, ¹Joseph W. Turek
University of Iowa Children's Hospital, Iowa City, IA
Discussant: *Kristine J. Guleserian, Nicklaus Children's Hospital, Miami, FL

8:00 am – 9:00 am
Break – Visit Exhibits
Cibolo Canyon Ballroom 7-11
FOURTH SCIENTIFIC SESSION B

9:00 am – 10:00 am
Simultaneous Adult Cardiac, Thoracic, and ECMO Breakout Sessions

CME Credits Available: 1.0

Attendees select to participate in one of the following three breakout sessions:

**ADULT CARDIAC BREAKOUT** Cibola Canyon Ballroom 5-6
(Presentations are limited to seven minutes, followed by two minutes of discussion from a selected discussant and an additional six minutes of discussion open to the audience.)

**Moderators:** *Richard L. Prager and *Dawn S. Hui

**Resident Moderator:** John Kelly

9:00 am – 9:15 am (page 140)
**41. Nadir Hematocrit on Bypass and Rates of Acute Kidney Injury in Coronary Artery Bypass: Does Sex Still Matter?**
*Alexander A. Brescia1, Xiaoxing Wu2, Gaetano Paone3, Michael Heung4, Theron Pough5, Kenny Shann6, David Fitzgerald7, Timothy Dickinson8, David Sturmer9, Jeffrey Chores10, Andrew Pruitt11, Haley N. Allgeyer12, Sim Uppal13, Min Zhang13, D*Himanshu Patel13, D*Richard L. Prager14, D*Donald S. Liskosy15
1University of Michigan, Ann Arbor, MI; 2Henry Ford Hospital, Detroit, MI; 3Massachusetts General Hospital, Boston, MA; 4Medical University of South Carolina, Charleston, SC; 5Mayo Clinic, Rochester, MN; 6St. John Providence Health System, Detroit, MI; 7Michigan Heart and Vascular Institute, St. Joseph Mercy Hospital, Ann Arbor, MI

**Discussants:** D*Vinod H. Tourism, MedStar Heart Institute, Washington Hospital Center, Washington, DC

9:15 am – 9:30 am (page 142)
**42. Sternotomy Closure Using Rigid Plate Fixation Versus Wire**
*Cercle: Patient Reported and Economic Outcomes from a Multicenter, Randomized Trial
**D**Keith B. Allen1, D*Vinod H. Tourism2, Yoshifumi Naka3, Kendra Grubb4, D*John Grehan5, Nirav Patel6, DT Sloan Guy7, Kevin Landolfio8, D*Marc Gerdisch9, Mark Bonnell10, D*David Cohen11
1St. Luke’s Mid America Heart Institute, Kansas City, MO; 2MedStar Heart Institute, Washington Hospital Center, Washington, DC; 3Columbia Presbyterian Hospital, New York, NY; 4University of Louisville, Louisville, KY; 5Allina Heart and Vascular, St. Paul, MN; 6Lenox Hill Hospital, New York, NY; 7Well Cornell, New York, NY; 8Mayo Clinic, Jacksonville, FL; 9St. Francis Heart Center, Indianapolis, IN; 10University of Toledo Medical Center, Toledo, OH

**Discussants:** Daniel T. DeArmond1, University of Texas Health Science Center, San Antonio, TX

9:45 am – 10:00 am (page 144)
**43. Reverse Remodeling of the Left Atrium Following Transaortic Carotid Surgery in Patients With Obstructive Hypertrophic Cardiomyopathy**

**Mayo Clinic, Rochester, MN**

**Discussants:** Nicholas G. Smedira, Cleveland Clinic, Cleveland, OH

4:00 pm – 5:00 pm
**45. Can Liquid (Blood) Biopsies Replace Tissue Biopsies in Patients With Non-Small Cell Lung Cancer?**
Asan F. Ghanim1, D*Robert J. Cerfolio2, Bhavika N. Patel3, Francisco Robert1
1University of Alabama, Birmingham, AL; 2New York University, New York, NY

**Discussants:** *James M. Isbell, Memorial Sloan Kettering Cancer Center, New York, NY

9:00 am – 9:15 am (page 148)
**46. Pre-operative CHA2DS2-VASc Score Predicts Post-operative Atrial Fibrillation After Lobectomy**
Charles T. Lee1,2, David M. Strauss1,2, Lauren E. Stone1,2, Jill C. Stoltzfus1,2, Matthew Puc1,2, *William R. Burfeind1,2
1St. Luke’s University Hospital, Bethesda, PA; 2Temple University, Philadelphia, PA

**Discussants:** Melanie Edwards, St. Louis University School of Medicine, St. Louis, MO

9:15 am – 9:30 am (page 150)
**47. Management of a LC2 Carinal Carcinoid Tumor Through a Minimally Invasive Parenchymal-Sparing Approach**
Monisha Sadarshan1, *Shanda H. Blackmon 2
Mayo Clinic, Rochester, MN

9:45 am – 10:00 am (page 154)
**48. Induction Chemoradiotherapy Versus Chemotherapy Alone for Superior Sulcus (Pancoast Tumors) Lung Cancers**
*Lary A. Robinson1, Tawee Tanvetyanon1, Deanna Grubs2, Scott J. Antonia1, D*Ben C. Creel1, Jacques-Pierre Fontaine3, Eric M. Toloza4, *Robert Keenan, Thomas J. Dilling1, Craig W. Stevens5, Frank Vrionis6, Keith E. Sommers7
1Mayo Clinic Cancer Center, Tampa, FL; 2Beaufont Health, Royal Oak, MI; 3Boca Raton Regional Hospital, Boca Raton, FL; 4BayCare Medical Group, Tampa, FL

**Discussants:** Eric L. Grogan, Vanderbilt University Medical Center, Nashville, TN

**EMCO BREAKOUT** Cibola Canyon Ballroom 1-3
(The invited speaker is limited to thirty minutes, followed by two abstract presentations limited to seven minutes each, and concluded by a sixteen minute panel discussion.)

**Moderators:** *Joseph A. Dearani and D*Mark S. Slaughter

9:00 am – 9:30 am
**ECMO: When, Where, and by Whom?**
*D*Joseph B. Zweifmanberger
University of Kentucky, Lexington, KY

9:30 am – 9:37 am (page 156)
**49. Delayed Initiation of Anticoagulation in ECMO Patients at High Risk for Exsanguination**
*HelenM. Merritt, Ira Schoiab, Shane Smith, Aleem Siddique, Elizabeth Lyden, Timothy Ryan, John Um, *Michael Moult1
University of Nebraska, Omaha, NE

*STSA Member D Relationship Disclosure

30 STSA 64th Annual Meeting
50. An 18-Year Retrospective Review of Extracorporeal Membrane Oxygenation (ECMO) and/or Ventricular Assist Device (VAD) at a Children’s Hospital
Shawn M. Shah1, David Kays1,2, Tom R. Karl1,2, Mel Almodovar1, Gary Stapleton1, Plato Alexander1, *James A. Quintessenza1, Alfred Asante-Korang1, Vyas Kartha1, Jade Hanson1, Ernest Amankwah1, Devendra Amre1, Joeli Roth1, *Jeffrey P. Jacobs1,2
1Johns Hopkins All Children’s Hospital, St. Petersburg, Tampa and Orlando, FL; 2Johns Hopkins University, Baltimore, MD
FOURTH SCIENTIFIC SESSION C

11:00 am – 12:00 pm
Simultaneous Adult Cardiac, Thoracic, Congenital and Transplant Breakout Sessions

CME Credits Available: 1.0

Attendees select to participate in one of the following four breakout sessions:

**ADULT CARDIAC BREAKOUT** Cibolo Canyon Ballroom 5-6
(Presentations are limited to seven minutes, followed by two minutes of discussion from a selected discussant and an additional six minutes of discussion open to the audience.)

**Moderators:** D*Tom C. Nguyen and *Todd K. Rosengart
**Resident Moderator:** Mehrdad Ghereishi

11:00 am – 11:15 am (page 160)
**51V. Hybrid Surgical Mitral Valve Replacement With a Transcatheter Valve in the Setting of Mitral Annular Calcification**
**Discussant:** Dawn S. Hui, St. Louis University, St. Louis, MO

11:15 am – 11:30 am (page 162)
**52. Concomitant Left Atrial Appendage Ligation: Is It Worth the Risk?**
1University of Virginia, Charlottesville, VA; 2Novant Health Forsyth Medical Center, Winston-Salem, NC

11:30 am – 11:45 am (page 164)
**53. Mechanical Versus Bioprosthetic Aortic Valve Replacement in Patients Aged 50 and Younger: Is Bioprosthetic Valve an Acceptable Option?**
1University of Virginia, Charlottesville, VA; 2Novant Health Forsyth Medical Center, Winston-Salem, NC

**Discussant:** Dawn S. Hui, St. Louis University, St. Louis, MO

11:45 am – 12:00 pm (page 166)
**54. Concomitant Mitral Valve Procedures in Patients With Hypertrophic Cardiomyopathy Undergoing Septal Myectomy: Incidence and Outcomes in a National Cohort**
Kimberly Holst, Kristine T. Hanson, Steve R. Ommen, Rick A. Nishimura, Elizabeth B. Habermann, *Hartzell Schaff*
Mayo Clinic, Rochester, MN
**Discussant:** Nicholas G. Smedira, Cleveland Clinic, Cleveland, OH

**THORACIC BREAKOUT** Cibolo Canyon Ballroom 1-3
(Presentations are limited to seven minutes, followed by two minutes of discussion from a selected discussant and an additional six minutes of discussion open to the audience.)

**Moderators:** *Matthew A. Steliga and *Mara B. Antonoff
**Resident Moderator:** Melanie Subramanian

11:00 am – 11:15 am (page 168)
**55V. PerOral Plication of the Esophagus (POPE): A Novel Approach to Megaesophagus**
Janani Reisenauer, Louis M. Wong Kee Song, *Shanda H. Blackmon*
Mayo Clinic, Rochester, MN

11:15 am – 11:30 am (page 170)
**56. Operative Outcomes and Evolving Techniques for Robotic Esophagectomy**
1University of Alabama, Birmingham, AL; 2University of Pittsburgh, Pittsburgh, PA; 3New York University, New York, NY
**Discussant:** Benny Weksler, University of Tennessee Health Science Center, Memphis, TN

11:30 am – 11:45 am (page 172)
**57. Longitudinal Assessment of Quality of Life Measures and Outcomes in a Community Based Lung Volume Reduction Surgery Program**
*Stephan Hazlerigg, Benjamin Seadler, Justin Sawyer, Kyle McCullough, Nisha Rizvi, Stephen Markwell, Michael Thomas, *Traves D. Crabtree*
Southern Illinois University, Springfield, IL
**Discussant:** Allan Pickens, Emory University, Atlanta, GA

11:45 am – 12:00 pm (page 174)
**58. The Safety and Feasibility of Lung Resection Following Immunotherapy for Metastatic or Unresectable Solid Tumors**
Memorial Sloan Kettering Cancer Center, New York, NY
**Discussant:** Boris Sepesi, University of Texas, MD Anderson Cancer Center, Houston, TX

**CONGENITAL BREAKOUT** Begonia-Bottlebrush
(Presentations are limited to seven minutes, followed by two minutes of discussion from a selected discussant and an additional six minutes of discussion open to the audience.)

**Moderators:** D*James S. Tweddell and *Ross M. Ungerleider

11:00 am – 11:15 am (page 176)
**59V. Cor Triatriatum Sinister With an Intact Interatrial Septum and a Decompressing Vein in a Toddler**
Ziyad M. Binsalamah, Luis E. De Leon, *Lauren C. Kane, *Jeffrey S. Heinle*
Texas Children's Hospital/Baylor College of Medicine, Houston, TX

11:15 am – 11:30 am (page 178)
**60V. Minimally Invasive ASD Repair With Limited Resources**
Carson Hoffmann, D*Tom C. Nguyen*
University of Texas Medical School at Houston, Houston, TX

11:30 am – 11:45 am (page 180)
**61V. Transposition of the Great Arteries With Intact Ventricular Septum and Type 1 Aortopulmonary Window**
Ziyad M. Binsalamah, Luis E. De Leon, Gurpreet S. Dhillon, Caraciolo J. Fernandes, Asra Khan, Keila N. Lopez, *Jeffrey S. Heinle*
Texas Children's Hospital/Baylor College of Medicine, Houston, TX

*STSA Member  D Relationship Disclosure  V indicates STSA/CTSNet surgical video
62V. Konno Aortoventriculoplasty and Mitral Valve Replacement in a Child With AV Septal Defect
Janani Reisenauer, *Joseph Dearani
Mayo Clinic, Rochester, MN

TRANSPLANT BREAKOUT Azalea
(Presentations are limited to seven minutes, followed by two minutes of discussion from a selected discussant and an additional six minutes of discussion open to the audience.)

Moderators: D*Jay D. Pal and *Mani A. Daneshmand

11:00 am – 11:15 am (page 184)
63. Interaction of Donor and Recipient Age: Do Older Heart Transplant Recipients Require Healthier Hearts?
Malini Daniel, Carol W. Chen, Jennifer J. Chung, DLee Goldberg, Michael A. Acker, Pavan Alluri
University of Pennsylvania, Philadelphia, PA
Discussants: *J. Michael DiMaio, Baylor University Medical Center, Dallas, TX

11:15 am – 11:30 am (page 186)
64. Risk Factors for Survival After Orthotopic Heart Transplantation for Pediatric and Congenital Cardiac Disease: A 21 Year Retrospective Study of 172 Transplants
Shawn M. Shah1, Alfred Asante-Korang1, Gary Stapleton1, Mel Almodovar1, Tom R. Karl1,2, *James A. Quintessenza1, *Constantine Mavroudis1,2, *Luca A. Vricella2, *Hugh Van Gelder1, Vyaz Kartha1, Plato Alexander1, Jennifer Carapellucci1, Diane Krasnoper1, Jade Hanson1, Ernest Amankwah1, Devendra Amre1, Joeli Rath1, Marshall L. Jacobs1,2, *Jeffrey P. Jacobs1,2
1Johns Hopkins All Children’s Hospital, St. Petersburg, Tampa and Orlando, FL; 2Johns Hopkins University, Baltimore, MD
Discussants: *Charles B. Huddleston, St. Louis University School of Medicine, St. Louis, MO

11:30 am – 11:45 am (page 188)
65. Single Versus Double Lung Transplantation in Pulmonary Fibrosis: Impact of Age, Allocation Score, and Pulmonary Hypertension in Decision-Making
Mauricio Villavicencio2, Michael Kwon1,2, Asishana Osho1,2, Nathalie Roy1,2, Todd Astor1,2, Serguei Melnitchouk2,2, David D’Alessandro1,2, George Tolis1,2, Yuval Raz1,2, Isabel Neuringer1,2, *Thoralf Sundt1,2
1Massachusetts General Hospital, Boston, MA; 2Harvard Medical School, Boston, MA
Discussants: *Scott B. Johnson, University of Texas Health Science Center, San Antonio, TX

11:45 am – 12:00 pm (page 190)
66. Primary Graft Dysfunction After Heart Transplantation: Outcomes and Resource Utilization
Mohammed Quader1, *Robert B. Hawkins2, *J.H. Mehaeffy1, Sula Mazimba1, D*Gorav Ailawadi2, *Leora Yarboro, Clifford Fonner1, D*Alan Speir2, Jeffrey B. Rich1, Vigneshwar Kasirajan1
1Virginia Commonwealth University, Richmond, VA; 2University of Virginia Health System, Charlottesville, VA; 3VCQI, Charlottesville, VA
Discussants: D*Mark S. Slaughter, University of Louisville, Louisville, KY

*STSA Member D Relationship Disclosure V indicates STSA/CTSNet surgical video
**GENERAL SESSION** (All attendees and guests welcome)

1:30 pm – 3:00 pm  
Cibolo Canyon Ballroom 5-6  

**CME Credits Available:** 1.5

1:30 pm – 2:30 pm  
**UPDATE ON PRACTICE MANAGEMENT EXPERT PANEL**  
Incorporating New Technology and New Operations into Clinical Practice: How I Do It

**Moderator:** *Richard L. Prager

1New York University; New York, NY; 2Mayo Clinic, Rochester, MN; 3The Heart Hospital, Plano, TX; 4Georgetown University Hospital, Washington, DC; 5Baylor College of Medicine, Houston, TX

**Educational Objectives:** Upon completion of this program participants should be able to:
- Describe the importance of adopting new technologies and procedures into clinical practice;
- Explain different approaches to adopting and implementing technologies and/or procedures into clinical practice.

2:30 pm – 3:00 pm (page 192)  
**HAROLD URSHEL HISTORY LECTURESHIP**

**Moderator:** *John W. Hammon

67. Mark M. Ravitch: Southern Comfort and Curmudgeonry  
*Stephen C. Yang

The Johns Hopkins Medical Institutions, Baltimore, MD

3:00 pm – 3:30 pm  
**Break – Visit Exhibits**  
Cibolo Canyon Ballroom 7-11
FIFTH SCIENTIFIC SESSION

3:30 pm – 4:30 pm
Cibolo Canyon Ballroom 5-6

CME Credits Available: 1.0

3:30 pm – 3:45 pm (page 194)
68. Long-term Outcomes Following Bioprosthetic Pulmonary Valve Replacement in Children With Repaired Tetralogy of Fallot
Mayo Clinic, Rochester, MN
Discussant: *Brian E. Kogon, University of Mississippi Medical Center, Jackson, MS

3:45 pm – 4:00 pm (page 196)
69. Assessment of Neutrophil to Lymphocyte Ratio as a Predictor of Response to Chemoradiotherapy in Patients With Esophageal Squamous Cell Carcinoma
Memorial Sloan Kettering Cancer Center, New York, NY
Discussant: *Wayne L. Hofstetter, University of Texas MD Anderson Cancer Center, Houston, TX

4:00 pm – 4:15 pm (page 198)
70. Bronchoscopy Simulation Training as a Tool in Medical School Education
Mallika Gopal, Alexus A. Skobodzinski, Helene M. Sterbling, *Virginia R. Litle, Sowmya R. Rao, Christopher R. LaChapelle, Kei Suzuki
Boston University, Boston, MA
Discussant: *Andrew C. Chang, University of Michigan Health System, Ann Arbor, MI

4:15 pm – 4:30 pm (page 200)
71. Long-term Impact of Endoscopic Thoracic Sympathectomy on Quality of Life for Patients With Primary Palmar Hyperhidrosis
Leah C. Horslen, Candice L. Wilshire, Brian E. Louie, Ralph W. Aye, Alexander S. Farivar, Eric Vallières
Swedish Medical Center, Spokane, WA
Discussant: Daniel T. DeArmond, University of Texas Health Science Center, San Antonio, TX

4:30 pm – 5:15 pm
STSA Annual Business Meeting (Members Only)
Cibolo Canyon Ballroom 1-3

4:30 pm – 5:00 pm
2017 Cardiothoracic Surgery Jeopardy Competition for North America - Final Round
Cibolo Canyon Ballroom 5-6

Annual Awards Dinner
7:00 pm – 8:00 pm
Reception
Cibolo Canyon Ballroom Foyer
8:00 pm – 10:00 pm
Awards Dinner
Cibolo Canyon Ballroom 5-6
SATURDAY, NOVEMBER 11, 2017

8:00 am – 11:40 am
The first portion of the Postgraduate Program is the General Session, which will feature Special Topics in Cardiothoracic Surgery presentations and teaching how to apply best current and anticipated future practices to enhance the quality and safety of patient care both in and out of the operating room, and prepare for future leadership, which includes a special discussion with one of our cardiothoracic surgery legends. Concurrent breakout sessions in adult cardiac, general thoracic, congenital heart surgery and interdisciplinary care will take place between 10:40 am and 11:40 am.

CME Credits Available: 3.25

GENERAL SESSION Cibolo Canyon Ballroom 5-6
Special Topics in Cardiothoracic Surgery
Moderators: *Robert J. Dabal and *Melanie A. Edwards
Educational Objectives: Upon completion of this program participants should be able to:

• Describe the impact of a functional OR team on quality and safety of patient care;
• Appraise how OR teams compare to other high risk industry teams;
• Apply a historical perspective to aortic repairs;
• Recognize the advantages and limitations of endovascular repairs in relation to historical standards;
• Identify leadership traits that cardiothoracic surgeons might wish to develop more fully;
• Explain pathways to develop a career path that involves leadership of a medical center enterprise;
• Discuss current and future quality measures relevant to cardiothoracic surgery practice;
• Understand how to use the STS National Database to define a quality cardiothoracic surgery program;
• Describe principles adapted from other high risk industries that have been explored and applied with success in the cardiothoracic surgical environment;
• Employ high risk tools in their clinical practices;
• Describe the capacity in which aortic repair has shifted from open to endovascular;
• Relate barriers to a fully endovascular approach for aortic repair;
• List the challenges of contemporary residency programs;
• Explain the shift from open to endovascular aortic repair;
• Describe the limits of endovascular aortic repair.

8:00 am – 8:30 am
Quality and Safety in the Operating Room
Presenter: *Thoralf M. Sundt
Massachusetts General Hospital, Boston, MA

8:30 am – 9:15 am
A Conversation with a Legend
Presenter: D*Joseph S. Coselli
Interviewer: D*Kevin Accola
1Texas Heart Institute/Baylor College of Medicine, Houston, TX
2Cardiovascular Surgeons PA, Orlando, FL

9:15 am – 9:30 am
Break
Cibolo Canyon Ballroom Foyer

9:30 am – 9:42 am
Transition to Leadership: The Academic Perspective
*Walter H. Merrill
Vanderbilt University, Nashville, TN

9:42 am – 9:56 am
Transition to Leadership: The Private Practice Perspective
*Richard K. Freeman
St. Vincent’s Health and Hospital System/Indiana Heart Institute, Indianapolis, IN

9:56 am – 10:08 am
Defining a Quality Cardiothoracic Surgical Procedure: Who Decides?
*Benjamin D. Kozower
Washington University, St. Louis, MO

10:08 am – 10:25 am
Panel Discussion

10:25 am – 10:40 am
Break
Cibolo Canyon Ballroom Foyer
ADULT CARDIAC BREAKOUT  Cibolo Canyon Ballroom 5-6

Advances in Adult Cardiac Surgery: New Techniques and Technologies
Moderators: *Ravi K. Ghanta and *Faisal G. Bakaeen
Educational Objectives: Upon completion of this program participants should be able to:
- Define the benefits of complete arterial grafting versus a combination of venous and arterial grafting in adult coronary artery surgery;
- Summarize contemporary trends in conduits for coronary artery bypass grafting;
- Compare new technologies for transcatheter valve repair and replacement beyond the aortic valve;
- Describe who should undergo atrial fibrillation surgery in 2017 and beyond and be able to appreciate the results of this type of surgery.

10:40 am – 11:00 am
Arterial Grafting Update
*James E. Davies
University of Alabama, Birmingham, AL

11:00 am – 11:20 am
Non-aortic Valve Transcatheter Therapies: Beyond TAVR
*D Gorav Ailawadi
University of Virginia, Charlottesville, VA

11:20 am – 11:40 am
Atrial Fibrillation Surgery: Who and Why
*Ralph J. Damiano, Jr.
Washington University, St. Louis, MO

GENERAL THORACIC BREAKOUT  Cibolo Canyon Ballroom 1-3

Advances in Thoracic Surgery: New Techniques and Technologies
Moderators: *Matthew J. Bott and *Elizabeth A. David
Educational Objectives: Upon completion of this program participants should be able to:
- Discuss new techniques and technologies that are being used for management of early stage lung cancer;
- Explain the different techniques available for intraoperative localization of non-palpable pulmonary nodules;
- Discuss new advanced transbronchial interventions;
- Assess the role of endoscopic mucosal resection, POEM and other advanced endoscopic procedures in a thoracic surgical practice;
- Develop a pathway to learn and implement advanced esophageal endoscopic procedures;
- Describe new techniques and technologies that are being used for management of early-stage lung cancer;
- Identify new advanced transbronchial interventions that are relevant to practice.

10:40 am – 11:00 am
General Thoracic Surgery in 2025
Kazuhiro Yasufuku
University of Toronto, Toronto, ON

11:00 am – 11:20 am
Managing the Difficult-to-Palpate Lung Nodule
*James M. Isbell
Memorial Sloan Kettering Cancer Center, New York, NY

11:20 am – 11:40 am
EMR and Beyond for Surgeons: How and Why
Thomas J. Watson
Georgetown University, Washington, DC

CONGENITAL BREAKOUT  Begonia-Bottlebrush

Advances in Congenital Heart Surgery: New Techniques and Technologies
Moderators: *S. Adil Husain and *Bahaaldin Alsoufi
Educational Objectives: Upon completion of this program participants should be able to:
- Identify opportunities in which interventional cardiologists and surgeons can collaborate to care for adults with congenital heart disease;
- Compare and contrast structural heart disease in adults with acquired heart disease versus adults with congenital heart disease;
- Choose the currently available device technologies that may be suitable for treating adults with adult congenital cardiac pathology;
- Describe the current options available for mid to long term cardiac support of infant and pediatric congenital patients;
- Recall future technological advances in the field of mechanical support for congenital patients;
- Describe the Ozaki technique for aortic valve repair in children and its early outcomes in these patients;
- Identify opportunities in which interventional cardiologists and surgeons can collaborate to care for adults with congenital heart disease;
- Compare and contrast structural heart disease in adults with acquired heart disease against adults with congenital heart disease;
- Demonstrate what currently available device technology may be suitable to treat adult congenital cardiac pathology;
- Describe the Ozaki procedure with complete cusp replacement for aortic valve disease.

10:40 am – 11:00 am
Interfacing with the Cath Lab in Adult Congenital Surgery
*Brian E. Kogon
University of Mississippi, Jackson, MS

11:00 am – 11:20 am
New VAD Technology in Congenital Surgery
*D Kristine J. Guleserian
Nicklaus Children's Hospital, Miami, FL

11:20 am – 11:40 am
Ozaki Technique for Aortic Valve Repair
*Christopher W. Baird
Boston Children's Hospital, Boston, MA

*STSA Member  D Relationship Disclosure

44  STSA 64th Annual Meeting
INTERDISCIPLINARY CARE PROVIDER BREAKOUT Azalea
Management of the Difficult Cardiothoracic Surgery Patient in the Early Postoperative Period
Moderator: Christine Armstrong and Christopher Barnes
Educational Objectives: Upon completion of this program participants should be able to:
- Identify common complications that occur in cardiothoracic surgery patients;
- Describe standard treatments of common complications after congenital, thoracic and adult cardiac surgery;
- Show confidence in the management of difficult cardiothoracic surgery patients;
- Describe complications that can occur in the congenital patient during the early post-operative period after heart surgery, including low cardiac output syndrome, bleeding, residual lesions, arrhythmias and tamponade;
- Explain how to deal with common complications in general thoracic surgical patients.

10:40 am – 10:55 am
How to Deal with the Difficult Congenital Patient
Stacy Reynolds
Children’s Mercy Hospital, Kansas City, MO

10:55 am – 11:10 am
How to Deal with the Difficult Cardiac Patient
*G Chad Hughes
Duke University, Durham, NC

11:10 am – 11:15 am
How to Deal with the Difficult General Thoracic Patient
*Benjamin Wei
University of Alabama, Birmingham, AL

11:15 am – 11:40 am
Panel Discussion
Stacy Reynolds, *G Chad Hughes, *Benjamin Wei

11:40 am
PROGRAM ADJOURNS
1B. Programmed Death Ligand 1: A Step Toward Immunoscore for Esophageal Cancer

Unless otherwise noted in this program book or verbally by the speakers, speakers have no relevant financial relationship to disclose and will only be presenting information on devices, products, or drugs that are FDA approved for the purposes they are discussing. Authors listed with a D next to their name have indicated that they have a financial or other relationship with a healthcare-related business or other entity to disclose.

Authors: Conor F. Hynes¹, Dong H. Kwon¹, Chaitanya Vadlamudi¹, Alexander Lofthus¹, Aya Iwamoto¹, Joeffrey J. Chahine¹, Sameer Desale², *Marc Margolis¹, Bhaskar V. Kallakury¹, Thomas J. Watson¹, Nadim G. Haddad¹, D*M. Blair Marshall¹

Author Institution(s): ¹MedStar Georgetown University Hospital, Washington, DC; ²MedStar Health Research Institute, Hyattsville, MD

Objectives: To evaluate the implications of programmed death ligand 1 (PD-L1) on prognosis of esophageal cancer.

Methods: Tissue specimens from 56 patients who underwent esophagectomies for malignancy at a single institution over a 6-year period were stained for the presence of PD-L1. Tumors were characterized as staining positive or negative for PD-L1. Tumor infiltrating lymphocytes (TIL) were stratified as staining high, low or negative for PD-L1. Tumor and TIL positivity for PD-L1 were analyzed in the context of survival, recurrence, and perioperative characteristics.

Results: Median follow up was 547 days with 91.1% survival and 19.6% recurrence. 93% were adenocarcinoma, 7% were squamous cell carcinomas. 60.8% were stage I or II. Neoadjuvant chemotherapy was given in 47%, neoadjuvant radiotherapy given in 36%. 21.4% of tumors stained positive for PD-L1. 91% of tumors had TIL cells that stained positive for PD-L1. Survival was significantly shorter in patients with primary tumors staining positive for PD-L1 (log rank: P=0.01). The majority of TIL cells stained positive for PD-L1. There was no significant difference in survival when comparing density of TIL staining positive for PD-L1 (log rank: P=0.33). Neither tumor or TIL staining for PD-L1 significantly affected recurrence rates.

Conclusions: Positive staining for PD-L1 is a prognostic marker for decreased survival in esophageal cancer. PD-L1 has potential as a therapeutic target and a relevant component of an immunoscore for esophageal cancer.

Figure 1. Kaplan-Meier analysis of survival stratified by tumor positivity for PD-L1. Log rank: P=0.01.
2B. Extended Brain Death Impairs Outcomes in Swine Lung Transplantation

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**Authors:** David J. Hall, Eduardo Fontena, David C. Holden, Joshua M. Pickering, *Thomas M. Beaver, Lyle L. Moldawer, Tiago N. Machuca

**Author Institution(s):** University of Florida, Gainesville, FL

**Objectives:** Following brain death, the ensuing catecholamine storm and associated hemodynamic instability are hazardous for potential donors, often prompting pro-inflammatory cytokine release, high volume resuscitation, and vasopressor support detrimental to donor organs. The effect of extended duration brain death on lung transplantation is not well-established, with most porcine studies utilizing short duration brain death (6 hours or less) prior to procurement. We aimed to determine the impact of prolonged brain death on a porcine lung transplantation model.

**Methods:** Following induction of anesthesia, male 30-kg Yorkshire pigs underwent placement of a catheter into the epidural space which was inflated to a total volume of 30 ml. Brain death and mechanical ventilation were maintained for 6h (n=5) or 10h (n=5) prior to lung procurement. After 16h of cold ischemia, single left lung transplantation was performed into a recipient. Recipients were maintained under anesthesia for 4h after reperfusion. Hourly samples were collected from the ipsilateral pulmonary vein for partial pressure of oxygen (PO2) and partial pressure of carbon dioxide (PCO2) measurements.

**Results:** After brain death, classical findings of catecholamine storm were observed in all subjects. Confirmation of brain death was obtained in all 10 donors. Hourly blood gases revealed significantly lower PO2 in the long brain death group (Figure 1). PCO2 values did not differ significantly. At the end of each experiment, recipients of lungs from donors who underwent long brain death had significantly lower PO2 (82.4 ± 37.29 vs 189.2 ± 63.82 mmHg, p=0.015).

**Conclusions:** In this porcine model of brain death and lung transplantation, short duration brain death produced a superior physiological post-transplant outcome compared to long brain death. Efforts should be made toward decreasing the interval between confirmation of brain death and lung procurement in order to avoid unnecessary allograft injury.
3B Upregulation of Beta Common Subunit by Diazoxide Enhances Anti-apoptotic Effects of Erythropoietin in Mouse Model of Spinal Cord Ischemia and Reperfusion Injury

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Authors: Katsuhiro Yamaka, Mohamed Eldeiry, *Muhammad Aftab, Lisa S. Foley, Joshua Mares, Xianzhong Meng, Michael J. Weyant, Joseph C. Cleveland, *David A. Fullerton, *T.B. Reece

Author Institution(s): University of Colorado, Aurora, CO

Objectives: Paraplegia remains a most terrible complication of thoracoabdominal aortic intervention. While erythropoietin (EPO) has shown the neuroprotective effects in spinal cord ischemia, EPO does not work until the Beta Common Receptor subunit (bcR) of the EPO receptor is induced by ischemia. Diazoxide (DZ) has been shown to mediate the neuroprotective preconditioning effect against ischemic insult. We hypothesized that bcR induced by DZ prior to ischemia amplifies the anti-apoptotic effects of EPO in mouse with spinal cord ischemia-reperfusion injury.

Methods: For DZ time trial, adult male C57/BL6 received DZ (20 mg/kg) by oral gavage. After 0, 12, 24, 36 and 48 hours of administration, spinal cords were harvested. For optimal dosing, DZ (0, 5, 10, 20, 40 mg/kg) was administered. The expression of bcR was assessed by western blot analysis. Four groups were studied: PBS (pretreatment)+PBS (immediately before), PBS+EPO, DZ+PBS, and DZ+EPO. Spinal cord ischemia was induced by 4-minutes thoracic aortic cross-clamp. Functional scoring (Basso Mouse Score) was done 12-hour intervals until 48 hours. Spinal cords were harvested for histological analysis and anti-apoptotic factors were evaluated by WB.

Results: Optimal bcR upregulation occurred 36 hours after administration of DZ. The optimal dosage for bcR induction was 20 mg/kg of DZ. The motor function of DZ+EPO was significantly preserved compared to all other groups. Mice treated with DZ+EPO had significantly more viable neurons than other groups. The expression of BCL2 and neurotorophin1 in DZ+EPO group were highest of all groups. The level of cleaved caspase8 and cleaved caspase3 in DZ+EPO were significantly reduced than other groups.

Conclusions: Pharmacological upregulation of bcR by DZ can increase the anti-apoptotic effects of EPO. Better understanding of this synergetic mechanism may serve to further prevent ischemic complications for aortic intervention.
4B Correlating Oxygen Delivery on Cardiopulmonary Bypass With the Neurological Injury Biomarker UCH-L1

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Authors: J. Trent Magruder1, *Charles Fraser1, Joshua C. Grimm1, Todd C. Crawford1, Alejandro Suarez-Pierre1, Ronald Hayes2, Claude Beaty3, Michael V. Johnston1, *William A. Baumgartner1

Author Institution(s): 1Johns Hopkins School of Medicine, Baltimore, MD; 2Banyan Biomarkers, Alachua, FL; 3University of Michigan, Ann Arbor, MI

Objectives: The neuron-specific enzyme ubiquitin C-terminal hydrolase L1 (UCH-L1) has been identified as a potential brain injury biomarker, but its relationship to oxygen delivery during cardiac surgery and postoperative stroke remains unclear.

Methods: We prospectively enrolled adults undergoing on-pump cardiac surgery between 2011-2016. Serum UCH-L1 levels were drawn at baseline, 6, and 24 hours following separation from cardiopulmonary bypass (CPB). Oxygen delivery (DO2) was computed from perfusion records, with a novel area-under-the-curve (AUC) computation performed to quantify the distance of DO2 excursions below predefined DO2 thresholds as well as the amount of time spent below them (increasing signifying less oxygen delivery). Strokes were defined radiographically (CT/MRI).

Results: Forty-three adults were included with a median age of 65 years (IQR 59-72). Three patients suffered radiographic strokes (imaged at 2, 7, and 8 days postoperatively). Most patients underwent isolated coronary artery bypass (42.9%, 18 patients) or isolated aortic valve replacement (31.0%, 13). Median UCH-L1 levels differed significantly from baseline to 6h and 24h post-CPB (40, 232, and 166 pg/mL, p<0.001). On multivariable linear regression analysis controlling for baseline and operative variables, only increasing DO2 AUC<225 was significantly associated with 6h UCH-L1 levels (p=0.001), while only increasing DO2 AUC<300 was significantly associated with 24h levels (p<0.001). The three patients suffering radiographic strokes had nonsignificantly elevated 24h UCH-L1 levels as compared to controls (585 vs. 151 pg/mL, p=0.11).

Conclusions: This is the first study to demonstrate an independent association between low oxygen delivery on CPB and elevations of a brain injury biomarker. Further study is needed to clarify whether UCH-L1 might be a useful biomarker for post-cardiac surgery neurological injury.
5B The Association of Novel Cardiac Biomarkers and 1-Year Readmission or Mortality After Cardiac Surgery

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Author Institution(s): 1 Johns Hopkins All Children’s Heart Institute, St. Petersburg, FL; 2 Johns Hopkins Medicine, Baltimore, MD; 3 Yale School of Medicine, New Haven, CT; 4 University of Michigan, Ann Arbor, MI; 5 Medical College of Wisconsin, Madison, WI; 6 Carolinas HealthCare System, Charlotte, NC; 7 The Dartmouth Institute for Health Policy & Clinical Practice, Lebanon, NH

Objectives: Novel biomarkers may be associated with adverse outcomes after cardiac surgery. In this study, we measured the association between the cardiac biomarkers ST2, Galectin-3, and the N-terminal prohormone of brain natriuretic peptide (NT-Pro BNP) and 1-year hospital readmission or mortality.

Methods: Novel biomarkers from 1,047 patients discharged alive after isolated coronary artery bypass graft surgery from 8 medical centers were measured in a cohort from the Northern New England Cardiovascular Disease Study Group from 2004 to 2007. Readmission status and mortality were ascertained using Medicare, state all-payer claims, and the National Death Index. Biomarkers were measured using MSD multi-plex assays. We evaluated the association between post-operative day-1 biomarkers and 1-year readmission or mortality using Kaplan-Meier estimates and Cox’s Proportional Hazards modeling adjusting for covariates used in the Society of Thoracic Surgeons’ readmission model.

Results: The median follow-up time was 365 days. Kaplan-Meier survival curves adjusted for established risk factors indicated ST2 levels above the median (47.09 ng/mL) were significantly associated with 1-year readmission or mortality. Patients with Galectin-3 levels above the median (8.40 ng/mL) had increased risk of readmission or death within 1 year. Patients exceeding the median (13.2 ng/mL) of NT-Pro BNP levels had increased risk of readmission or death. All novel biomarker tertiles had a significant association of trend for 1-year readmission or mortality (p≤0.001).

Conclusions: In patients undergoing cardiac surgery, novel cardiac biomarkers were associated with readmission and/or mortality independent of previously established risk factors. Measuring these biomarkers may help us identify patients at highest risk for readmission and/or mortality before discharge while implementing strategies for personalized medicine based on the patient’s biomarker profile.

<table>
<thead>
<tr>
<th>Cardiac Biomarker</th>
<th>Median (ng/mL)</th>
<th>HR</th>
<th>95% CI</th>
<th>p-value</th>
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<tbody>
<tr>
<td>ST2</td>
<td>47.09</td>
<td>1.30</td>
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<td>13.2</td>
<td>1.54</td>
<td>1.15-2.06</td>
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</tr>
</tbody>
</table>
6B Thoracic and Cardiovascular Surgeons Achieve High Rates of K Award Conversion into R01 Funding

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Author Institution(s): University of Virginia, Charlottesville, VA

Objectives: Obtaining NIH R01 funding remains extremely difficult. The utility of career development grants (K awards) to successfully reach the goal of R01 funding remains debated, particularly for clinical-investigators in demanding specialties. We sought to determine the success rate for thoracic and cardiovascular (TCV) surgeons compared to other specialties in converting K-level grants into R01 equivalents.

Methods: All K (K08, K11, K23) grants awarded to surgeons by the National Institutes of Health (NIH) between 1993-2017 were identified through the NIH Research Portfolio Online Reporting Tool Expenditures and Results (RePORTER), an online database combining NIH funding records, publications, and data from the U.S. Patent and Trademark Office. Only grants awarded to surgeons in cardiac, thoracic, or vascular surgery were included. Active grants or grants active within the past year were identified and analyzed separately. Mann-Whitney U-tests and Chi-squared tests were used to compare groups.

Results: A total of 65 K-level grants belonging to TCV surgeons were identified, including 17 of which were still active within the last year and excluded from analysis. Twenty-four (50%) TCV awardees with a completed K grant successfully transitioned to an R01 equivalent grant. Awardees with successful conversion published 11.29 publications per K grant compared to 7.25 publications for those who were unsuccessful (p=0.076). TCV K awardees obtained their first R grant 5.46 years after the beginning of their K award. The 10-year conversion rate to R01 equivalent was significantly higher for TCV surgeons compared to all other peers (58.9% vs 42.5%, p=0.038).

Conclusions: TCV surgeon-scientists have a higher 10-year conversion rate to first R01 award than their peers. New career development grants are critical for R01 funding and the NIH receives a good return on investment when funding TCV surgeon-scientists.
1 Favorable Early and Midterm Outcomes of Transcatheter Aortic Valve Replacement in Patients With Bicuspid Aortic Valve: A Single Center Study

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Authors: Seyed Hossein Aalaei Andabili, *Thomas M. Beaver, Anthony A. Bavry, John Petersen, DR. David Anderson, *Charles T. Klodell, Ashkan Karimi, Heather Reed, Teng Lee, George Arnaoutakis

Author Institution(s): University of Florida, Gainesville, FL

Discussant: DVinod H. Thurani, MedStar Heart Institute, Washington Hospital Center, Washington, DC

Objectives: Bicuspid aortic valve (BAV) stenosis is considered a relative contraindication to transcatheter aortic valve replacement (TAVR). In this study, we compared the outcome of TAVR in patients with BAV stenosis versus a matched group of patients with tricuspid aortic valve (TAV) stenosis.

Methods: From Mar-2012 to Sept-2016, 544 patients underwent TAVR, of which 27 patients with BAV and 81 matched patients with TAV were included. TEE was used to estimate post-TAVR degree of perivalvular leak (PVL) (none=0, minimal=1, mild=2, moderate=3, severe=4).

Results: Patients had similar preoperative characteristics (Table-1). Mean aortic annular area was 500.8±140.1 mm² in TAV group and 554.42±122.5 mm² in BAV group (p=0.11). Fifty-seven TAV (70.4%) and 23 BAV (85.2%) patients underwent TAVR via transfemoral approach (p=0.20). Patients in BAV group underwent TAVR with a valve size ≥23mm more frequently than TAV group, 24 (88.9%) vs. 54 (66.7%) (p=0.027). Procedural success was 100% in both groups. Thirty-day mortality was 3.7% (N=3) in TAV group and 7.4% (N=2) in BAV group (p=0.59). Post-TAVR stroke and new pacemaker implantation rates were 3.7% (n=3) and 8.6% (n=8) in TAV group and 7.4% (n=2) and 11.1% (n=3) in BAV group, p=0.59 and 0.70, respectively. Aortic gradient was not different between two groups after TAVR (p=0.78) (Table-1). No patient had severe PVL following TAVR. Two (2.5%) patients in TAV group and one (3.7%) patient in BAV group had moderate PVL (p=1). Mean degree of PVL was not different between the two groups (0.85±81 vs. 0.77±0.75, p=0.67). There was no difference in survival: TAV 88% at 1-2 year and BAV 82% at 1-2 years (P=0.57) (Figure-1).

Conclusions: TAVR in Bicuspid aortic valve disease with both initial and newer generation valves is feasible, durable, and effective with favorable valve performance. Immediate and mid-term outcomes of TAVR in patients with BAV is not inferior to those with TAV.
2 Long-term Results for Clinical Stage IA Lung Cancer - Comparing Recurrence and Survival Between Lobectomy and Sublobar Resection

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Authors: Melanie P. Subramanian1, Timothy McMurry2, Varun Puri1, *Bryan F. Meyers1, *Benjamin Kozower1

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Discussant: *Elizabeth A. David, UC Davis Medical Center, Sacramento, CA

Objectives: Lobectomy has been compared with sublobar resection for the treatment of stage IA non-small cell lung cancer (NSCLC). However, accurate long-term data are lacking on the risk of recurrence in routine clinical practice. This study utilizes a unique and representative dataset within the United States to compare recurrence, overall survival (OS) and lymph node staging between lobectomy and sublobar resection.

Methods: The American College of Surgeons performed a Special Study of the National Cancer Data Base, re-abstracting records to augment NSCLC data with enhanced information on preoperative comorbidity and subsequent cancer recurrence (2007-2013). For patients treated with lobectomy or sublobar resection (wedge/segmentectomy) for clinical stage IA NSCLC, propensity matching and competing risks models compared 5-year OS and risk of cancer recurrence. Secondary measures focused on lymph nodes collected and frequency of pathologic upstaging.

Results: 1687 stage IA patients were identified (1354 lobectomy and 333 sublobar resections). Propensity matching yielded 325 pairs. 5-year OS was higher in the lobectomy group (62% vs. 56%, P=0.02). The sublobar group had a 40% increased risk of NSCLC recurrence (HR = 1.42, 95% CI 1.07-1.89), which is illustrated in Figure 1. Median lymph node counts were higher for lobectomy patients [6 (4,10) vs. 1 (0,4) (P<0.001)], and upstaging was more common (10.1% vs. 4.8%, P=0.001).

Conclusions: In an enhanced national dataset representative of clinical outcomes for resection of stage IA NSCLC, sublobar resection was associated with a 40% increased risk of cancer recurrence and worse 5-year OS. Importantly, the majority of patients treated with sublobar resection had an inadequate lymph node assessment. These real world clinical results must be considered when existing clinical trial results comparing these treatments are extrapolated for clinical use.
3 Pulmonary Arteriovenous Malformation Regression Following a Fontan is Associated With Angiopoietin-2 Driven Angiogenesis Inhibition

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Authors: *Minoo N. Kavarana, Robert Stroud, Rupak Mukherjee, Jeffrey A. Jones, *Scott M. Bradley

Author Institution(s): Medical University of South Carolina, Charleston, SC

Discussant: *Sunjay Kaushal, University of Maryland Medical Center, Baltimore, MD

Objectives: The Glenn shunt provides superior hemodynamics when compared with the Fontan. The longevity of a Glenn is adversely limited by cyanosis due to pulmonary arteriovenous malformations (PAVMs), which resolve following a Fontan. Although PAVMs have been associated with aberrant angiogenesis, specific molecular targets that prevent or reverse the process have not been identified. Angiopoietins (AGP) are a group of factors that regulate angiogenesis via endothelial cell receptors (tie-2). However, it remains unknown whether the levels of these angiogenic factors are altered following the Fontan.

Methods: A prospective study of children with single ventricle disease following a Glenn (n=25) through Fontan completion was established to evaluate the development of PAVMs and analyze serum biomarker profiles. Echocardiography with a bubble study confirmed the presence of PAVMs. Vascular endothelial growth factor (VEGF), Angiopoietin (AGP) 1 and 2, matrix metalloproteinases (MMP), tissue inhibitors of metalloproteinases (TIMP) among other biomarkers were analyzed and compared with controls and between the Glenn and Fontan stages.

Results: AGP2, VEGF, MMP 1,2 and 7 levels were significantly elevated in the Glenn group compared with controls. Early post-Fontan, AGP-2, VEGF, MMP 3,7 and TIMP 1 levels were significantly increased in comparison with the Glenn group. At later follow up after the Fontan, AGP2 levels remained elevated while VEGF levels returned toward baseline (Table).

Conclusions: These results demonstrate that PAVM formation following the Glenn procedure is associated with a pro-angiogenic profile which is significantly inhibited following Fontan completion (Figure). The expression of AGP-2 (anti-angiogenic factor) increased following the Fontan, was associated with PAVM resolution and may provide a therapeutic target for children with PAVM’s.

<table>
<thead>
<tr>
<th>Analyte</th>
<th>Glenn</th>
<th>Stddev</th>
<th>Post Fontan 1</th>
<th>Stddev</th>
<th>Post Fontan 2</th>
<th>Stddev</th>
</tr>
</thead>
<tbody>
<tr>
<td>Angiopoietin-2 (pg/mL)</td>
<td>7501.42</td>
<td>5119.90</td>
<td>19605.05</td>
<td>6640.79*</td>
<td>18423.63</td>
<td>6007.80*</td>
</tr>
<tr>
<td>VEGF (pg/mL)</td>
<td>7.72</td>
<td>5.86</td>
<td>27.33</td>
<td>22.92*</td>
<td>13.52</td>
<td>11.16 #</td>
</tr>
<tr>
<td>MMP2 (pg/mL)</td>
<td>86007.64</td>
<td>10993.54</td>
<td>78900.82</td>
<td>16203.01</td>
<td>94647.26</td>
<td>17060.41</td>
</tr>
<tr>
<td>MMP3 (pg/mL)</td>
<td>771.35</td>
<td>434.14</td>
<td>1699.84</td>
<td>776.33 *</td>
<td>1016.72</td>
<td>536.62 #</td>
</tr>
<tr>
<td>MMP7 (pg/mL)</td>
<td>1618.04</td>
<td>637.52</td>
<td>3149.78</td>
<td>3591.31 *</td>
<td>2383.36</td>
<td>1180.81</td>
</tr>
<tr>
<td>MMP8 (pg/mL)</td>
<td>1000.73</td>
<td>623.14</td>
<td>2000.72</td>
<td>1106.35 *</td>
<td>1307.00</td>
<td>560.84</td>
</tr>
<tr>
<td>TIMP-1 (pg/mL)</td>
<td>55805.72</td>
<td>15332.34</td>
<td>101777.65</td>
<td>43346.23 *</td>
<td>68762.82</td>
<td>22224.26 #</td>
</tr>
<tr>
<td>TIMP-2 (pg/mL)</td>
<td>67139.36</td>
<td>9251.22</td>
<td>72298.98</td>
<td>9987.32</td>
<td>83372.37</td>
<td>12586.91 *</td>
</tr>
</tbody>
</table>

* p<0.05 vs Glenn
# p<0.05 vs Post Fontan 1

Angiopoietin-2

NOTES:
4 A Novel Risk Score Predicts In-hospital Mortality After Operative Repair of Stanford Type A Acute Aortic Dissection

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Authors: *Mehrdad Ghoreishi, Eric Wise, Lugman Cral-Albrahams, Charles Drucker, Richa Kalsi, Nandakumar Menon, Salva Hassan, Robert Crawford, D Bradley S Taylor

Author Institution(s): University of Maryland, Baltimore, MD

Discussant: D*Himanshu J. Patel, University of Michigan, Ann Arbor, MI

Objectives: Current stratification systems for patients presenting with acute Type A aortic dissection (AAAD) rely on signs of malperfusion to predict mortality. In this study, we sought to develop an algorithm to readily risk stratify these patients using admission characteristics.

Methods: Two-hundred and twenty-four AAAD patients (2002 - 2015) were retrospectively reviewed for easily obtainable preoperative demographics and laboratory values deemed a priori as potential predictors of in-hospital mortality. Multiple logistic regression analysis was performed to determine independent significance, and linear regression was performed to generate the concomitant regression expression of the three variables significant on bivariate analysis: age, admission creatinine level, and admission lactic acid level.

Results: Overall operative mortality was 13% (29/244). Upon multivariate analysis, age (P=.01), creatinine (P=.05) and lactic acid level (P=.02) remained independent significant predictors (n=138) (Table). Regression coefficients allowed the generation of a risk score as: 0.6*(age, yrs)+6*(creatinine, mg/dL)+4*(lactic acid, mmol/L) (Figure 1). Upon receiver-operating characteristic curve analysis, this model generated a c-statistic of 0.79; using an optimal cut-off of 54.15, in-hospital mortality was predicted with a sensitivity of 75% and specificity of 69% (Figure 2). Among patients within the lowest tertile (risk score < 48), there were no mortalities (0/46), whereas patients in the middle (48-56) and highest (>56) tertiles had mortality rates of 15% (7/46) and 28% (13/46), respectively.

Conclusions: While still requiring external validation, this risk score represents a novel and highly facile model to gauge likelihood of in-hospital mortality on patients presenting with AAAD, and may help optimize patient selection for surgical intervention. Unexpectedly, a low risk score very accurately predicts survival to discharge.

Bivariate Analysis of Factors Associated with In-Hospital Mortality

<table>
<thead>
<tr>
<th>Preoperative Variable</th>
<th>Survivors (n = 195)</th>
<th>Mortalities (n = 29)</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age, y</td>
<td>58 [49-67]</td>
<td>63 [56-72]</td>
<td>0.02</td>
</tr>
<tr>
<td>Recent cardiac arrest</td>
<td>1% (2)</td>
<td>10% (3)</td>
<td>0.02</td>
</tr>
<tr>
<td>Coronary artery disease</td>
<td>9% (17)</td>
<td>27% (7)</td>
<td>0.02</td>
</tr>
<tr>
<td>Congestive heart failure</td>
<td>4% (7)</td>
<td>15% (4)</td>
<td>0.03</td>
</tr>
<tr>
<td>Pulmonary disease</td>
<td>7% (13)</td>
<td>27% (7)</td>
<td>0.004</td>
</tr>
<tr>
<td>Chronic kidney disease</td>
<td>7% (13)</td>
<td>19% (3)</td>
<td>0.05</td>
</tr>
<tr>
<td>Hypertension</td>
<td>73% (141)</td>
<td>92% (24)</td>
<td>0.03</td>
</tr>
<tr>
<td>Prior open thoracic procedure</td>
<td>6% (12)</td>
<td>26% (7)</td>
<td>0.004</td>
</tr>
<tr>
<td>Creatinine (mg/dL)</td>
<td>1.1 [0.9-1.4]</td>
<td>1.5 [1.2-2.1]</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>INR</td>
<td>1.1 [1.1-1.2]</td>
<td>1.2 [1.1-1.7]</td>
<td>0.04</td>
</tr>
<tr>
<td>PTT (seconds)</td>
<td>31 [28-34]</td>
<td>33 [29-41]</td>
<td>0.005</td>
</tr>
<tr>
<td>Lactic acid (mmol/L)</td>
<td>1.7 [1.3-2.3]</td>
<td>2.6 [1.5-2.1]</td>
<td>0.005</td>
</tr>
<tr>
<td>CK-MB (mg/mL)</td>
<td>1.4 [0.9-2.9]</td>
<td>3.5 [1.7-10.4]</td>
<td>0.003</td>
</tr>
<tr>
<td>Mechanical ventilation</td>
<td>7% (13)</td>
<td>24% (7)</td>
<td>0.007</td>
</tr>
</tbody>
</table>

Categorical variables are expressed as percent with the variable (raw number, n); continuous variables are represented by median (interquartile range). Patients with referenced values obtainable (denominator, N);

NOTES:
**5 Safety Of Next Day Discharge Following Lobectomy: Have We Broken The Speed Limit?**

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**Authors:** Stephen Greer, *Ashley D. Miller, *Jeremiah Smith, D*James R. Headrick, Jr.

**Author Institution(s):** 1ACTVS, Chattanooga, TN; 2University of Tennessee, Chattanooga, TN

**Discussant:** D*Robert J. Cerfolio, New York University, New York, NY

**Objectives:** Utilizing our standardized approach to air leak reduction (STAR) protocol has led to a continual decrease in the need for inpatient recovery following lobectomy. Although next day discharges do occur, the current literature has not addressed their safety. We analyzed our STAR dataset to better study this specific group of outliers and their outcomes.

**Methods:** A retrospective review of prospectively collected data from the (STAR) dataset was performed. Characteristics were compared between patients discharged on postoperative day (POD) 1 and those with longer admissions. Outcome data, including 30-day morbidity, mortality and readmissions were analyzed. Statistical analysis was performed using GraphPad software.

**Results:** From June 2010 through February 2017, 361 patients underwent lobectomy and met study criteria. Of these, 131 (36%) were discharged on POD 1 versus 230 (64%) who were discharged later (mean LOS 3.9 days). There was no increase in morbidity, mortality or 30-day readmission between the two groups (Table 1). Distinguishing characteristics of the POD 1 group included more non-smokers, higher BMI, increased use of minimally invasive techniques, right middle lobectomy, and a lower incidence of prolonged air leak. FEV1 and DLCO data were also favorable in the POD 1 group (Table 1). The percentage of patients sent home POD 1 increased over time, from an average of 23.4% over the first three years of the study to 59.0% over the last three years.

**Conclusions:** Appropriately identified patients can safely go home on POD 1 following lobectomy without an increase in 30-day readmission, morbidity or mortality. A continued focus on lobectomy LOS reduction has the capacity to increase patient satisfaction and lead to reduction in overall healthcare costs.

---

**Table 1**

<table>
<thead>
<tr>
<th></th>
<th>Discharge POD #1</th>
<th>Discharge &gt; POD #1</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Mortality</strong></td>
<td>2(1.5)</td>
<td>1(0.4)</td>
<td>0.2989</td>
</tr>
<tr>
<td><strong>30 Day Readmission</strong></td>
<td>1(1)</td>
<td>11(5)</td>
<td>0.0625</td>
</tr>
<tr>
<td><strong>COMORBIDITIES</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-smoker</td>
<td>27(21)</td>
<td>28(12)</td>
<td>0.0468*</td>
</tr>
<tr>
<td>BMI</td>
<td>27.8±5.2</td>
<td>26.3±5.7</td>
<td>0.0136*</td>
</tr>
</tbody>
</table>

(%) Fisher’s Exact Test, or unpaired t-test for values with SD. * p<0.05

**NOTES:**
6 Transcatheter Versus Surgical Aortic Valve Replacement in Patients With Prior Mitral Valve Surgery

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Authors: John Kelly1, Jessica Forcillo1, David Cervantes1, Jose Binongo1, John Hunting1, D Vasiliis Babaliaros1, Jose Iturbe1, *Robert Guyton1, D Chandan Devireddy1, D Bradley G. Leshnower1, James P Stewart1, D Vinod H. Thourani2

Author Institution(s): 1 Emory University, Atlanta, GA; 2 MedStar Heart Institute, Washington Hospital Center, Washington, DC

Discussant: Thomas E. MacGillivray, Houston Methodist, Houston, TX

Objectives: Due to perceived technical challenges and the potential for increased paravalvular leak (PVL), patients with prior mitral valve surgery (MVS) are typically excluded from transcatheter aortic valve replacement (TAVR) trials. Therefore, surgical aortic valve replacement (SAVR) remains the standard of care in these patients. Our objective was to evaluate the 30-day outcomes of TAVR and SAVR in patients with prior MVS.

Methods: This was a retrospective study that reviewed a total of 68 patients with history of MVS who subsequently underwent TAVR (n=35) or SAVR (n=33) in a U.S. institution between 1/2005 and 8/2016. Operative characteristics and clinical outcomes were analyzed, and standard statistical analyses were performed.

Results: The mean age was 73.3±11.9 years for TAVR and 61.3±14.8 for SAVR (p=0.005). The mean Society of Thoracic Surgeons Predicted Risk of Mortality (STS PROM) score was not significantly different between groups (TAVR: 8.6% vs. SAVR: 6.7%, p=0.19). There was no significant difference in all-cause mortality (TAVR: 5.9% vs SAVR: 3.1%, p=0.60) or re-admission within 30 days (TAVR: 2.9% vs SAVR: 12.9%, p=0.16). Moreover, there was no moderate/severe postoperative aortic PVL in either group. The time in the operating room (p<0.0001), length of postoperative ICU stay (p=0.007), length of postoperative hospital stay (p<0.0001), postoperative atrial fibrillation (p=0.02), and postoperative blood transfusions (p<0.0001) were significantly less in the TAVR group.

Conclusions: Patients requiring aortic valve replacement after previous MVS have excellent 30-day outcomes following either SAVR or TAVR. Compared with SAVR, patients who underwent TAVR had no significant difference in early mortality, but demonstrated lower morbidity and improved resource utilization. TAVR represents a viable alternative to high-risk SAVR in patients with a previous MVS.
7 Implementing a Thoracic Enhanced Recovery Program: Lessons Learned in the First Year

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Authors: *Meredith A. Harrison, Bethany Sarosiek, Traci Hedrick, A. Sasha Krupnick, *Christine Lau, Robert Thiele, Dustin Walters, Randal Blank, *Linda W. Martin

Author Institution(s): University of Virginia, Charlottesville, VA

Discussant: *Betty C. Tong, Duke University Medical Center, Durham, NC

Objectives: Postoperative pain is the Achilles’ heel of thoracic surgery, and is a source of anxiety for patients anticipating surgery. To improve thoracic patients’ surgical experiences, we implemented an Enhanced Recovery After Surgery (ERAS) protocol and reviewed its use after our first year.

Methods: Two protocols were developed: ERAS light for VATS and ERAS full for open pulmonary and pleural operations. Each protocol incorporated preoperative patient education and carbohydrate loading, opioid-sparing multimodal analgesia, goal-directed fluid therapy, early postoperative feeding and ambulation; early in the program we stopped using epidural analgesia and switched to nerve blocks with liposomal bupivacaine and spinal duramorph. One year aggregate data on length of stay (LOS), pain scores, opioid use, fluid administration, cost, and patient satisfaction scores was reviewed. ERAS patients were compared to historic controls with a similar distribution of case type.

Results: 321 pre-ERAS VATS patients were compared to 71 ERAS light patients. Intraoperative morphine equivalents were reduced (9.4 mg vs 2.0 mg, p=0.001). Total fluid balance was also reduced (837mL vs -490mL, p<0.05). Patient LOS was similar (3.7 days vs. 3.5 days, p=0.66). Hospital costs decreased nonsignificantly ($20,008 to $18,511, p=0.13). 136 pre-ERAS thoracotomy cases were compared to 37 ERAS full cases. Fewer intra- (14.4 vs 3.8, p<0.001) and postoperative (117.3 vs 55.1, p=0.01) morphine equivalents were used (Fig. 1). There was a significant reduction in mean LOS (7.1 days vs 5.2 days, p=0.009). Hospital costs decreased significantly ($43,319 to $27,062, p=0.003). Press Ganey scores for pre-ERAS compared to all ERAS pathways increased in 3 categories.

Conclusions: Implementation of an ERAS protocol can lead to an increase in patient satisfaction, shorter length of stay, decreased opioid usage, decreased postoperative fluid balance, and decreased hospital costs.
8 Predictors of Failure of Medical Management in Uncomplicated Type B Aortic Dissection

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Author Institution(s): Emory University, Atlanta, GA

Discussant: *Andrea J. Carpenter, University of Texas Health Science Center, San Antonio, TX

Objectives: Optimal medical management (OMT) of uncomplicated type B aortic dissection (uTBAD) provides excellent short-term outcomes but is associated with a high incidence of failure. The aim of this study was to identify predictors of aortic intervention and mortality in uTBAD patients undergoing OMT.

Methods: A retrospective review of a U.S. academic center aortic database from 2005-2016 identified 314 uTBAD patients undergoing OMT. 85% of patients had ≥1 imaging scan at presentation analyzed for maximum aortic diameters (AD), false lumen (FL) status, and visceral vessel perfusion. Logistic regression models were constructed to estimate hazards ratios (HR) and identify predictors of OMT failure.

Results: The mean age of all patients was 58±12 years, and 67% were male. At presentation, the maximum AD of the descending thoracic and abdominal aorta were 4.6±1.1 cm and 3.7±0.9 cm, respectively. FL status was patent in 59.4% (151/254), thrombosed partially in 39.8% (101/254) and completely in 0.8% (2/254). Over a median follow-up of 4.1 years (IQR: 1.6, 7.4), 44.9% of patients failed OMT and underwent intervention: n=58 open, n=83 endovascular. For the remaining 173 patients, mortality was 20.2%. A maximum descending thoracic AD of 4.5 cm [HR: 2.65 (1.84, 3.82), p<0.0001] and a partially thrombosed FL [HR: 1.51 (1.01, 2.26), p=0.04] were significant predictors of intervention but not mortality. At 10 years, the intervention-free survival was higher for patients presenting with a patent versus a partially thrombosed FL (42.1% versus 30.6%, p=0.04) (Figure). The distribution of visceral vessels arising from the FL did not predict OMT failure.

Conclusions: There is a significant incidence of OMT failure in uTBAD patients. A maximum descending thoracic AD of ≥4.5cm and a partially thrombosed FL at presentation predict intervention but not mortality. An aggressive approach with early endovascular intervention may improve long-term outcomes in these high-risk patients.
The Relationship Between Pre-operative Aortic Arch Dimensions and Late Outcome Following Coarctation Repair in Infancy via Lateral Thoracotomy

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**Authors:** Preeti Ramachandran¹, Philip Khoury¹, Robert Beekman², Erik C. Michelfelder³, D*James S. Tweddell⁴, James Cnota¹

**Author Institution(s):** ¹Pediatric Cincinnati Children’s Hospital Medical Center, Cincinnati, OH; ²CS Mott Children’s Hospital, Ann Arbor, MI; ³Sibley Heart Center, Children’s Healthcare of Atlanta, Atlanta, GA

**Discussant:** *Robert Dabal, University of Alabama, Birmingham, AL

**Objectives:** Decision making for aortic coarctation surgery (lateral thoracotomy vs median sternotomy) is frequently based on preoperative arch dimensions. Few studies have assessed the relationship between preoperative arch dimensions and late postoperative outcome. This study aimed to define how preoperative arch dimensions relate to late outcomes and identify long term predictors of successful surgery.

**Methods:** Retrospective review of 104 neonates and infants undergoing isolated coarctation repair via lateral thoracotomy was performed. Long term surgical success was defined as arch gradient <20mm Hg, no anti-hypertensive medication use and freedom from reintervention at 3 year and at latest clinic visit. The successful and non-successful groups were compared using appropriate statistical tests. Logistic regression analyses were performed to determine independent determinants of success.

**Results:** 104 eligible patients were identified (Table 1). Total of 7 patients required reintervention for re-coarctation. There was no correlation between preoperative arch dimensions and long term success. Surgical success was demonstrated in patients with preoperative proximal transverse arch Z scores as small as -7.6.

**Conclusions:** Aortic arches of various dimensions were successfully repaired via lateral thoracotomy approach. This challenges contemporary surgical decision making that uses threshold aortic arch dimensions to guide surgical approach.

| Table 1: Demographic details and description of aortic arch dimensions at 3 years of age |
|---------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
|                                | NO INTERVENTION (N=97)          | Re-INTERVENTION (N=7)           |                                |                                |
|                                | Mean [range]                   | Mean [range]                   |                                |                                |
| Birth weight (kg)              | 2.9 [1.1, 4.5]                 | 3.3 [3.6, 3.7]                 |                                |                                |
| Pre-surgical weight (kg)       | 3.9 [1.7, 9.8]                 | 4.28 [3.5, 5.3]                |                                |                                |
| Age at surgery (years)         | 0.14 [0.003, 1]                | 0.192 [0.01, 0.6]              |                                |                                |
| Proximal transverse arch dimension (mm) | 5.2 [2.2, 11.2] | 5.14 [3.4, 7.3]              |                                |                                |
| Proximal transverse arch Z score | -3.09 [-7.6, -0.4]            | -3.03 [-5.8, -0.76]           |                                |                                |
| Distal transverse arch dimension (mm) | 4.15 [2.1, 8.5]             | 3.8 [3.3, 5.2]                |                                |                                |
| Isthmus dimension (mm)         | 2.85 [1.7, 5.1]                | 2.78 [1.9, 5.6]                |                                |                                |
| Isthmus Z score                | -4.24 [-6.5, -2.16]           | -4.81 [-6.5, -2.8]            |                                |                                |
10 History and Evolution of the STSA President’s Award for Best Scientific Paper

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Authors: *Constantine Mavroudis

Author Institution(s): Johns Hopkins Children’s Heart Surgery Florida Hospital for Children, Johns Hopkins University School of Medicine, Orlando, FL

Body of History Abstract: The Southern Thoracic Surgical Association (STSA) has a long and storied tradition of heartfelt camaraderie, close family ties, and sentinel scientific contributions. In 1964, The President’s Award for best scientific paper was inaugurated by President Lewis Bosher to stimulate friendly scientific competition. The name was changed to Clifford Van Meter President’s Award in 2008 and expanded in 2013 to honor esteemed members for presentations in General Thoracic Surgery (Carolyn Reed), Adult Cardiac Surgery (Clifford Van Meter), and Congenital Heart Surgery (George Daicoff).

Between 1964 and 2015, 58 awards were bestowed on 57 presenters (average age 40.9 ± 7.7 years) for topics in general thoracic surgery (18), adult cardiac surgery (25), and congenital heart surgery (15), which were published in Annals of Thoracic Surgery. The average number of subsequent citations in journals as a measure of scientific importance was 43.7 ± 60.2.

General thoracic surgery presentations included studies on lung cancer, thoracic tumors, lobectomy techniques, and infection control. Adult cardiac presentations highlighted coronary artery bypass, thoracic aneurysm repair, and intraoperative innovation. Congenital presentations documented single-ventricle operations, interrupted aortic arch repair, transformation from Mustard to arterial switch operations for transposition of the great arteries, and transesophageal echocardiography.

Awardees were also honored by the Tiki Award (9), Osler Abbott Award (11); and 13 were elected President 12.9 years later (on average) for continued participation and academic achievement. A seemingly small and prosaic addition of a yearly scientific award has had an enormous impact on the scientific community, STSA traditions, and enhanced membership participation.
11 Amiodarone Protocol Provides Cost Effective Reduction in Postoperative Atrial Fibrillation

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Author Institution(s): University of Virginia, Charlottesville, VA

Discussant: *Thoralf M. Sundt, Massachusetts General Hospital, Boston, MA

Objectives: Postoperative Atrial Fibrillation (POAF) following cardiac surgery results in a significant increase in morbidity, mortality, and health care cost. Prophylactic amiodarone has been shown to reduce the incidence of POAF, however the cost effectiveness of a protocol driven approach remains unknown.

Methods: All patients with a Society of Thoracic Surgeons (STS) risk score enrolled in a prophylactic amiodarone protocol (n=153) were propensity score matched 1:3 with STS risk score patients prior to protocol implementation (n=3574). Using the matched cohort, multivariate logistic and linear regressions assessed the relative risks (POAF reduction and adverse medication effects) of amiodarone therapy and costs respectively. TreeAge cost effectiveness software modeled the effects of prophylactic amiodarone using costs, complication rates and related utility with sensitivity analysis using 95% confidence intervals to evaluate the effects of variation.

Results: Of patients eligible for the prophylactic amiodarone protocol, 94.3% (281/298) were enrolled. Prophylactic amiodarone significantly reduced the rate of POAF (25.7 vs 16.8%, p<0.0001). A total of 600 matched patients demonstrate no baseline differences in demographics, comorbidities, disease state, or operative factors with a significant reduction in POAF despite no significant increase in other associated complications (Table). Using these adjusted estimates, the prophylactic amiodarone protocol demonstrated a cost savings of $458 per patient. Sensitivity analysis confirmed cost-effectiveness for the majority of likely POAF cost and protocol related POAF risk reductions (Figure).

Conclusions: Implementation of a prophylactic amiodarone protocol significantly reduced risk-adjusted rates of POAF with a cost savings of $458 per patient. This analysis demonstrates how rigorous quantitative analysis can evaluate the benefits of quality improvement projects.

Risk and Cost Estimates From Multivariate Regression

<table>
<thead>
<tr>
<th>Amiodarone Effects</th>
<th>Adjusted Odds Ratio</th>
<th>95% Confidence Interval</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>POAF Reduction</td>
<td>0.456</td>
<td>0.270</td>
<td>0.769</td>
</tr>
<tr>
<td>Amiodarone Complications</td>
<td>1.199</td>
<td>0.953</td>
<td>1.445</td>
</tr>
<tr>
<td>Cost Estimates</td>
<td>Adjusted Estimates</td>
<td>95% Confidence Interval</td>
<td>p-value</td>
</tr>
<tr>
<td>POAF</td>
<td>$6,743</td>
<td>3104</td>
<td>10382</td>
</tr>
<tr>
<td>Amiodarone Complications</td>
<td>$6,766</td>
<td>1720</td>
<td>11812</td>
</tr>
</tbody>
</table>

POAF (Postoperative Atrial Fibrillation)
12 Outcomes of an Intensive, Pre-Operative Smoking Cessation Program

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Authors: Kayla Fay, Joseph Phillips, Timothy Millington, David Finley

Author Institution(s): Dartmouth-Hitchcock Medical Center, Lebanon, NH

Discussant: D*Daniel L. Miller, WellStar Health System, Marietta, GA

Objectives: It has been well documented that smoking cessation leads to better post-operative outcomes and improved long-term survival in patients undergoing lung resection. We sought to investigate the outcomes of an intensive, pre-operative smoking cessation program in patients undergoing lung resection at our institution.

Methods: A retrospective analysis of an IRB approved prospective database was performed. Patients who had undergone surgical lung resections occurring from January 1, 2015 through June 30, 2016 were identified. Basic demographics as well as smoking status at initial consult and 6-month follow-up, pack-years, smoking cessation counseling, and smoking quit date were obtained and analyzed to assess the success of an intensive smoking cessation program. All patients were offered smoking cessation counseling and all were encouraged to quit prior to surgery.

Results: A total of 213 patients underwent lung resection. Of these, 46 patients were currently smoking at the time of the initial thoracic surgery consult. 36 of these patients were involved in formal, intensive smoking cessation program. Twenty-five patients in the program (69.4%) were able to quit smoking by their operation date. At the time of their six month follow-up, 23 (92%) of the patients that had quit by their operation still abstained from smoking. Two (5.5%) patients that had quit by their operation restarted smoking, and 8 (22.2 %) patients were unable to stop smoking at all, for an overall success rate of 56.5%. Three patients who had not quit by their operation date were able to quit by 6 months post-op for a success rate of 72.2% (26 of 36 patients) for patients who went through our smoking cessation program.

Conclusions: An intensive smoking cessation program in the peri-operative period demonstrated a high initial and mid-term success rate. Implementation during this period may lead to increased long term success in abstinence from tobacco.
13 Federal Litigation of Cardiac Surgery: Neurologic Injury Predicts Plaintiff Success

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Authors: *Dawn S. Hui, Katie Tichich, *Richard L. Lee

Author Institution(s): St. Louis University, St. Louis, MO

Discussant: *Robert S.D. Higgins, Johns Hopkins University School of Medicine, Baltimore, MD

Objectives: The federal court system is divided into 11 districts. The incidence and outcomes of federal cases related to cardiac surgery has not been previously explored. We aimed to describe the characteristics of these cases.

Methods: A commercial database retrieval of legal citations was queried for cardiac surgery-related terms. Citations and related documents were reviewed for relevance and case details. Inclusion criteria were district court cases involving cardiac operations. Exclusion criteria were rulings on solely procedural matters. Associations were explored using Pearson’s chi-square.

Results: Of 355 unique citations from 1956-2017, 19.4% (n=69) met criteria. The geographical distribution is shown in the Figure, with District Court 3 having the highest number (24.6%, n=17). Operations were CABG in 33.3% (n=23), isolated valve in 37.7% (n=26), and congenital operations in 18.8% (n=13). Litigation was prompted by media reporting in 10.1% (n=7) and involved neurologic injury in 18.8% (n=13), death in 33.3% (n=23), and informed consent issues in 29.0% (n=20). Findings were summary judgment for the defendant in 44.9% (n=31); partial summary judgment in 17.4% (n=12); dismissal based on jurisdiction, preemption, or time-barred action in 27.5% (n=19); and ruling for the plaintiff in 8.7% (n=6). Of the rulings for the plaintiffs, damages were reported in 83.3% (n=5) with a mean±SD amount of $1,074,907 ± 1,018,113 (range $205,000-$2,177,352). In comparing rulings for plaintiff versus defendant, neurologic injury was significantly associated with ruling for the plaintiff (83.3% vs 3.2%, p<0.01); death, informed consent, and surgeon defendant were not associated.

Conclusions: Federal cardiac malpractice court cases are rare. Rulings in favor of the plaintiff, while also rare, are associated with neurologic injury. Exploration of state-level cases may provide power to identify other factors.
14 Creation, Implementation and Assessment of a Transportable General Thoracic Surgical Skills Simulation Course in a Low-Middle Income Country

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Author Institution(s): 1University of Virginia, Charlottesville, VA; 2University of Rwanda Teaching Hospital, Kigali, Rwanda; 3Kampala International University, Ishaka-Bushenyi, Uganda

Discussant: D*M. Blair Marshall, MedStar Georgetown University Hospital, Washington, DC

Objectives: To accelerate the acquisition of needed general thoracic surgery skills by general surgery residents in a low-middle income country (LMIC) using transportable inexpensive simulation teaching models. The site of the simulation course was Rwanda - a country of twelve million inhabitants with at present no specialty trained thoracic surgeon.

Methods: Five inexpensive training models (see image) were created for use in a LMIC setting; two incorporated locally acquired goat mediastinal tissue. The models were then implemented in on-site workshops with general surgery residents at two Rwandan teaching hospitals. A website <https://thoracicsurgeryeducation.org> was created describing the assembly of the models and step-by-step teaching as supplement to the on-site teaching. Participants completed a modified version of the Michigan Standard Simulation Experience Scale (MiSSES) survey and a pre- and post-training knowledge assessment of skills competency. Descriptive and bivariable analyses were performed on participants’ responses.

Results: Participants reported significantly improved confidence in performing each thoracic surgery skill presented in the simulation from 78% to 100% (see table). Moderate to complete levels of confidence paralleled statistically significant changes of pre-training assessment scores for each component (p = 0.02 to p < 0.01).

Conclusions: General thoracic surgery simulation provides a practical, inexpensive, and expedited learning experience in LMIC settings that lack experienced faculty and subspecialty fellowship training opportunities. Resident feedback showed enhanced confidence in performance of thoracic procedures and suggested that simulation surgery could be an effective tool to expand the resident knowledge base and preparedness for performing clinically needed thoracic procedures.

Characteristics of thoracic simulation training participants and post-simulation assessment of confidence

<table>
<thead>
<tr>
<th></th>
<th>Number (%)</th>
<th>Pre- and Post-training evaluation difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total participating in thoracic simulation training</td>
<td>23 (100)</td>
<td>N/A</td>
</tr>
<tr>
<td>Participants with no prior thoracic surgery exposure</td>
<td>11 (48)</td>
<td>N/A</td>
</tr>
<tr>
<td>Participants with prior thoracic surgery exposure</td>
<td>4 (17)</td>
<td>N/A</td>
</tr>
<tr>
<td>Participants with prior simulation training:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>With thoracic surgery exposure</td>
<td>3 (13)</td>
<td>N/A</td>
</tr>
<tr>
<td>With no thoracic surgery exposure</td>
<td>5 (22)</td>
<td>N/A</td>
</tr>
<tr>
<td>Moderate to complete confidence following completion of simulation training in:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Positioning for posterolateral thoracotomy</td>
<td>23 (100)</td>
<td>p &lt; 0.01</td>
</tr>
<tr>
<td>Performing a posterolateral thoracotomy</td>
<td>21 (91)</td>
<td>p &lt; 0.01</td>
</tr>
<tr>
<td>Performing repair of a ruptured diaphragm</td>
<td>21 (91)</td>
<td>p &lt; 0.01</td>
</tr>
<tr>
<td>Performing pulmonary decortication</td>
<td>20 (87)</td>
<td>p &lt; 0.01</td>
</tr>
<tr>
<td>Performing repair of an esophageal perforation</td>
<td>17 (78)</td>
<td>p = 0.01</td>
</tr>
</tbody>
</table>

NOTES:
15 Genetic Syndromes and Extracardiac Anomalies are Associated With Inferior Single Ventricle Palliation Outcomes

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Author Institution(s): Emory University School of Medicine, Atlanta, GA

Discussant: *Jeffrey P. Jacobs, Johns Hopkins All Children’s Hospital, St. Petersburg, FL

Objectives: We aim to examine the effect of Genetic syndromes and extra-cardiac anomalies (GS/EC) on single ventricle (SV) palliation with focus on hospital death, interstage mortality, and progression towards subsequent palliation stages.

Methods: 530 neonates with SV underwent first-stage palliation: Norwood (n=284, 53%), Blalock-Taussig shunt (n=173, 33%), pulmonary artery band (n=73, 14%). Outcomes were compared between those with GS/EC (Group G, n=121, 23%) and without GS/EC (Group N, n=409, 77%). Regression analyses were adjusted for other risk factors (age, gender, prematurity, weight, SV anomaly, first-stage palliation type).

Results: GS/EC varied among SV defects (range 9% for DILV and 100% for heterotaxy). Group G patients required longer ventilation (208 vs. 120 hours, p<0.0001), ICU (287 vs. 187 hours, p=0.0003), hospital (23 vs. 17 days, p=0.0001) stays. While Groups G and N had comparable ECMO (13% vs. 11%, p=0.553) and unplanned reoperation rates (16% vs. 11%, p=0.189); hospital mortality was higher in Group G (24% vs. 12%, p=0.0008). Subsequent to hospital discharge, Group G had higher interstage death with lower progression to Glenn (62% vs. 78%, p=0.034) and lower 10-year survival (55% vs. 78%, p=0.010). After adjustment for other risk factors, GS/EC were significant risk factors affecting survival (HR 2.3 (95% 1.4-3.8), p<0.001) in all subgroups of patients.

Conclusions: The presence of GS/EC varies between SV anomalies and is associated with additional risk factors such as prematurity and low weight. After adjusting for other risk factors, GS/EC are associated with an increase in resource utilization following first-stage palliation and in both hospital and inter-stage mortality, with subsequently fewer patients progressing towards the Glenn shunt. The increased death risk in those patients persists for almost 1 year after first-stage palliation, suggesting the need for more vigilant monitoring and outpatient care in those high-risk patients.
16 Surgeon Led CT Screening for Lung Cancer: A 10-Year Process

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Authors: D*Daniel L. Miller, Vickie J. Beckler, Aaron A. Cann, Gerald A. Helms, *William R. Mayfield

Author Institution(s): WellStar Health System, Marietta, GA

Discussant: *Lisa M. Brown, UC Davis Medical Center, Sacramento, CA

Objectives: The NLST showed that cancer mortality can be reduced with annual CT scans in high risk patients. In 2014, we reported our initial results of 1267 patients who participated in a community-based multidisciplinary lung cancer screening program. This review is of the 39 months after that report to determine if we could maintain a high quality surgeon led community-based lung cancer screening program.

Methods: In 2008, we launched a lung cancer CT screening program within the WellStar Health System consisting of five hospitals, three health parks, 140 outpatient medical offices and 12 imaging centers in a five county area of approximately 1.4 million people in Metro-Atlanta. Screening criteria incorporated were the NCCN guidelines. The time period for this review was January 2014 through March 2017.

Results: A total of 3315 individuals have undergone CT lung cancer screening; 62% were screened in the last 39 months (53 new patients/month). Former or current smokers represented 91% of patients with a median of 48 pack years of smoking history. Diagnostic procedures were performed in less than 3.0% of patients with a benign biopsy rate of 9.4%. Forty six percent of patients had their lung cancer discovered on initial CT scan; 46% on subsequent scans with nodule growth and 8% developed a new nodule; 2.2% of patients were diagnosed with a primary lung cancer (1 for every 46 scans). Only 57% of the lung cancer patients would have qualified for the NLST. The majority of patients (76%) had early stage disease (I and II) with an overall five-year cancer-specific survival of 73%.

Conclusions: Maintaining a community-based multidisciplinary lung cancer screening program is a labor intensive process. Surgeon leadership with nurse navigator devotion and compassion for their screened patients is invaluable. A comprehensive infrastructure with dedicated personnel focused on patient education is the key to a successful lung cancer screening program over a 10 year period.

<table>
<thead>
<tr>
<th></th>
<th>2008-2013 (72 Months)</th>
<th>2014-2017 (39 Months)</th>
<th>P Value (&lt; 0.05)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients</td>
<td>1267</td>
<td>2058</td>
<td>-</td>
</tr>
<tr>
<td>Male Gender</td>
<td>53%</td>
<td>46%</td>
<td>p &lt; 0.05</td>
</tr>
<tr>
<td>New Patient/Month</td>
<td>18</td>
<td>53</td>
<td>p &lt; 0.01</td>
</tr>
<tr>
<td>Diagnostic Procedures</td>
<td>36 (2.8%)</td>
<td>51 (2.5%)</td>
<td>NS</td>
</tr>
<tr>
<td>Lung Cancers</td>
<td>28 (2.2%)</td>
<td>44 (2.1%)</td>
<td>NS</td>
</tr>
<tr>
<td>Stage I and II</td>
<td>75%</td>
<td>77%</td>
<td>NS</td>
</tr>
<tr>
<td>NLST Qualifier</td>
<td>54%</td>
<td>59%</td>
<td>NS</td>
</tr>
<tr>
<td>5-year Cancer Survival</td>
<td>71%</td>
<td>74%</td>
<td>NS</td>
</tr>
</tbody>
</table>
17 Does Mitral Valve Calcium in Patients Undergoing Mitral Valve Replacement Portend Worse Survival?

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Author Institution(s): Mayo Clinic, Rochester, MN

Discussant: D*Edward Y. Sako, University of Texas, San Antonio, TX

Objectives: Mitral annular calcification (MAC) is associated with increased perioperative morbidity and mortality. Data on long-term outcome after mitral valve replacement (MVR) in the presence of MAC is limited. We reviewed our experience of MVR in the presence of MAC.

Methods: A retrospective review of 496 consecutive patients (pts) who underwent isolated primary MVR between Jan 2000 and Dec 2015 was done. Pts with active endocarditis were excluded. The degree of MAC was ascertained on the basis of operative findings. The extent of calcifications (Ca) was classified as anterior (Ant), posterior (Post) annular, leaflet, commissures and/or circumferential. Chi-Square and Fisher’s exact tests were performed as appropriate.

Results: Mean age was 64.4±14.1 years with 217 (44%) males. Mitral valvar/subvalvar Ca were observed in 169 (34%) pts. MAC was present on Ant annulus in 36 (7%) pts, Post annulus in 91 (18%), and commissures in 62 (13%), and in 26 it was circumferential. There were 120 (24%) pts who had leaflet Ca, 18 on the Ant, 38 on the Post and 71 on both leaflets. Atrioventricular groove disruption occurred in 3 pts, all with Post MAC. Pts with any Ca had higher stroke rate (p = .04) while pts with Ant leaflet Ca and commissural Ca had higher rates of pacemaker/implanted cardioverter-defibrillator implantation (p = 0.01, p = 0.001, respectively). Pts with circumferential MAC had higher rates of postoperative renal failure (p = .035). Operative mortality was not significantly different based on the presence of mitral Ca, however, long-term survival was worse (HR 1.26; 95% CI: 0.95, 1.67). MAC was associated with increased late mortality (HR 1.62; 95% CI: 1.20, 2.18).

Conclusions: Mitral valve calcification is associated with higher perioperative morbidities. While perioperative mortality is not significantly different based on the presence or absence of significant mitral valvar and/or subvalvar calcifications, long-term survival is worse and MAC carries the worst prognosis.
18 The Role of Post-operative Radiation Therapy (PORT) Following Induction Chemotherapy and Resection in Patients With Stage III (N2) Non-Small Cell Lung Cancer

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Author Institution(s): Memorial Sloan Kettering Cancer Center, New York, NY

Discussant: Mark W. Onaitis, University of California, San Diego, CA

Objectives: Post-operative radiation therapy (PORT) may be offered in selected non small cell lung cancer (NSCLC) patients following resection. The purpose of this study was to examine the impact of PORT on local recurrence (LR) and disease-free survival (DFS) in ypN2 patients following induction chemotherapy and surgery.

Methods: We performed a retrospective review of a prospectively maintained database in pathologic-proven N2 NSCLC patients who underwent induction chemotherapy followed by resection (2004-2016). Exclusion criteria included: pre-operative radiation, death < 90 days, non-anatomic resection and R1/R2 resection. The primary endpoint was LR. Secondary endpoint was DFS. Associations between clinicopathologic variables and PORT were assessed. Differences in LR were assessed using the Fine and Gray method. DFS was summarized by Kaplan-Meier method and compared using log-rank test.

Results: 198 patients met inclusion criteria; 125 (63%) had ypN2 disease of which 91 (73%) developed recurrence and/or died. Median follow-up was 25 mos (range, 3-137). 74% (93/125) received PORT and 32% (40/125) developed a LR. PORT was more likely in patients with higher tumor SUVmax (p=0.05) only. Univariable competing risk analysis for LR revealed no association with PORT, pstage, multiple ypN2 nodal stations, tumor response to chemotherapy, or tumor histology. PORT did not significantly decrease LR compared to no PORT (29% vs 41%, respectively; p=0.3, Fig 1). The median DFS for PORT was 12 months versus 17 months for no PORT (log-rank test p=0.4).

Conclusions: In this select patient population with ypN2 disease following induction chemotherapy and surgery PORT did not improve LR or DFS.

![Graph of Local Recurrence (N=125)]
19 A Propensity Matched Analysis of Robotic, Minimally Invasive, and Conventional Mitral Valve Surgery

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Authors: *Robert B. Hawkins1, *J.H. Mehaffey1, *Wiley Nifong3, D*W. Randolph Chitwood1, Mohammed Quader2, D*Andy Kiser2, D*Alan Speir2, D*Gorav Ailawadi1, Marc Katz5

Author Institution(s): 1University of Virginia, Charlottesville, VA; 2East Carolina University, Greenville, NC; 3Virginia Commonwealth University, Richmond, VA; 4INOVA Heart and Vascular Institute, Falls Church, VA; 5Medical University of South Carolina, Charleston, SC

Discussant: Joseph F. Sabik, University Hospitals Cleveland Medical Center, OH

Objectives: Studies suggest robotic mitral surgery may be associated with superior outcomes. The objective of this study was to compare the outcomes of robotic, minimally invasive (mini), and conventional mitral surgery.

Methods: A total of 2,351 patients undergoing nonemergent isolated mitral valve operations from 2011-2016 were extracted from a regional Society of Thoracic Surgeons database. Patients were stratified by approach: robotic (n=372), mini (n=576) and conventional sternotomy (n=1352). To account for preoperative differences, robotic cases were propensity score matched (1:1) to both conventional and mini groups.

Results: A total of 314 robotic cases were well matched to conventional, while 295 cases were matched to mini cases. There were no significant baseline differences in matched groups. Despite similar rates of degenerative mitral regurgitation (79% vs 78%, p=0.73), robotic surgery was associated with higher rates of valve repair compared to conventional (91% vs 76%, p<0.0001). Less invasive approaches were associated with better than expected morbidity and mortality (Table), while conventional approach had higher operative mortality (O:E = 1.66). Robotic approach provided a similar complication rate as conventional approach, but demonstrated higher rates of atrial fibrillation and transfusion than mini (Table). Robotic surgery was associated with shorter length of stays compared to conventional, but longer than mini (Table). Finally, robotic approach was associated with increased costs compared to both conventional and mini approaches.

Conclusions: Less invasive approaches are associated with a higher rate of mitral valve repair and a trend towards lower mortality. Compared to conventional approach, robotic demonstrates equivalent outcomes with increased costs. Compared to minimally invasive, robotic approaches are associated with greater atrial fibrillation, transfusion and resource utilization.

<table>
<thead>
<tr>
<th></th>
<th>Robotic (n=314)</th>
<th>Conventional (n=314)</th>
<th>p-value</th>
<th>Robotic (n=295)</th>
<th>Mini (n=295)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operative mortality</td>
<td>0.6%</td>
<td>2.2%</td>
<td>0.06</td>
<td>0.7%</td>
<td>0.7%</td>
<td>1.00</td>
</tr>
<tr>
<td>Major morbidity</td>
<td>8.6%</td>
<td>8.9%</td>
<td>0.89</td>
<td>7.5%</td>
<td>5.8%</td>
<td>0.33</td>
</tr>
<tr>
<td>Atrial fibrillation</td>
<td>24.8%</td>
<td>27.7%</td>
<td>0.42</td>
<td>26.4%</td>
<td>17.6%</td>
<td>0.01</td>
</tr>
<tr>
<td>Transfusion (PRBC)</td>
<td>15.3%</td>
<td>17.8%</td>
<td>0.37</td>
<td>15.3%</td>
<td>4.8%</td>
<td>0.0001</td>
</tr>
<tr>
<td>Reoperation for bleeding</td>
<td>2.6%</td>
<td>1.9%</td>
<td>0.59</td>
<td>2.7%</td>
<td>1.4%</td>
<td>0.25</td>
</tr>
<tr>
<td>Postoperative LOS (d)</td>
<td>4 [4-6]</td>
<td>5 [4-7]</td>
<td>&lt;0.0001</td>
<td>4 [4-6]</td>
<td>4 [2-6]</td>
<td>0.02</td>
</tr>
<tr>
<td>Hospital Cost (S, mean)</td>
<td>$48,423</td>
<td>$39,128</td>
<td>&lt;0.0001</td>
<td>$47,664</td>
<td>$41,926</td>
<td>&lt;0.0001</td>
</tr>
<tr>
<td>Operative mortality (O:E)</td>
<td>0.59</td>
<td>1.66</td>
<td>&lt;0.0001</td>
<td>0.54</td>
<td>0.46</td>
<td></td>
</tr>
<tr>
<td>Morbidity and Mortality (O:E)</td>
<td>0.69</td>
<td>0.67</td>
<td></td>
<td>0.66</td>
<td>0.50</td>
<td></td>
</tr>
</tbody>
</table>

NOTES:
**20 Patient Outcomes After Stent Failure for the Treatment of Acute Esophageal Perforation**

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**Authors:** Ong Gabie, *Richard K. Freeman, *Anthony J. Ascioti, Raja Mahidhara, Vijay K. Nuthakk

**Author Institution(s):** St. Vincent Hospital and Health System, Indianapolis, IN

**Discussant:** *Daniela Molena, Memorial Sloan Kettering Cancer Center, New York, NY

**Objectives:** Esophageal stent placement for acute esophageal perforation has become part of the treatment algorithm for many thoracic surgery programs. Despite high success rates, there are patients for which stent placement is not successful. Little has been published regarding this topic. This investigation summarizes the outcomes of a relatively large group of such patients.

**Methods:** Patients who underwent esophageal stent placement for an acute perforation but required conversion to another form of therapy were identified from a prospectively collected institutional database. Excluded were patients whose perforation was associated with a malignancy. Patient demographics, operative and non-operative invasive procedures, morbidities, mortality and 6 month follow up after discharge were reviewed.

**Results:** Between 2008 and 2015, 26 patients who failed to seal their esophageal leak after stent placement were identified. Eighteen of these patients required an operative repair with primary closure of the perforation. Four primary repairs had a persistent leak controlled with subsequent stent placement. Four patients required an esophagectomy with cervical esophagostomy and subsequent reconstruction of foregut continuity. Three patients, because of comorbid conditions, were referred for hospice care. One patient refused operative repair and developed a chronic fistula which resolved with subsequent stent placement.

**Conclusions:** Patients whose esophageal perforation does not seal with stent placement can be treated with primary surgical repair or esophagectomy without increasing their morbidity and mortality or compromising their prognosis. Hospital stay is extended.

**Outcomes After Failed Stent Placement**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>N</td>
<td>26</td>
</tr>
<tr>
<td>Age (mean years)</td>
<td>57</td>
</tr>
<tr>
<td>Female</td>
<td>12 (46%)</td>
</tr>
<tr>
<td>Treatment After Stent Failure</td>
<td>18 (69%)</td>
</tr>
<tr>
<td>Primary Surgical Repair</td>
<td></td>
</tr>
<tr>
<td>Esophagectomy</td>
<td>4 (15%)</td>
</tr>
<tr>
<td>Hospice</td>
<td>3 (12%)</td>
</tr>
<tr>
<td>Observation</td>
<td>1 (4%)</td>
</tr>
<tr>
<td>Length of Stay (mean days)</td>
<td>13</td>
</tr>
<tr>
<td>Morbidity</td>
<td>7 (27%)</td>
</tr>
<tr>
<td>Mortality</td>
<td>0</td>
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</tbody>
</table>
21 Use of a Bare Metal Stent in Addition to a Covered Endograft for Management of Complicated Acute Type B Aortic Dissection Offers Positive Remodeling for the Thoracoabdominal Aorta

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Authors: Ibrahim Sultan, Keith Dufendach, Dhaval Trivedi, Rachel McGargle, Andrew D. Althouse, Floyd Thoma, Forozan Navid, Thomas G. Gleason

Author Institution(s): University of Pittsburgh, Pittsburgh, PA

Objectives: To demonstrate evidence of aortic remodeling using a PETTICOAT (Proximal ExTension to Induce COmplete ATtachment) system in patients with acute complicated type B aortic dissections (TBAD) when compared to standard endovascular therapy.

Methods: From 2013 to 2016, 33 patients underwent thoracic endografting for complicated acute TBAD. The indications for endografting included persistent pain despite maximal antihypertensive therapy, visceral and renal malperfusion and aortic rupture. 12 patients underwent standard therapy with a thoracic endograft to cover the primary tear (standard group). 21 patients had an additional bare metal stent (185mm long) placed distal to the covered endograft (PETTICOAT group). To eliminate time bias and inter-patient variability, 3D CT scans were reviewed preoperatively, on discharge and at six months at ten different anatomic locations along the aorta (from the left subclavian to the common iliac arteries). Aortic diameter, true lumen (TL) diameter and TL index (TL diameter/aortic diameter = TLI) were compared within and between the two groups for aortic remodeling at 6 months.

Results: There was no difference in baseline characteristics between the standard and the PETTICOAT group. At six months, both the PETTICOAT and standard groups had significant change in aortic diameter, TL diameter and TLI throughout the thoracoabdominal aorta demonstrating positive remodeling (see table 1). When comparing the standard group to the PETTICOAT group at six months, the change in TL diameter and TLI was significantly greater at the level of maximal aortic diameter. However, the change in TLI was greater at the level of the celiac artery with the PETTICOAT system when compared to the standard group.

Conclusions: The use of a PETTICOAT concept with an addition of a bare metal stent distal to the proximal thoracic endograft offers positive aortic remodeling in the thoracoabdominal aorta at six months.
22 Timing and Risk Factors Associated With Venous Thromboembolism Following Lung Cancer Surgery

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Authors: Daniel C. Thomas¹, Brian N. Arnold¹, Frank C. Detterbeck¹, Daniel J. Boffa¹, Anthony W. Kim², Justin D. Blasberg³

Author Institution(s): ¹Thoracic Surgery, Yale School of Medicine, New Haven, CT; ²University of Southern California, Los Angeles, CA

Discussant: *Virginia R. Litle, Boston Medical Center, Boston, MA

Objectives: Few studies have examined the timing and risk factors of venous thromboembolism (VTE) in patients undergoing surgery for lung cancer, and there are limited data regarding the criteria for prophylactic treatment of VTE after hospital discharge. This study sought to identify risk factors and describe the occurrence of post-discharge VTE following lung cancer surgery.

Methods: Patients undergoing lobectomy or pneumonectomy for lung cancer were identified in the National Surgical Quality Improvement Program database from 2005-15. Patient demographic and peri-operative characteristics were evaluated for association with post-discharge VTE. Predictors of post-discharge VTE were identified using multivariable analysis. Secondary analyses evaluated the timing of VTE, hospital readmission, and 30-day mortality.

Results: VTE occurred in 1.6% (234) of the 14,308 patients identified. Of these, 44% (102) of events occurred post-hospital discharge with a median time to VTE of 10 days. Patients who sustained VTE were more likely to be men (2.0% vs 1.2%, p<.01), have COPD (2.4% vs 1.4%, p<.001), undergo pneumonectomy (4.3% vs 1.5%, p<.01), or an open resection (2.1% vs 1.1%, p<.001). In-hospital VTE was significantly associated with extended length of stay (3.4% vs 0.8%, p<.001). Patients with post-discharge VTE were 10 times more likely to be readmitted compared to those without a VTE (78.8% vs 7.9%, p<.001), and also more likely to die within 30 days of surgery (6.3% vs 0.5%, p<.001). Multivariable analysis identified older age, obesity, history of COPD, need for pneumonectomy, and prolonged operative time (>75th percentile) as independent predictors of post-discharge VTE.

Conclusions: Risk for post-operative in-hospital VTE is low following surgery for lung cancer, however a significant proportion of events occur after hospital discharge when VTE prophylaxis is typically discontinued. Routine post-discharge VTE prophylaxis should be considered for high-risk patients.
23 Repair of Thoracic and Thoracoabdominal Mycotic Aneurysms and Infected Aortic Grafts Using Cryopreserved Allograft

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Authors: *Joel Corvera*, David Blitzer1, Hannah Copeland2, Daniel Murphy1, *Philip Hess*, DJohn Fehrenbacher1

Author Institution(s): 1Indiana University, Indianapolis, IN; 2Virginia Commonwealth University, Richmond, VA

Discussant: D*Joseph S Coselli, Baylor College of Medicine, Houston, TX

Objectives: Mycotic aneurysm of the thoracic or thoracoabdominal aorta (T/TAA) and infection of T/TAA grafts are challenging surgical problems with high mortality. Radical surgical debridement and in-situ reconstruction with cryopreserved allograft (CPA) avoids placement of prosthetic material in an infected field and the need for indefinite suppressive antibiotics or tissue coverage.

Methods: Fifty patients with infection of a T/TAA graft or mycotic aneurysm underwent surgical resection and replacement with in-situ CPA from 2006 to 2016. Patients with infected infrarenal abdominal aortic grafts, mycotic aneurysms of the infrarenal aorta and isolated aortic valve endocarditis requiring root replacement were excluded from the study. Preoperative blood cultures and intraoperative surgical cultures were obtained. Intravenous antibiotics were continued postoperatively for 4 to 6 weeks. Long-term suppressive antibiotics were rarely used (3 patients). Follow up imaging occurred at 12, 30 and 54 months postoperatively.

Results: Males comprised 64% of the cohort. Mean age was 63±14 years. Procedures performed included redo operations in 72%, proximal aortic replacement in 44%, distal replacement in 64% and both proximal and distal in 8%. The intraoperative organisms were staphylococcus (24%), enterococcus (12%), candida (6%) and gram negative rods (14%). Operative mortality was 8%, stroke 4%, paralysis 2%, acute renal failure 20%, and respiratory failure requiring tracheostomy 6%. Reoperation for pseudoaneurysm of the CPA was necessary in 4 patients. One, two and five year survival was 84%, 76% and 64%, respectively.

Conclusions: Radical resection and in-situ T/TAA reconstruction with CPA avoids placing prosthetic material in an infected field and provides good early and mid-term outcomes. There is no need for autologous tissue coverage or indefinite suppressive antibiotics. However, long-term postoperative surveillance imaging is necessary given the risk of pseudoaneurysm formation.
24 Outcomes of Planned 2-Stage Hybrid Aortic Repair With Dacron Replaced Proximal Landing Zone

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Authors: David Ranney, Morgan Cox, Babatunde A. Yerokun, Ehsan Benrashid, Richard McCann, G.C. Hughes

Author Institution(s): Duke University Medical Center, Durham, NC

Discussant: Edward G. Soltesz, Cleveland Clinic, Cleveland, OH

Objectives: Results of hybrid aortic repair (HAR) utilizing native zone 0 proximal landing zone (PLZ) have been unsatisfactory in many published series, especially in the setting of any dilation (>4.0 cm) of the ascending aorta. This study reports early and late outcomes of patients undergoing planned 2-stage HAR with open 1st stage proximal aortic replacement followed by 2nd stage thoracic endovascular aortic repair (TEVAR) with PLZ within the Dacron replaced zone 0.

Methods: N=32 patients who underwent planned 2-stage HAR between 1/2006-3/2017 were identified from a prospectively maintained institutional aortic surgery database. First stage proximal aortic replacement included ascending aorta ±valve, ±root) and total arch replacement (TAR); n=19 (59.4%) underwent TAR with creation of an elephant trunk and n=13 (40.6%) underwent TAR without elephant trunk. Primary outcomes included 30-day/in-hospital results and Kaplan-Meier (KM) estimates of overall and aorta-specific survival and freedom from reintervention.

Results: Patient characteristics are presented in the Table. Both stages of repair were completed in a single hospital stay in 53% of patients. 30-day/in-hospital rates of mortality, stroke, permanent paraparesis/plegia, and new dialysis were 6.3%, 3.1%, 0%, and 0%, respectively. KM overall and aorta-specific survivals at 5 years were 62.1% and 93.5%, respectively, with a 5-year freedom from re-intervention of 78.4% (Figure).

Conclusions: Planned 2-stage HAR with open 1st stage proximal aortic replacement followed by 2nd stage TEVAR with PLZ within the Dacron replaced zone 0 yields excellent short and long-term results, including a low rate of reintervention likely due to long-segment PLZ within Dacron-replaced aorta. The technique should be considered in patients with even mild (>4.0 cm) ascending aortic dilation in whom HAR is otherwise the preferred treatment option.

<table>
<thead>
<tr>
<th>Variable</th>
<th>% (No.) or Mean ± SD (N = 32)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Demographics</td>
<td></td>
</tr>
<tr>
<td>Age, years</td>
<td>58.4 ± 11.6</td>
</tr>
<tr>
<td>Male gender</td>
<td>56.3 (18)</td>
</tr>
<tr>
<td>White race</td>
<td>43.8 (14)</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>26.2 ± 5.4</td>
</tr>
<tr>
<td>Comorbidities</td>
<td></td>
</tr>
<tr>
<td>Hypertension</td>
<td>100.0 (32)</td>
</tr>
<tr>
<td>Hyperlipidemia</td>
<td>59.4 (19)</td>
</tr>
<tr>
<td>History of tobacco use</td>
<td>62.5 (20)</td>
</tr>
<tr>
<td>Diabetes mellitus</td>
<td>6.3 (2)</td>
</tr>
<tr>
<td>Coronary artery disease</td>
<td>34.4 (11)</td>
</tr>
<tr>
<td>History of stroke/TIA</td>
<td>12.5 (4)</td>
</tr>
<tr>
<td>COPD</td>
<td>37.5 (12)</td>
</tr>
<tr>
<td>CKD</td>
<td>28.1 (9)</td>
</tr>
<tr>
<td>Peripheral vascular disease</td>
<td>9.4 (3)</td>
</tr>
<tr>
<td>ASA score, median</td>
<td>3 (3-4)</td>
</tr>
<tr>
<td>Indication</td>
<td></td>
</tr>
<tr>
<td>Degenerative aneurysm</td>
<td>34.4 (11)</td>
</tr>
<tr>
<td>Chronic dissection</td>
<td>65.6 (21)</td>
</tr>
</tbody>
</table>

NOTES:

![Graph A](image1.png)

![Graph B](image2.png)
25V Leaflet Reconstructive Techniques for Aortic Valve Repair

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Authors: Domenico Mazzitelli, Theodor Fischlein, J.S. Rankin, Yeong-Hoon Choi, Christof Stamm, Steffen Pfeiffer, Lawrence Wei, Vinay Badhwar

Author Institution(s): West Virginia University, Morgantown, WV; Klinikum Bogenhausen, Munich, Germany; University of Cologne, Cologne, Germany; German Heart Center Berlin, Berlin, Germany; Klinikum Nürnberg, Nuremberg, Germany

Objectives: In patients with Grade 3 or 4 aortic insufficiency (AI), leaflet defects may occur in up to 80%. For successful aortic valve repair (AVr), an in-depth knowledge of leaflet reconstruction is essential. This video illustrates a comprehensive approach that has been highly efficacious in this setting.

Methods: The most commonly encountered cusp defect is leaflet prolapse. Two-thirds involve the isolated right coronary cusp, and the remainder are equally divided between isolated non-coronary, isolated left coronary, and multi-leaflet prolapse. After aortic ring annuloplasty, prolapse is corrected with symmetrical peri-Nodular leaflet plication, normalizing leaflet effective height and coaptation area. Around a fourth of patients have Nodular retraction, and Nodular release is performed with a CUSA ultrasonic device. If calcium involves less than 25% of the leaflet, ultrasonic decalcification also can be applied. Structural leaflet defects, such as commissural rupture, holes, or extensive fenestrations, are observed in 20%. These are reconstructed with double layers of Glutaraldehyde-fixed autologous pericardium, using fine vertical mattress sutures. In extreme cases, leaflets are replaced with autologous pericardium, using the algorithm: Leaflet free-edge length = reconstructed annular diameter times 1.5.

Results: Leaflet plication has been effective and stable in prolapse correction, with a negligible incidence of failure. Ultrasonic Nodular release and pericardial reconstruction also have been highly successful long-term. In combination with aortic ring annuloplasty, these leaflet techniques provide an effective method of AVr.

Conclusion: When performing AVr for significant AI, leaflet defects are common. Techniques for cusp repair using central plication, limited decalcification or Nodular release, and autologous pericardium, when combined with ring annuloplasty, afford a simple and comprehensive system for AVr.
26 The David V Valve Sparing Aortic Root Replacement Provides Excellent Mid to Long Term Outcomes for Bicuspid Valve Aortopathy Irrespective of the Degree of Preoperative Aortic Insufficiency

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Authors: *Michael O. Kayatta, D*Bradley G. Leshnower, LaRonica McPherson, Jose Binongo, Yi Lasanajak, *Edward P. Chen

Discussant: Prashanth Vallabhajosyula, University of Pennsylvania, Philadelphia, PA

Objectives: Standard therapy for aortic root dilation in the setting of bicuspid aortic valves remains use of a composite valve conduit. The long-term durability of valve sparing root replacement (VSRR) in bicuspid aortopathy, particularly with preoperative aortic insufficiency (AI), is presently unclear. In this study, the mid to long-term results of performing a David V VSRR in the setting of bicuspid valve aortopathy and AI were analyzed.

Methods: A single institutional database identified 280 patients who underwent VSRR from 2005-2016. Outcomes were analyzed in 60 consecutive patients undergoing a VSRR in the setting of a bicuspid aortic valve with AI. Patients were followed prospectively and had annual echocardiograms.

Results: The average age in this series was 42±11 years. Eighty percent were male and 33% had NYHA Class III-IV symptoms. Either 3+ (22%, 13 pts) or 4+ (28%, 17 pts) AI was present in 50% of patients preoperatively. The incidence of operative death, stroke and renal failure was 0%. Ventilation hours and hospital length of stay were 13.3±14 hours and 6±2 days, respectively. The average period of follow-up was 39±30 months (range 1-112 months). At latest follow-up, 62% of patients had zero AI and 87% of patients had <1+ AI. At 9 years, freedom from >2+ AI was 97% and freedom from AVR was 96%. Preoperative AI was not found to be a significant risk factor for postoperative >2+ AI (p=0.61) or AVR (p=0.61). VSRR significantly reduced LV dimensions on the latest follow-up echocardiogram (Table).

Conclusions: The David V VSRR can be safely and effectively performed in young patients with bicuspid valve anatomy regardless of the degree of pre-operative AI. At mid to long term follow-up, valve function is durable and the incidence of valve-related complications is low. VSRR is an attractive and potentially superior option to conventional root replacement in appropriately selected patients with bicuspid aortopathy.

Echocardiographic data before surgery and at most recent follow-up

<table>
<thead>
<tr>
<th></th>
<th>Preoperative</th>
<th>Most Recent</th>
<th>Change (95% CI)</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>EF</td>
<td>54.41 (6.65)</td>
<td>58.23 (7.12)</td>
<td>Change: 2.55 (-0.14, 3.24)</td>
<td>0.06</td>
</tr>
<tr>
<td>LVEDD</td>
<td>3.85 (0.81)</td>
<td>3.28 (0.62)</td>
<td>Change: -0.57 (-0.78, -0.37)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>LVESD</td>
<td>1.38 (0.81)</td>
<td>1.20 (0.62)</td>
<td>Change: -0.18 (-0.33, -0.04)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

*STSA Member  D Relationship Disclosure*
27 Functional Outcomes of Non-aneurysmal Type I Bicuspid Aortic Valve Repair With Annular Stabilization: Subcommissural Annuloplasty Versus External Subannular Aortic Ring

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Authors: Hanjo Ko, Joseph E Bavaria, Caroline Kamlo, Yianni Augoustides, Melanie Freas, Mary Siki, Karianna Milewski, DWilson Y. Szeto, Nimesh Desai, Prashanth Vallabhadrosula

Discussant: *Marc R. Moon, Washington University, St. Louis, MO

Objectives: For repairable bicuspid (BAV) aortic insufficiency (AI), external subannular aortic ring (ESAR) is being increasingly utilized for annular stabilization, compared to traditional technique of subcommissural annuloplasty (SCA). Yet there is no comparative study assessing functional equivalence or superiority of ESAR over SCA. We report our single institution experience of functional outcomes of these two techniques.

Methods: From 2003-2017, 139 patients underwent type I BAV repair, of which 52 had SCA and 27 had ESAR. Intraoperative transesophageal echocardiography performed before and after procedure were retrospectively analyzed by two operators independently for 11 parameters in the functional aortic root complex (Figure 1).

Results: Preoperatively, ESAR patients had larger annulus, LVOT diameter, and more billowing (p=0.005) than SCA patients; but degree of AI eccentricity was less (p=0.007; Table 1). In-hospital/30-day mortality and stroke rates were zero. Postoperatively, 100% freedom from AI>1+ was achieved in both groups, with significant reduction of the vena contracta, degree of AI eccentricity, and LV dimension (p<0.05, Table 1). In each group, significant reduction in annulus (25 ± 2.5mm vs. 24.7 ± 2.2mm ESAR), LVOT (25.8 ± 3.1mm vs. 25.4 ± 3.8mm), and cusp billowing (1.4 ± 0.5mm vs. 2.3 ± 1.6mm) were achieved compared to preoperative values (p<0.05). Further, ESAR patients showed improved transvalvular gradients compared to SCA (p<0.003), with lower AI grade and eccentricity. Although postoperative annular diameters were similar, the annular reduction achieved was greater in the ESAR patients (-3.4 ± 2.2mm vs. -5.1 ± 2.7mm; p=0.01).

Conclusions: ESAR provides improved annular reduction and transvalvular gradients than SCA, with excellent freedom from AI>1+. Further echocardiographic follow-up outcomes will be important to understand the functional significance of these differences.
28V Open Surgical Repair for the Removal of an Atrial Septal Amplatzer™ Device Eroding the Aortic Root

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**Authors:** D*Joseph S. Coselli, D*Scott A. LeMaire, D*Ourania Preventza, *Kim I. de la Cruz, Cristian Rosu, *Gregory Pattakos, Scott Weldon

**Author Institution(s):** Baylor College of Medicine, Houston, TX

**Objectives:** The Amplatzer Septal Occluder is a minimally invasive device used to treat atrial septal defects (ASD). Despite the low associated complication rates, the Amplatzer device has, on rare occasions, been found to erode surrounding structures. We describe a case in which a patient presented with an aortic root fistula and underwent open surgical repair to remove an Amplatzer device that had been percutaneously inserted 9 years earlier to repair an ostium secundum ASD.

**Methods:** A 33-year-old woman presented for evaluation of device erosion into the aortic root, with continuous blood flow between the aorta and right atrium consistent with a fistula. The patient underwent elective surgical repair via a median sternotomy to remove the Amplatzer device from the atrial septum. Exploration revealed a fistula from the noncoronary sinus of the aortic root into the right atrium. Repair consisted of removing the device, replacing the aortic wall of the entire noncoronary sinus and the right atrial wall with bovine pericardium, and replacing the atrial septum with autogenous pericardium.

**Results:** The patient had an uneventful recovery with no complications—including no dysrhythmia or heart block—and was discharged on post-operative day 6. Post-operative transesophageal echocardiography showed no post-repair shunt from the noncoronary sinus to the right atrium and an entirely competent aortic valve. The patient has returned to work and remains well 5 months after the procedure.

**Conclusion:** Although complications are uncommon after closure of an ASD with an Amplatzer Septal Occluder, the device may erode surrounding structures and produce a fistula. Such complications can be successfully repaired with extensive open surgical techniques.
29 Risk Factors for Occult N2 Disease in Patients With Non-Small Cell Lung Cancer

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**Authors:** Adam R. Dyas*, D*Robert J. Cerfolio*, R.W. King*, Asem F. Ghanim*,

**Author Institution(s):** 1University of Alabama, Birmingham, AL; 2New York University, New York, NY

**Discussant:** *Matthew J. Bott, Memorial Sloan Kettering Cancer Center, New York, NY

**Objectives:** Our objective is to compare the clinical to the pathologic stage in patients with non-small cell lung cancer (NSCLC).

**Methods:** A review of a prospective database. Patients had NSCLC, chest tomography (CT), integrated positron emissions tomography (PET) scan and mediastinoscopy and/or endobronchial ultrasound for suggested N2 and/or N1 or central tumors or tumors > 5 cm.

**Results:** Between January/2006 – December/2016, there were 1,444 consecutive patients. The accuracy of clinical staging using CT and PET was 80% and 78% was for stage I, 59% and 64% for stage II, 60% and 50% for stage III, and 82% and 61% for stage IV, respectively. Pathologic N1 disease was proven in 104 patients and missed in 53 (51%) by CT and 67 by PET (64%). There were 45 (43%) patients who were predicted correctly as N1 negative on both CT and PET. Pathologic N2 disease was proven in 279 patients and missed in 131 (47%) by CT and 122 (44%) by PET. There were 110 (39%) patients who were predicted correctly as N2 negative on both CT and PET. Occult N2 was found in 10% of patients clinically staged I and in 17% of patients clinically staged II (most commonly subcarinal and aortopulmonary). Statistically significant risk factors for occult N2 disease include larger tumor size (>3cm) on CT, presence of tumor lymphovascular invasion and poor tumor differentiation (Table 1).

**Conclusions:** Despite advancements in CT, PET and minimally invasive lymph node biopsy there remains significant mis-staging and missed N2 and N1 disease.

<table>
<thead>
<tr>
<th>Statistically Significant Risk Factors for Occult N2 Disease</th>
<th>Occult N2 Disease</th>
<th>Clinical Stage 1</th>
<th>Statistical Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size by CT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• 0-2.99cm</td>
<td>32 (43.87) [3.21]</td>
<td>416 (404.13) [0.31]</td>
<td>χ2 = 12.986, Fischer’s Exact p = 0.00025</td>
</tr>
<tr>
<td>• 3-5.99cm</td>
<td>28 (16.25) [8.49]</td>
<td>138 (149.75) [0.92]</td>
<td></td>
</tr>
<tr>
<td>• ≥6cm</td>
<td>1 (0.08) [0.02]</td>
<td>8 (8.12) [0.00]</td>
<td></td>
</tr>
<tr>
<td>Lymphovascular Invasion</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Yes</td>
<td>47 (10.92) [13.24]</td>
<td>64 (100.08) [13.01]</td>
<td>χ2 = 161.6711, p &lt; 0.0001</td>
</tr>
<tr>
<td>• No</td>
<td>13 (49.08) [26.52]</td>
<td>44 (449.92) [2.89]</td>
<td></td>
</tr>
<tr>
<td>Degree of Differentiation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>• Well</td>
<td>10 (19.70) [4.78]</td>
<td>199 (189.30) [0.50]</td>
<td>χ2 = 24.9189, p &lt; 0.00001</td>
</tr>
<tr>
<td>• Moderate</td>
<td>15 (23.10) [2.84]</td>
<td>230 (221.90) [0.30]</td>
<td></td>
</tr>
<tr>
<td>• Poor</td>
<td>31 (13.20) [24.01]</td>
<td>109 (126.80) [2.50]</td>
<td></td>
</tr>
</tbody>
</table>

Note: The expected value for each group is in parentheses, and the χ2 statistic for each cell is in brackets.
30 Current State of Empyema Management

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Author Institution(s): Washington University, St. Louis, MO

Discussant: *William R. Mayfield, WellStar Health System, Marietta, GA

Objectives: Empyema affects over 30,000 patients annually in the United States and recent consensus guidelines demonstrate ambiguity about the most appropriate treatment modality. This study examines trends and outcomes for inpatient treatment of empyema using a comprehensive, longitudinal dataset that encompasses an entire state cohort of hospitalized patients.

Methods: We queried the Healthcare Cost and Utilization Project (HCUP) New York State Inpatient Database for patients with primary empyema (2009-2014) and subsequent readmissions. Patients were categorized into three groups by definitive treatment during their initial hospitalization: nonsurgical drainage (thoracentesis or chest tube placement), VATS decortication/drainage, or open decortication/drainage. Treatment outcomes were compared between groups using chi-square tests.

Results: The HCUP database included 9,543 patients undergoing intervention for primary empyema during this period. Definitive treatment options remained stable over time, with the majority of patients receiving definitive nonoperative management (nonsurgical drainage: 66.1%, VATS: 17.1%, open: 16.9%, p<0.001). Overall, these patients have a high mortality rate (nonsurgical: 13.7%, VATS: 5.1%, open: 7.5%, p<0.001), a substantial readmission rate for empyema (nonsurgical: 8.8%, VATS: 4.5%, open: 5.8%, p<0.001), with reintervention at readmission substantially higher for nonsurgical (10.4%) vs surgical patients (VATS: 1.8%, open 3.5%, p<0.001).

Conclusions: This study characterizes the current treatment practices of patients with empyema, demonstrating stable rates of nonsurgical and surgical treatments. Higher readmission and reintervention rates were observed in the nonsurgical patients, suggesting some of these patients may benefit from earlier definitive surgical intervention. Notably, success rates with VATS vs open drainage or decortication were comparable.

Definitive Treatment During Initial Hospitalization for Empyema

<table>
<thead>
<tr>
<th>Definitive Treatment Modality</th>
<th>Chest Tube or Thoracentesis</th>
<th>VATS Drainage or Decortication</th>
<th>Open Drainage or Decortication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Cohort n=9,543</td>
<td>n=6,306 (66.1%)</td>
<td>n=1,627 (17.1%)</td>
<td>n=1,610 (16.9%)</td>
</tr>
<tr>
<td>Outcome Measure</td>
<td>n (%)</td>
<td>n (%)</td>
<td>n (%)</td>
</tr>
<tr>
<td>Length of Stay (Median and IQR)</td>
<td>11 days (6-19)</td>
<td>13 days (9-20)</td>
<td>15 days (10-22)</td>
</tr>
<tr>
<td>Mortality (Index Hospitalization)</td>
<td>872 (13.7%)</td>
<td>83 (5.1%)</td>
<td>120 (7.5%)</td>
</tr>
<tr>
<td>30 Day Readmission for Any Reason</td>
<td>1,797 (28.5%)</td>
<td>245 (15.1%)</td>
<td>300 (18.6%)</td>
</tr>
<tr>
<td>30 Day Readmission for Empyema</td>
<td>556 (8.8%)</td>
<td>73 (4.5%)</td>
<td>94 (5.8%)</td>
</tr>
<tr>
<td>30 Day Reintervention Rate</td>
<td>657 (10.4%)</td>
<td>29 (1.8%)</td>
<td>57 (3.5%)</td>
</tr>
<tr>
<td>90 Day Reintervention Rate</td>
<td>915 (14.5%)</td>
<td>45 (2.8%)</td>
<td>84 (5.2%)</td>
</tr>
</tbody>
</table>
31V Hybrid Superior Sulcus Tumor Resection

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Authors: Jordan Hoffman, DJohn D. Mitchell

Author Institution(s): University of Colorado, Denver, CO

Objectives: To describe a novel technique combining a limited open and thoracoscopic approach to resection of superior sulcus tumors.

Methods: A superior sulcus tumor was resected using a combination of a limited open posterior paraspinal approach followed by completion thoracoscopic lobectomy and lymphadenectomy.

Results: We were able to remove a large superior sulcus tumor with a hybrid open and thoracoscopic approach. We were able to achieve widely negative margins and 14 negative lymph nodes.

Conclusion: A hybrid approach to superior sulcus tumor resection is feasible and safe.
32 Excess Cost of Complications and Their Predictive Factors After Esophagectomy in the SEER-Medicare Database

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**Authors:** Renjian Jiang2, Yuan Liu2, Kevin Ward2, *Seth D. Force1, *Allan Pickens1, *Manu S. Sancheti1, *Jeffrey Javidfar1, *Felix Fernandez1, *Onkar V. Khullar1

**Author Institution(s):** 1Emory University School of Medicine, Decatur, GA; 2Rollins School of Public Health, Emory University, Atlanta, GA

**Discussant:** Brian E. Louie, Swedish Cancer Institute and Medical Center, Seattle, WA

**Objectives:** To examine 90-day excess costs associated with inpatient complications post-esophagectomy, and predictive factors for these costs, utilizing the Surveillance, Epidemiology, and End Results (SEER)-Medicare database.

**Methods:** We examined patients over age 65 diagnosed from 2002-2009 with adenocarcinoma of the lower esophagus undergoing esophagectomy, in the SEER-Medicare data. Quantile regression models were fit, with corresponding 95% confidence intervals, at increasing intervals of 5% for the excess 90-day cost associated with perioperative complications, controlling for baseline characteristics. Excess cost was defined as the difference in total cost for those with versus without the complication. The analyses were then stratified by patient characteristics to identify predictive factors.

**Results:** 812 patients were identified in the cohort, of whom, 46% had at least one complication. Significant excess cost was associated with intraoperative or pulmonary complication across all quantiles ($p<0.05$). Mechanical wound (0.05-0.65 quantiles), infection (0.30-0.85 quantiles), and systemic (0.30-0.85 quantiles) complications were associated with higher costs (Figure). The excess costs of these complications were significantly elevated in the higher quantiles. At the 0.50 quantile, the excess cost in patients with any complication was significantly higher in patients undergoing a transhazardous esophagectomy, an emergent esophagectomy, with a Charlson comorbidity index $>0$, living in a non-metro area or poorer community, or in hospitals with a higher total number of beds; no such cost difference was identified in patients without a complication (Table). Similar results were observed in patients with a pulmonary complication.

**Conclusions:** Complications after esophagectomy result in significant excess 90-day cost. Quality improvement efforts should focus on this cohort of patients, as this may result in significant improvements in both outcomes, as well as cost.
Assessing the Clinical Feasibility of Implementing a Novel Assessment of Frailty, the Electronic Rapid Fitness Assessment in Diverse Thoracic Surgery Clinics

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Authors: Robert J. Downey, Beatriz Korc-Grodzicki, Ryan Weber, Andrew Vickers, *David R. Jones, Manjit S. Bains, Armin Shahrokni

Author Institution(s): Memorial Sloan Kettering Cancer Center, New York, NY

Discussant: *Linda W. Martin, University of Virginia, Charlottesville, VA

Objectives: The American College of Surgeons and American Geriatrics Society recommend geriatric/frailty assessment (GA) in the preoperative evaluation. We previously reported the development and implementation of the electronic Rapid Fitness Assessment (eRFA) in geriatric clinics. We now report the feasibility of clinical implementation of the eRFA in diverse thoracic surgery outpatient settings.

Methods: Over 5 months, the eRFA was implemented until used by 5 surgeons in 2 outpatient clinics. All patients presenting for initial consultation completed the self-reported components of the eRFA by themselves or with the help of caregivers using a tablet or desktop computer, before coming to the clinic or in the clinic. A nurse performed the timed “get up and go” test and MiniCog test. A summary report was prepared for the clinician by the time of the encounter; the data were stored in a database and as part of the electronic medical record. Time to complete the eRFA was recorded.

Results: Since initiation in 9/2016, 78% of patients (65/83; median age, 71 [range, 20-88]; 31F:34M) completed the eRFA at initial consultation with a thoracic surgeon. Median time to complete was 9 min (range, 2-50); 75% of surveys were completed by the patient alone, 23% with a caregiver, and 3% by a caregiver alone. Many geriatric syndromes were found: 26% of patients (17/65) had abnormalities in word recall, clock drawing, and/or timed “get up and go”; 41% (27/65) needed assistance with activities of daily living; 9% needed a cane or other support to ambulate; and 26% had at least 1 fall in the last year.

Conclusions: Administration of the eRFA, an electronic assessment of patient frailty, is feasible in the initial evaluation of thoracic surgery patients. Future steps include characterization of functional reserve of patients considered for surgery, creation of prognostic models, and development of clinical trials to assess means of improving outcomes in this at-risk population.
**34 Comprehensive Program for Air Leak Prevention and Management After Lobectomy for Lung Cancer is Associated With Reduced Length of Stay**

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**Authors:** Jessica Mayor¹, DDonald R. Lazarus¹, Roberto F. Casal², Shuab Omer¹, D*Ourania Preventza¹, Katherine Simpson¹, Ernesto Jimenez¹, *Lorraine D. Cornwell¹

**Author Institution(s):** ¹Baylor College of Medicine, Houston, TX; ²MD Anderson Cancer Center, Houston, TX

**Discussant:** *John A. Howington, Saint Thomas Health, Nashville, TN

**Objectives:** Air leaks remain an important impediment to recovery from lung resection surgery. We developed a comprehensive program to help prevent and manage air leaks by using pre-compression of lung staple lines, sealant, fissureless video-assisted thoracoscopic (VATS) lobectomy, a digital drainage system, endobronchial valve placement for prolonged air leak, and other measures. We aimed to assess the effectiveness of this program on chest tube duration and hospital length of stay in our high-risk veteran population.

**Methods:** Data were retrospectively analyzed from 235 patients who underwent lung resection for clinical stage I or II lung carcinoma by VATS or open lobectomy in a single Veterans Affairs medical center. A prospectively maintained database was evaluated and divided into 2 groups for comparison: Group A (n=115), the intervention group, underwent lobectomy from 2012 until 2014 and received all aspects of the comprehensive program, and group B (n=120), underwent lobectomy surgery from 2009 to 2011 and served as historical controls.

**Results:** Group A had fewer median chest tube days (3 d, IQR 2-4) than group B (4 d, IQR 2-6) (p=0.0062). Group A also had a shorter median hospital stay (6 d vs 8 d, p<0.0001). Prolonged chest tube duration, defined as >5 days, was much less common in Group A (8.7%) than in group B (26.7%) (p=0.0003). Likewise, prolonged length of stay, defined as more than 14 days, was less frequent in Group A (4.4%) than in group B (16.7%) (p=0.0022). Multivariate analysis showed that predictors of longer length of stay included open surgery, preoperative DLCO<60% predicted, and surgery in the early time period (group B) (p<0.01 for all).

**Conclusions:** In this study, our comprehensive program to prevent and manage air leak after lung surgery is associated with reduced chest tube duration and hospital length of stay.

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Authors: Tara Karamlou1, Jorge Arango2, Lucia Mirea1, Monique Riemann1, David Adelson1,2, Richard Towbin1, John Nigro3,1

Author Institution(s): 1Phoenix Children's Hospital, Phoenix, AZ; 2Barrow's Neurologic Institute, Phoenix, AZ; 3Pediatric Cardiac Surgery, Rady Children's Hospital, San Diego, CA

Discussant: D* James S. Tweddell, Cincinnati Children's Hospital Medical Center, Cincinnati, OH

Objectives: Ensuring that cerebral perfusion is optimized among neonates undergoing single ventricle palliation (SVP) could mitigate neurologic risk, and dramatically improve neurodevelopmental outcome. Current methods utilized to evaluate adequacy of brain perfusion (cerebral near-infrared spectroscopy) are indirect and lack sensitivity. We sought: 1) to investigate the feasibility of a transcranial Doppler (TCD) to assess cerebral blood flow (CBF) in the immediate postoperative period following SVP; 2) describe the evolution of CBF within different vascular beds; 3) correlate CBF changes with relevant clinical information.

Methods: Prospective feasibility study of neonates (< 30 days) having SVP in 2016 at our institution. Protocolized serial TCD measured blood flow velocity within major cerebral arteries at 2, 6, 12, and 24 hrs postoperatively, and derived metrics including pulsatility and resistance index were calculated using standard formulas. These velocities were interpreted as surrogates for CBF. TCD parameters were correlated with clinical information, and regression models characterized the trajectory of TCD velocities over time intervals.

Results: Procedures among 11 neonates who completed the protocol were Norwood in 6, Hybrid in 2, aortopulmonary shunt in 2, arch reconstruction with damus-kaye-stansel and aortopulmonary shunt in one. Parabolic trends over time were identified for most of the cerebral arteries, with a nadir in CBF by 6 hrs (Figure 1A). CBF dropped significantly despite mean arterial blood pressure (MABP) > 50 mmHg (Figure 1B). CBF normalized to baseline in the majority of subjects at 24 hrs.

Conclusions: Serial TCD is feasible following SVP and could inform perioperative care to optimize brain perfusion. CBF following SVP drops significantly despite adequate MABP, indicating that current strategies to optimize MABP may not optimize CBF. These CBF changes may partly explain neurodevelopmental delays common to the SV population.
36 Use of Septal Myectomy in Subaortic Stenosis Membrane Resection: The Effect on Recurrence Rates Requiring Reoperation

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Authors: Alyssa A. Mazurek, Sunkyung Yu, Ray E. Lowery, Richard Ohye

Author Institution(s): University of Michigan, Ann Arbor, MI

Discussant: *Joseph A. Dearani, Mayo Clinic, Rochester, MN

Objectives: Recurrence of subaortic stenosis (SubAS) is up to ~19% following resection. Historically, treatment has consisted of membrane resection alone. This study investigated the effect of routine septal myectomy in addition to membrane resection.

Methods: A single-center review was performed in all patients <18 years of age undergoing membrane resection with septal myectomy for SubAS from 2003-2013. Demographic, perioperative, and follow-up data were collected. Freedom from reoperation and risk factors for reoperation were determined.

Results: 107 subjects (median age 4.8 years) were identified. There was one in-hospital death, five patients (5%) requiring pacemaker and no iatrogenic ventricular septal defects. Follow-up was 80% complete and median follow-up was 4.9 years (range: 0.5-12 years). Fourteen (16%) subjects required reoperation. Freedom from reoperation was 98% at 1 year, 86% at 5 years and 69% at 10 years (Figure 1). There was no difference in initial decrease of peak gradient between patients who did and did not require reoperation (-47 vs. -40 mmHg; p=0.59). On univariate analysis, chromosomal anomaly (hazard ratio [HR] 5.0, p=0.02), body surface area ≤ 0.71 m² (HR 6.8, p = 0.01) and age at surgery ≤ 4.8 years (HR 12.2, p = 0.02) were significantly associated with reoperation.

Conclusions: The routine use of myectomy with membrane excision did not result in a lower rate of reoperation or higher rates of complications compared to historical controls. Younger age, smaller size and chromosomal anomaly were associated with increased risk for reoperation. Patients with these risk factors may benefit from more intensive long-term follow-up.

![Graph showing freedom from re-operation over time](image_url)
37 Neonatal Systemic Pulmonary Shunts: Is the Configuration of the Shunt a Risk Factor?

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**Authors:** *Joseph Caspi

**Author Institution(s):** Louisiana State University, New Orleans, LA

**Discussant:** *T K Susheel Kumar, Le Bonheur Children’s Hospital, Memphis, TN

**Objectives:** Construction of systemic-to-pulmonary shunt (SPS) still carries high morbidity and mortality. In vitro flow dynamics studies demonstrated correlation between irregular luminal flow patterns, the shape and size of the artificial conduit and early clotting. We analyzed the relationship between the configuration of the SPS and the potential adverse events in newborns with cyanotic heart diseases.

**Methods:** Between January 2004 and December 2015, 88 newborns (<30 days old) underwent SPS with expanded polytetrafluoroethylene (ePTFE) tube graft (3.5-4mm). Median weight was 2.8 (1.7-4.1) kg. Patients with HLHS were excluded. Thirty-eight (43%) patients had biventricular morphology and 50 (57%) patients univentricular morphology. Two shapes of ePTFE grafts were compared: straight Blalock-Taussig (BT) shunt from the subclavian artery to the ipsilateral pulmonary artery (PA) in 35 (40%) patients (Group 1) and curved central shunt (CS) between the aorta and the main PA in 53 (60%) patients (Group 2).

**Results:** One patient with pulmonary atresia and intact ventricular septum died of low cardiac output (1%). Acute shunt occlusion occurred in 2 (5.7%) patients in group 1 and 3 (5.6%) patients in group 2 (NS). Upsizing of the ePTFE graft due to inadequate pulmonary blood flow was required in 3 (8.5%) patients in group 1 (p<0.05). Pulmonary overcirculation occurred in 5 (9.4%) patients in group 2 and in 1 (2.8%) patient in group 1 (p<0.05). Univentricular morphology and body weight <2.5 kg were significant risks of early shunt clotting and pulmonary over circulation (p<0.05). The increase of PA Nakata index was more significant in group 2 (p<0.05) with fewer patients requiring PAAs patch augmentation.

**Conclusions:** Curved shape of CS is not a risk factor of early occlusion compared to straight BT shunt. CS effectively promotes the growth of the PAs. Univentricular hearts and body weight <2.5 kg are risk factors of early shunt clotting and pulmonary over circulation.
38 Liberal Use of Delayed Sternal Closure Following Pediatric Cardiac Surgery is Not Associated With Increased Morbidity

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**Authors:** Ram Kumar Subramanyan1,2, Nigel Scott2, Winfield J. Wells1,2, Vaughn A. Starnes1,2

**Author Institution(s):**
1 University of Southern California, Los Angeles, CA;
2 Children's Hospital, Los Angeles, Los Angeles, CA

**Discussant:** *S. Adil Husain, University of Texas Health Science Center, San Antonio, TX*

**Objectives:** Delayed sternal closure (DSC) is often employed to optimize hemodynamics following pediatric cardiac surgery. Prior reports have suggested that DSC may be associated with increased morbidity. We sought to analyze the impact of a liberal policy of DSC on surgical outcomes at our center.

**Methods:** We retrospectively evaluated the clinical course of 1,000 consecutive patients whose sternum was left open following complex pediatric cardiac surgery. Data are presented as median and quartiles.

**Results:** The cohort of 1,000 patients was operated on between June 2005 and Dec 2015. In majority of cases, the sternum was left open following complex surgery, usually involving circulatory arrest, especially in neonates. Age at index surgery was 7 (3-19) days and weight 3.3 (2.8-3.7) kg. 954 (95%) patients were infants, including 764 (76%) neonates. Index operations included 324 (32%) STAT 5, 489 (49%) STAT 4, 185 (19%) STAT 3 and 2 STAT 2 procedures. DSC was undertaken 3 (2-4) days post-op in the intensive care unit in 97.8% patients. Overall, major STS morbidity was 23.6% and mortality 6.8%. 74 patients had their DSC 7 days or more after their index procedure, and mortality in this sub-group was 38% (vs. 4.3% in under 7 days, p< 0.001). There were 64 (6.4%) clinical sternal and mediastinal wound infections, and 59 (5.9%) positive surveillance cultures with the most common organism being coagulase-negative staphylococcus. There were a total of 105 (10.5%) infectious complications. Compared to STS database current outcomes, mortality and length of stay in our patients were comparable when analyzed as benchmark procedures or STAT categories (Table).

**Conclusions:** A liberal policy of DSC does not adversely affect surgical outcomes, including infectious complications and length of stay. We submit that need for DSC should not, in itself, be considered a source of morbidity.

### Outcomes compared to STS database

<table>
<thead>
<tr>
<th>Procedure</th>
<th>Mortality % (Cohort)</th>
<th>Mortality % (STS)</th>
<th>Mediastinitis % (Cohort)</th>
<th>Mediastinitis % (STS)</th>
<th>ICU LOS d (Cohort)</th>
<th>ICU LOS d (STS)</th>
<th>Hospital LOS d (Cohort)</th>
<th>Hospital LOS d (STS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Norwood</td>
<td>1.2</td>
<td>1.5</td>
<td>1.3</td>
<td>1.3</td>
<td>37</td>
<td>44</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Arterial Switch</td>
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<td>3.2</td>
<td>0.9</td>
<td>0.6</td>
<td>19</td>
<td>21</td>
<td></td>
<td></td>
</tr>
<tr>
<td>STAT 5</td>
<td>10.7</td>
<td>13.6</td>
<td>2</td>
<td>14</td>
<td>33</td>
<td>40</td>
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<tr>
<td>STAT 4</td>
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<td>18</td>
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<tr>
<td>STAT 3</td>
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<td>0.3</td>
<td>8</td>
<td>12</td>
<td>14</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

LOS = length of stay
ICU = Intensive Care unit
d = days
39 Porcine Small Intestine Submucosa Patch is a Suitable Material for Norwood Arch Reconstruction

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**Authors:** Roni Jacobsen1,2, *Michael E. Mitchell*2, Ronald Woods1,2, Shagun Sachdeva1,2, D*James S. Tweddell*3,4

**Author Institution(s):** ¹Children’s Hospital of Wisconsin, Milwaukee, WI; ²Medical College of Wisconsin, Milwaukee, WI; ³Cincinnati Children’s Hospital Medical Center, Cincinnati, OH; ⁴University of Cincinnati, Cincinnati, OH

**Discussant:** D*Brian E. Kogan, University of Mississippi Medical Center, Jackson, MS

**Objectives:** The Norwood procedure typically requires a patch for arch reconstruction. The patch material may impact the risk of arch obstruction or aneurysm formation. Our objective was to determine the utility of porcine small intestine submucosa (PSIS) patch (CorMatrix, Rosswell, GA) for Norwood arch re-intervention.

**Methods:** A single institution retrospective analysis of the Norwood operation using PSIS patch for arch construction. Outcome end points included: survival, transplant free survival, arch re-intervention and aneurysm formation or rupture of the PSIS patch.

**Results:** Forty-four patients underwent a Norwood Procedure using PSIS patch from February of 2011 to January of 2015. Median follow-up was 387.5 days. There was 1 early and 2 late deaths. Two patients were transplanted at 2 and 4 years. Freedom from death or transplant was 89%. Five patients underwent re-intervention on the aortic arch. Two patients underwent surgical patch arterioplasty for recurrent arch obstruction; one at 16 days and the other at 92 days after the Norwood procedure. Three patients underwent catheter based arch re-intervention at 83, 209 and 214 days after the Norwood procedure. Freedom from arch re-intervention was 85% at 4 years. There was no instances of patch failure, specifically, no aneurysm formation or patch ruptures.

**Conclusions:** Survival and freedom from recurrent arch obstruction following Norwood operation with PSIS patch compares favorably to other materials. There was no incidence of rupture or aneurysm formation of the patch material.
40 Less is More in Post Pediatric Heart Transplant Care

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Authors: R.E. Edens, Samantha Wagner, Michelle Staron, Jennifer Maldonado, *Joseph W. Turek

Author Institution(s): University of Iowa Children's Hospital, Iowa City, IA

Discussant: *Kristine J. Guleserian, Nicklaus Children's Hospital, Miami, FL

Objectives: This study aimed to evaluate post-transplant (tpx) immunosuppression and rejection monitoring methods pertaining to use of steroids and surveillance biopsies. Historically, both treatments have been standard of care, however each carries risks. Herein, we describe our experience eliminating steroid and surveillance biopsy use post pediatric heart tpx. The entire patient population received the same dosages of Tacrolimus and Cellcept over the 15 years. We hypothesized there would be no differences in outcome pertaining to survival, rejection, and fewer adverse events.

Methods: We performed a retrospective study examining outcomes of pediatric cardiac tpxs over a 15 year period (n=49). Two groups were formed: (1) received steroids > 1 week post-tpx AND underwent routine protocol biopsy (n=18); and (2) neither received steroids nor underwent routine biopsy (n=13). The remaining 18 patients either received steroids or underwent biopsy but not the other (did not fit into either comparative group).

Results: No differences were found between groups for patient demographics or pre-tpx risk factors. Group 1 patients exhibited 94% 1-year survival, while Group 2 exhibited 92%. Most notably, 14 patients in the complete patient population exhibited moderate-severe rejection (11/14 included in Group 1; 3/14 received long term steroids, but did not undergo surveillance biopsies, thus did not meet inclusion criteria for either group). No significant cases of rejection detected in Group 2. Statistical analysis suggests more patients on steroids experienced hypertension post-tpx (p=.0028). No statistical difference was found comparing dialysis dependent renal failure.

Conclusions: This study suggests that less-invasive post-tpx management that avoids biopsies and steroids can be implemented while achieving at least comparable clinical outcomes. The promising outcomes of this study suggest a larger, multi-institutional, prospective study would be beneficial.
41 Nadir Hematocrit on Bypass and Rates of Acute Kidney Injury in Coronary Artery Bypass: Does Sex Still Matter?

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Author Institution(s): 1 University of Michigan, Ann Arbor, MI; 2 Henry Ford Hospital, Detroit, MI; 3 Massachusetts General Hospital, Boston, MA; 4 Medical University of South Carolina, Charleston, SC; 5 Mayo Clinic, Rochester, MN; 6 St. John Providence Health System, Detroit, MI; 7 Michigan Heart and Vascular Institute, St. Joseph Mercy Hospital, Ann Arbor, MI

Discussant: *Vinod H. Thourani*, MedStar Heart Institute, Washington Hospital Center, Washington, DC

Objectives: Findings from a recent large multi-center experience associated lower nadir hematocrit (Hct) with an increased risk of acute kidney injury (AKI) following cardiac surgery, although the effect was significantly greater among men. We explored whether sex-related differences persisted among patients undergoing isolated coronary artery bypass grafting (CABG).

Methods: We performed a prospective, observational study of 17,363 non-dialysis patients (13,137 male: 75.7%; 4,226 female: 24.3%) undergoing isolated CABG between 2011 and 2016 across 41 institutions participating in the Perfusion Measures and Outcomes (PERForm) registry. We calculated crude and adjusted odds ratios between nadir Hct during cardiopulmonary bypass and stage 2 or 3 AKI, and tested the interaction of sex with nadir Hct. Adjusted odds ratios generalized linear mixed effect models accounted for surgical year, pre- and intra-operative factors, and institution.

Results: Median nadir Hct was 26.9% among men and 22.1% among women (p < 0.001). Women were administered a greater median net prime volume indexed to body surface area (407 ml/m2 vs. 363 ml/m2), lower volume of ultrafiltration (1740.6 ml vs. 1340.4 ml), although more red blood cell (RBC) transfusions (24.3% vs. 55.5%), all p < 0.001. Rates of AKI were higher among women (4.3% vs. 6.0%, p < 0.0001). There was no significant interaction between sex and nadir Hct (p = 0.67). Lower nadir Hct was inversely associated with AKI (adjusted OR per 1 unit increase in nadir Hct 0.96, CI 95%: 0.93 to 0.98); this effect was similar across sexes (Figure), and independent of RBC transfusions.

Conclusions: In this large, multi-center experience, we found no significant sex-related differences in the effect of nadir Hct on AKI following isolated CABG. However, the strong inverse relationship between nadir Hct and AKI across sexes suggests the importance of reducing a patient’s exposure to lower nadir Hct.
42 Sternotomy Closure Using Rigid Plate Fixation Versus Wire Cerclage: Patient Reported and Economic Outcomes from a Multicenter, Randomized Trial

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Authors: DKeith B. Allen, D*Vinod H. Thourani, Yoshifumi Naka2, Kendra Grubb3, DJohn Grehan4, Nirav Patel5, DT Sloane Guy7, Kevin Landolfo8, DMarc Gerdisch9, Mark Bonnell10, DDavid Cohen1

Author Institution(s): 1St. Luke’s Mid America Heart Institute, Kansas City, MO; 2MedStar Heart Institute, Washington Hospital Center, Washington, DC; 3Columbia Presbyterian Hospital, New York, NY; 4University of Louisville, Louisville, KY; 5Allina Heart and Vascular, St. Paul, MN; 6Lenox Hill Hospital, New York, NY; 7Weill Cornell, New York, NY; 8Mayo Clinic, Jacksonville, FL; 9St. Francis Heart Center, Indianapolis, IN; 10University of Toledo Medical Center, Toledo, OH

Discussant: Daniel T. DeArmond, University of Texas Health Science Center, San Antonio, TX

Objectives: In a randomized, single blinded trial, rigid plate fixation (RPF) compared to wire cerclage (WC) resulted in significant improvements in sternal healing and fewer sternal complications at 6 months. Additional secondary endpoints are presented from this trial.

Methods: Twelve US centers randomized 236 patients to RPF (n=116) or WC (n=120). Pain, function and QOL scores were assessed out to 6 months and correlated to CT derived sternal healing scores using logistic regression. Cost analysis was performed by an independent core lab.

Results: Better sternal healing scores correlated to having no sternal pain both at rest (OR = 1.6; 95% CI 1.2-2.2; p=0.002) and after coughing (OR = 1.6; CI 1.2-2.2; p=0.0007). RPF resulted in more patients reporting no postoperative sternal pain after coughing at 3 weeks (p=0.001) and 6 weeks (p=0.003) and at rest at 6 weeks (p=0.01) and 3 months (p=0.03) compared to WC (Fig 1A-D). The probability of a patient reporting no difficulty with upper extremity function was significantly better following RPF at all time points measured compared to WC (Fig 1E). RPF resulted in improvements in SF-36 QOL scores at 3 weeks (p=0.03), 6 weeks (p=0.03) and 6 months (p=0.04) compared to WC. RPF resulted in a trend towards fewer readmissions (12.9% (15/116) vs 20.8% (25/120); p=0.1) and less time spent in rehabilitation hospitals/skilled nursing facilities (312 days vs 520 days; p=0.2). Cost analysis using a 90-day global period demonstrated that RPF was a statistically cost neutral strategy but in actual dollars cost $1,888 less than WC patients ($29,179 ± $21,016 vs $31,067 ± $28,562; p=0.5).

Conclusions: In a randomized trial, RPF compared to WC resulted in better sternal healing and fewer sternal complications through 6-months follow-up. Additional positive secondary endpoints included reduced sternal pain, improved upper extremity function and QOL scores and no additional cost in a 90-day bundled care model.

Figure 1: Pain scores at rest (A) and with forced coughing (C). Percent of patients and relative odds ratios of patients who report having no sternal pain at rest (B) and with forced coughing (D). Relative odds ratios of patients reporting no difficulty with using their upper extremities (E).
43 Reverse Remodeling of the Left Atrium Following Transaortic Myectomy in Patients With Obstructive Hypertrophic Cardiomyopathy

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Author Institution(s): Mayo Clinic, Rochester, MN

Discussant: Nicholas G. Smedira, Cleveland Clinic, Cleveland, OH

Objectives: In patients with hypertrophic cardiomyopathy (HCM), enlargement of the left atrium (LA) is associated with increased mortality and morbidity due to risk of atrial fibrillation, stroke, and heart failure. In this study, we investigated whether LA is capable of reverse remodeling by observing atrial dimensions early and late after transaortic myectomy.

Methods: Between March 2007 and July 2015, 1,434 pt underwent transaortic myectomy at our institution. Patients were included if they had pre- and at least one postoperative transthoracic echocardiographic (TTE) recording of LA dimensions (n=656). We reviewed clinical and echocardiographic data of these pt, comparing their pre- and postoperative measurements.

Results: The mean age was 54.4±13.9 yr and 370 (56%) were male. New York Heart Association Class III/IV dyspnea was present in 581 (89%). Preoperative TTE showed LA size of 26.9±6.1 cm², LA volume index (LAVI) of 49.9±16.7, and resting left ventricular outflow tract (LVOT) gradient of 58.6±41.4 mmHg. Moderate/severe mitral regurgitation (MR) was present in 188 (29%) and systolic anterior motion (SAM) in 563 (86%). All pt underwent transaortic myectomy. Postoperative complications included atrial fibrillation in 227 (35%) and stroke in 3 (0.5%). Early postoperative TTE was performed in 517 (79%) at a mean follow-up of 4.1±1.8 days, showing LA size of 25.8±5.4 cm² (p<0.001), LAVI of 45.8±14.6 (p<0.001), resting LVOT of 11.5±9.9 mmHg (p<0.001), moderate/severe MR in 10 (2%, p<0.001), and SAM in 146 (22%, p<0.001). Late postoperative TTE was performed in 209 (32%) at a mean follow-up of 2.4±2.0 yr, showing LA size of 23.8±5.1 cm² (p<0.001), and LAVI of 41.2±12.8 (p<0.001).

Conclusions: Left atrial size and volume decrease significantly following transaortic myectomy. Early changes likely reflect lower left atrial pressure due to LVOT gradient relief and abolishment of MR and late reduction in atrial size and volume suggests continued reverse remodeling.
44 STS Predicted Risk of Mortality Score Predicts Thirty-day Readmission Following Coronary Artery Bypass Grafting

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Author Institution(s): 1Emory University, Atlanta, GA; 2MedStar Heart Institute, Washington Hospital Center, Washington, DC

Discussant: DKeith B. Allen, Mid America Heart and Lung Surgeons, Kansas City, MO

Objectives: Trends in quality metrics and reimbursement models focus on 30d readmission rates after coronary artery bypass grafting (CABG). Certain preoperative variables are associated with higher rates of readmission. The purpose of this study was to determine whether STS short-term predicted risk of mortality (PROM) scores predict 30d readmission following CABG.

Methods: A retrospective review of all patients undergoing isolated CABG between 2002-2017 at a US academic institution was performed. Thirty-day readmission was collected for all patients. Logistic regression analysis was used to determine the association between PROM and readmission, and the area under the ROC curve was calculated to estimate predictive accuracy.

Results: Overall, 21990 patients underwent CABG during the study period, and 2027 (9.2%) patients were readmitted within 30d. Readmitted patients were sicker with higher rates of comorbid conditions and higher STS PROM scores (1.9% vs 2.6%, OR 1.31, CI 1.25-1.36, p<0.0001). Mean time to readmission was 18.0±9.9d with length of stay 4.8±2.1d. When PROM scores were divided into quintiles, higher PROM scores were significantly associated with increased odds of readmission (Table). PROM-adjusted 30d mortality was lower in the readmitted group (1.5% vs 1.0%, OR 0.57, CI 0.36-0.89, p<0.01), but mid-term survival was significantly worse. PROM was a modest predictor of readmission (area under ROC 0.58, CI 0.56-0.60) as compared to insurance status (0.54, 0.53-0.56), ejection fraction (0.52, 0.50-0.54), and history of heart failure (0.51, 0.50-0.52) (Figure).

Conclusions: STS PROM scores are strongly associated with increased risk of readmission following CABG, and STS PROM may be a more accurate predictor of those at risk than current metrics. Further studies are needed to generate robust prediction models so as to develop early intervention strategies aimed at patients at high risk for readmission.

<table>
<thead>
<tr>
<th>PROM Quintile</th>
<th>PROM Quantiles (range, %)</th>
<th>P value for trend</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Sample</td>
<td>(n=21990)</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>(n=4404)</td>
<td>0.12-0.53</td>
</tr>
<tr>
<td>2</td>
<td>(n=4385)</td>
<td>0.53-0.84</td>
</tr>
<tr>
<td>3</td>
<td>(n=4409)</td>
<td>0.84-1.38</td>
</tr>
<tr>
<td>4</td>
<td>(n=4394)</td>
<td>1.38-2.61</td>
</tr>
<tr>
<td>5</td>
<td>(n=4398)</td>
<td>2.61-4.92</td>
</tr>
<tr>
<td>Readmission, n (%)</td>
<td>267 (12.5%)</td>
<td>332 (7.5%)</td>
</tr>
<tr>
<td>OR (95% CI)</td>
<td>1.18 (1.00-1.38)</td>
<td>1.34 (1.14-1.57)</td>
</tr>
</tbody>
</table>

“Model” = PROM+Insurance+EF+prior HF

NOTES:
45 Can Liquid (Blood) Biopsies Replace Tissue Biopsies in Patients With Non-Small Cell Lung Cancer?

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Authors: Asem F. Ghanim*, Robert J. Cerfolio*, Bhavika N. Patel*, Francisco Robert

Author Institution(s): *University of Alabama, Birmingham, AL; 2New York University, New York, NY

Discussant: *James M. Isbell, Memorial Sloan Kettering Cancer Center, New York, NY

Objectives: Targeted chemotherapy based on driver tumor mutations in patients with non-small cell lung cancer (NSCLC) improves outcomes. Our goal is to show the accuracy of circulating free DNA in blood compared to tissue.

Methods: Blood samples were collected for DNA testing on 209 consecutive patients and evaluated using an available commercial product. Tissue-based mutation results were compared to blood-based results.

Results: From July 2015 to January 2017, 209 patients were evaluated. Mean time for blood-biopsy Epidermal Growth Factor Receptor (EGFR) results was three days and tissue-based EGFR results was three weeks. Liquid-biopsy EGFR results were available for all 209 patients. Tissue-based EGFR results were available for 152 patients. Tissue results were unavailable in 57 patients. EGFR was negative on both liquid and tissue biopsy in 28 patients and positive by both methodologies in 1 patient. Liquid biopsy was positive for EGFR on 2 patients where the tissue biopsy was negative – these patients had stage IIIA lung cancer. Tissue biopsy was positive for EGFR in 9 patients where liquid biopsy was negative; 6 of those mutations were variants not evaluated in the liquid-biopsy test. The 3 remaining patients were stages IA,IB and IIB. Liquid biopsy identified 2 additional patients with an EGFR mutation that had insufficient pathologic material to tissue test for EGFR.

Conclusions: Mutational status is returned faster and more often using liquid biopsies which facilitates decreased time to treatment in NSCLC patients. Utility for liquid biopsy looks promising, but may miss early stage cancers due to a lack of circulating DNA tumor shedding into the bloodstream. Liquid biopsy is complementary in patients who have small or necrotic tissue samples or when expedited results are desired.
46 Pre-operative CHA\(_{2}\)DS\(_{2}\)-VASc Score Predicts Post-operative Atrial Fibrillation After Lobectomy

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**Authors**: Charles T. Lee\(^1\), David M. Strauss\(^1\), Lauren E. Stone\(^1\), Jill C. Stoltzfus\(^1\), Matthew M. Puc\(^1\), William R. Burfeind\(^1\)

**Author Institution(s)**: \(^1\) St. Luke's University Hospital, Bethlehem, PA; \(^2\) Temple University, Philadelphia, PA

**Discussant**: Melanie Edwards, St. Louis University School of Medicine, St. Louis, MO

**Objectives**: Post-operative atrial fibrillation (POAF) affects 10-20% of non-cardiac thoracic surgeries and increases patient morbidity and costs. The purpose of this study is to determine if pre-operative CHA\(_{2}\)DS\(_{2}\)-VASc score can predict POAF after pulmonary lobectomy for non-small cell lung cancer. CHA\(_{2}\)DS\(_{2}\)-VASc score components are captured in the STS database.

**Methods**: Patients with complete CHA\(_{2}\)DS\(_{2}\)-VASc data who underwent lobectomies from January 2007 to January 2016 at a single institution were analyzed in a retrospective case-control study utilizing a prospective database. An independent samples t-test was used to compare the mean CHA\(_{2}\)DS\(_{2}\)-VASc scores of POAF and non-POAF groups. A multivariate regression analysis (MVA) evaluated the variables of the CHA\(_{2}\)DS\(_{2}\)-VASc score for independent predictors of POAF based on odds ratios adjusted for confounders (aOR). Chi-squared tests were used to determine the cut-off score above which it was significantly predictive of POAF. Pre-operative CHADS\(_{2}\) was additionally analyzed as a POAF predictor.

**Results**: Of 525 total patients, 82 (15.6%) developed POAF; mean CHA\(_{2}\)DS\(_{2}\)-VASc score was 2.7, SD ±1.5. 443 (84.4%) were in the non-POAF group; mean score was 2.3, SD ±1.4. Mean difference was 0.43 and was significant (95% CI 0.09–0.76, p=0.01). In MVA, the covariates significantly predictive for POAF were age 65–74 years (aOR=2.45, 95% CI 1.31–4.70, p=0.006), and age >75 years (aOR=3.11, 95% CI 1.62–5.95, p=0.0006); Figure 1. Patients with CHA\(_{2}\)DS\(_{2}\)-VASc scores >4 had significantly increased odds ratio for POAF (OR=2.59, 95% CI 1.22–5.50); Table 1. CHADS\(_{2}\) scores did not show significant mean difference or odds ratios.

**Conclusions**: Pre-operatively calculated CHA\(_{2}\)DS\(_{2}\)-VASc score can predict POAF in patients undergoing pulmonary lobectomy. Age is the most statistically significant independent predictor, and patients with scores 5-7 have significantly increased risk. Trials for POAF prophylaxis should target this population.

Table 1: Odds ratios of cumulative CHA\(_{2}\)DS\(_{2}\)-VASc and CHADS\(_{2}\) scores predictive of POAF

<table>
<thead>
<tr>
<th>Cumulative Score Value</th>
<th>Odds Ratio (95% CI) for POAF</th>
<th>Statistical Significance (based on 95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-7 (versus 0) (n = 475)</td>
<td>1.74 (0.67–4.63)</td>
<td>No</td>
</tr>
<tr>
<td>2-7 (versus &lt; 3) (n = 370)</td>
<td>1.73 (0.98–3.06)</td>
<td>No</td>
</tr>
<tr>
<td>3-7 (versus &lt; 2) (n = 222)</td>
<td>1.53 (0.96–2.46)</td>
<td>No</td>
</tr>
<tr>
<td>4-7 (versus &lt; 3) (n = 113)</td>
<td>1.65 (0.97–2.80)</td>
<td>No</td>
</tr>
<tr>
<td>5-7 (versus &lt; 6) (n = 16)</td>
<td>2.59 (1.22–5.50)</td>
<td>Yes</td>
</tr>
</tbody>
</table>

NOTES:
47V Management of a LC2 Carinal Carcinoid Tumor Through a Minimally Invasive Parenchymal-Sparing Approach

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Authors: Monisha Sudarshan, *Shanda H. Blackmon

Author Institution(s): Mayo Clinic, Rochester, MN

Objectives: Bronchial neuroendocrine tumors are an uncommon neoplasm of the lungs characterized by an endobronchial mass that mostly arise in the proximal airways. This video demonstrates successful management of a LC2 carinal carcinoid tumor through a minimally invasive parenchymal-sparing approach.

Methods: A 34 year old welder presented in February of 2017 with a 2-3 year history of wheezing with progressive shortness of breath requiring multiple visits to the emergency room. Preliminary work-up included a CT scan and flexible bronchoscopy which demonstrated a lumen obstructing mass at the LC2 carina with complete left lower lobe collapse. He underwent a bronchoscopic debulking of the tumor with pathology consistent with a carcinoid. A Ga-DOTATATE scan did not demonstrate any distant metastatic disease. The patient underwent a video-assisted thoracoscopic resection of the left superior segment of the lower lobe, resection of the left LC2 carina and bronchoplasty with pleural flap buttressing. Bronchoscopic guidance was employed during the surgery to optimize resection.

Results: The patient was dismissed on post-operative day 6 with an uneventful hospital course. A bronchoscopy before dismissal demonstrated an intact bronchoplasty. Final pathology confirmed a pT1aN0 typical carcinoid tumor with negative margins.

Conclusion: This video demonstrates successful parenchymal-sparing LC2 carina resection and bronchoplasty using a VATS approach for a typical carcinoid tumor.
48 Induction Chemoradiotherapy Versus Chemotherapy Alone for Superior Sulcus (Pancoast Tumors) Lung Cancers

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Authors: *Lary A. Robinson1, Tawee Tanvetyanon1, Deanna Grubbs1, Scott J. Antonia1, DBen C. Creelan1, Jacques-Pierre Fontaine1, Eric M. Tolaza1, *Robert Keenan1, Thomas J. Dilling1, Craig W. Stevens2, Frank Vrionis3, Keith E. Sommers4

Author Institution(s): 1 Moffitt Cancer Center, Tampa, FL; 2 Beaumont Health, Royal Oak, MI; 3 Boca Raton Regional Hospital, Boca Raton, FL; 4 Baycare Medical Group, Tampa, FL

Discussant: *Eric L. Grogan, Vanderbilt University Medical Center, Nashville, TN

Objectives: Superior sulcus (Pancoast) tumors are uncommon and challenging to treat. Although treatment with induction chemoradiotherapy (CR) followed by surgery employed in the Intergroup 0160 trial demonstrated improved 5-year survivals, there are significant perioperative morbidity and mortality associated with this approach. We reviewed our experience of using several induction regimens in these patients.

Methods: All patients who underwent multimodality treatment including en bloc resection of lung cancer invading the superior pulmonary sulcus between 1994 and 2016 were retrospectively reviewed. The Multivariable Cox Proportional Hazards model was constructed.

Results: Of 102 analyzed patients, 53 (52%) underwent induction CR, 34 (33%) underwent induction chemotherapy only (CH) followed by full dose adjuvant radiotherapy, and 15 (15%) underwent no induction therapy followed in most with adjuvant radiotherapy. 67 (66%) of patients were treated in the last 10 years. All patients starting induction therapy underwent surgery. There were no mortalities due to induction therapy and only 2 (1.9%) postoperative deaths. To date, 42 patients are alive with a median follow-up of 72.5 months (see table). Survival was significantly influenced by age, FEV1, positive resection margins, surgical complications, but not the induction regimen. In a subset of 65 patients with R0 resections (excluding N2 or N3 disease, no induction therapy or primary lung sarcomas), induction chemotherapy only is a significant predictor of survival (HR 0.34, 95% CI: 0.12-0.97, p=0.04). Treatment toxicity and postoperative complications were somewhat higher with induction CR, but not statistically significant.

Conclusions: Our single-institutional experience compares favorably to the results from INT-0160. Induction CH only followed by adjuvant radiotherapy provides comparable outcomes to induction CR and should be considered an acceptable alternative to induction CR but with less toxicity.

Survival Rates By Induction Regimen

<table>
<thead>
<tr>
<th>Induction Regimen (All Stages)</th>
<th>Median Survival, Months (95% CI)</th>
<th>3-yr. Survival Rates %</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall, n=102</td>
<td>45 (18.4-71.6)</td>
<td>45</td>
<td>---</td>
</tr>
<tr>
<td>Chemo Only, n=54</td>
<td>38 (not estimable)</td>
<td>47</td>
<td>NS</td>
</tr>
<tr>
<td>ChemoRade, n=53</td>
<td>54 (20.6-87.4)</td>
<td>47</td>
<td>NS</td>
</tr>
<tr>
<td>No Induction, n=15</td>
<td>45 (0-100.0)</td>
<td>35</td>
<td>NS</td>
</tr>
</tbody>
</table>
49 Delayed Initiation of Anticoagulation in ECMO Patients at High Risk for Exsanguination

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**Authors:** *HelenMari Merritt, Irsa Shoiab, Shane Smith, Aleem Siddique, Elizabeth Lyden, Timothy Ryan, John Um, *Michael Moulton

**Author Institution(s):** University of Nebraska, Omaha, NE

**Objectives:** Immediate initiation of anticoagulant infusion is recommended in patients requiring extracorporeal membrane oxygenator (ECMO) support. However, in patients at high risk of exsanguination, it may necessary to delay or withhold administration of anticoagulants. We sought to examine delayed initiation of anticoagulation, and associated adverse events.

**Methods:** A retrospective chart review was performed on 115 patients who required VA or VV ECMO support for at least six hours at our institution between 2012 and 2015. Cohorts were established according to amount of time between ECMO deployment and anticoagulation initiation: Immediate (0-5 hours); Intermediate (between 6-24 hours); or Delayed (>24 hours). Descriptive and comparative statistics were employed for data examination.

**Results:** 93 patients (81%) received anticoagulation infusion during ECMO support. Median time on ECMO without anticoagulation was 12 hours; mean 29 hours. Median duration of ECMO support was 5 days with no difference between cohorts. There was no direct correlation between adverse events and the amount of anticoagulation delay. Specifically, no difference existed between the three groups for 30-day survival (p = 0.79), thromboembolic events including circuit changes (p = 1.00), neurologic events (p = 0.34), limb ischemia (p = 0.18), or an outcome composite (p = 0.42). Patients who required ECMO immediately following another surgery were most likely to fall in the Delayed cohort (p < 0.001). The incidence of major or fatal bleeding was lowest in the Intermediate group (p = 0.0075).

**Conclusions:** No significant difference existed for survival or adverse events when the initiation of anticoagulation was delayed in ECMO patients. These results suggest that in select patients, delayed anticoagulation may be reasonable. Prospective confirmation of this study would potentially alter how ECMO is practiced in patients at high risk for bleeding.

<table>
<thead>
<tr>
<th></th>
<th>Immediate (0-5 hours)</th>
<th>Intermediate (6-24 hours)</th>
<th>Delayed (&gt;24 hours)</th>
<th>p Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients (n)</td>
<td>87</td>
<td>57</td>
<td>35</td>
<td></td>
</tr>
<tr>
<td>30-Day Survival (%)</td>
<td>95</td>
<td>52</td>
<td>44</td>
<td>0.79</td>
</tr>
<tr>
<td>VA Support (%)</td>
<td>90</td>
<td>57</td>
<td>57</td>
<td>0.8963</td>
</tr>
<tr>
<td>Median Days of Support (n)</td>
<td>4</td>
<td>6</td>
<td>5</td>
<td>0.61</td>
</tr>
<tr>
<td>Units of RBCs per day on ECMO (median)</td>
<td>1.8</td>
<td>1.0</td>
<td>2.0</td>
<td>0.07</td>
</tr>
<tr>
<td>Major Bleeding (%)</td>
<td>62</td>
<td>81</td>
<td>78</td>
<td>0.8075</td>
</tr>
<tr>
<td>Thromboembolic Events (%)</td>
<td>21</td>
<td>22</td>
<td>20</td>
<td>1.0</td>
</tr>
<tr>
<td>Neurologic Events (%)</td>
<td>15</td>
<td>4</td>
<td>14</td>
<td>0.335</td>
</tr>
<tr>
<td>Composite Adverse Event (%)</td>
<td>69</td>
<td>82</td>
<td>91</td>
<td>0.42</td>
</tr>
<tr>
<td>ECMO after another operation (%)</td>
<td>9</td>
<td>15</td>
<td>56</td>
<td>0.002</td>
</tr>
<tr>
<td>Limb Ischemia (%)</td>
<td>13</td>
<td>7</td>
<td>6</td>
<td>0.18</td>
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</tbody>
</table>
50 An 18-Year Retrospective Review of Extracorporeal Membrane Oxygenation (ECMO) and/or Ventricular Assist Device (VAD) at a Children’s Hospital

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Authors: Shawn M. Shah1, David Kays1,2, Tom R. Karl1,2, Mel Almodovar1, Gary Stapleton1, Plato Alexander1, *James A. Quintessenza1, Alfred Asante-Korang1, Vyasa Kartha1, Jade Hanson1, Ernest Amankwah1, Devendra Amre1, Joeli Roth1, *Jeffrey P. Jacobs1,2

Author Institution(s): 1 Johns Hopkins All Children’s Hospital, St. Petersburg, Tampa and Orlando, FL; 2 Johns Hopkins University, Baltimore, MD

Objectives: In order to describe diagnostic characteristics and assess risk factors for mortality, we reviewed all patients who were supported with ECMO and/or VAD at a single children’s hospital.

Methods: Retrospective cohort study of all patients who were supported with ECMO and/or VAD from our first case (10/8/1998) through 7/25/2016. Cox proportional hazard models estimate association between risk factors and survival. Kaplan-Meier analyses demonstrate longitudinal survival.

Results: Table 1 documents survival to discharge and longitudinal survival for all ECMO and VAD patients.

223 patients underwent 241 ECMO runs. Median time on ECMO was 3.98 days (mean = 6.42 ± 7.0 days; range = 0.04 days to 55.8 days). Mean ± SD age at initiation was 727.4 days (±146.9 days). Figure 1 shows overall 5-year survival rate for all ECMO runs = 34% (95% CI: 27%-41%). Patients were stratified into cardiac ECMO (n = 175; 72.6%) or respiratory ECMO (n = 66; 27.4%). The most frequent indication for cardiac ECMO was hypoplastic left heart syndrome (HLHS) or HLHS-related malformation (n = 64). For respiratory ECMO patients, the most frequent diagnosis was congenital diaphragmatic hernia (CDH) (n = 22).

24 patients underwent 26 VAD runs. Median time on VAD was 7 days (mean = 15.3 ± 18.8 days; range = 0 days to 75 days). Mean ± SD age at initiation of VAD was 2,530.8 days ±660.2 days). The overall survival rate for all VAD patients at 1-year was 44.7% (95% CI: 24.4%-63.1%). Cardiomyopathy/myocarditis was the most frequent indication for VAD placement (n = 14; 53.8%). Older patients (HR: 1.09; 95% CI: 1.02-1.18) and patients previously placed on VAD (HR: 3.95; 95% CI: 0.81-19.2) were at an increased risk for mortality.

Conclusions: This single institutional 18-year review documents the differential rates of survival with various subgroups of patients who require support with ECMO or VAD. The underlying etiology of the disease and age of the patient will influence the likelihood of survival.

5-year Kaplan-Meier survival estimate for ECMO runs

* = Beginning in 2016, our survival for patients with Congenital Diaphragm Hernia (CDH) has been 100%.

Figure 1 shows Kaplan-Meier overall survival of all 241 ECMO runs from the time of cannulation for ECMO. Overall 5 year survival was 34% (95% CI = 27% - 41%).

Authors: Shawn M. Shah1, David Kays1,2, Tom R. Karl1,2, Mel Almodovar1, Gary Stapleton1, Plato Alexander1, *James A. Quintessenza1, Alfred Asante-Korang1, Vyasa Kartha1, Jade Hanson1, Ernest Amankwah1, Devendra Amre1, Joeli Roth1, *Jeffrey P. Jacobs1,2

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Conclusions: This single institutional 18-year review documents the differential rates of survival with various subgroups of patients who require support with ECMO or VAD. The underlying etiology of the disease and age of the patient will influence the likelihood of survival.

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* = Beginning in 2016, our survival for patients with Congenital Diaphragm Hernia (CDH) has been 100%.

Figure 1 shows Kaplan-Meier overall survival of all 241 ECMO runs from the time of cannulation for ECMO. Overall 5 year survival was 34% (95% CI = 27% - 41%).
51V Hybrid Surgical Mitral Valve Replacement With a Transcatheter Valve in the Setting of Mitral Annular Calcification

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Authors: D Raymond Lee1, *Bret Borchelt1, D Isaac George2,

Author Institution(s): 1Columbia University Medical Center, New York, NY; 2Novant Health Forsyth Medical Center, Winston-Salem, NC

Objectives: Mitral annular calcification during mitral valve replacement can result in significant complications. Surgical decalcification with atrial plasty or pericardial patch can lead to atrioventricular disruption. Here we show a novel technique using a transcatheter valve deployed during open surgery in the mitral valve position.

Methods: 83 yo female presenting with 2 month history of lower extremity swelling, shortness of breath, lethargy, in NYHA class 4 heart failure. Echocardiogram showed severe aortic stenosis and severe mitral regurgitation with mitral annular calcification and a prolapsed P2 leaflet.

Results: She underwent replacement of her aortic valve with a bovine pericardial valve and open transcatheter replacement of the mitral valve. The anterior leaflet of the mitral valve was resected to reduce left ventricular outflow tract obstruction. Anterior annular sutures were placed, followed by posterior leaflet sutures away from the calcium. The annulus was sized using a 26mm and 29mm balloon. A 29mm transcatheter valve was opened and a 1cm soft felt cuff was placed around the skirt of the valve. The commissures of the valve were marked on the felt cuff. The valve was oriented to avoid placement of the commissure in the left ventricular outflow tract. The valve was deployed under direct vision with the felt cuff on the atrial side of the annulus, minimizing the cuff material in the left ventricular outflow tract. The mitral valve sutures were passed through the felt cuff and tied down to prevent perivalvular leak. The patient was separated from cardiopulmonary bypass easily with no signs of perivalvular leak and a left ventricular outflow tract gradient of 3mmHg.

Conclusion: The use of a transcatheter valve in the mitral position allowed us to avoid potential atrioventricular disruption. This hybrid approach to mitral annular calcification can improve surgical results and allow high risk patients to have surgery to improve quality of life.
Concomitant Left Atrial Appendage Ligation: Is It Worth the Risk?

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Author Institution(s): 1 University of Virginia, Charlottesville, VA; 2 Virginia Cardiac Services Quality Initiative, Virginia Beach, VA; 3 Inova Heart and Vascular Institute, Falls Church, VA; 4 Virginia Commonwealth University, Richmond, VA

Discussant: *Dawn S. Hui, St. Louis University, St. Louis, MO

Objectives: Left atrial appendage ligation (LAAL) is frequently performed during cardiac operations, but the impact of LAAL on patient outcomes is not fully known. We hypothesized that the addition of LAAL would increase morbidity, mortality, or resource utilization.

Methods: A total of 28,311 patients undergoing cardiac surgery from 2011 to 2016 were extracted from a multi-institutional Society of Thoracic Surgeons (STS) database. Patients were stratified by LAAL for univariate analysis. The effect of LAAL on risk-adjusted outcomes were assessed by hierarchical linear and logistic regression modeling accounting for preoperative risk factors (including preoperative atrial fibrillation (AF)), planned surgical procedure (including ablative procedures), hospital, and year.

Results: A total of 9.3% (n=2,384) underwent concomitant LAAL, and those patients were older and more likely to have hypertension, coronary artery disease, preoperative AF, and heart failure. Patients who had a LAAL were significantly more likely to develop postoperative AF independent of the presence of preoperative AF (OR=1.45, p<0.01). Adding LAAL to an operation, however, did not increase major morbidity, short-term stroke, or mortality (Table 1). Cardiopulmonary bypass (CPB) time was not significantly increased; however, patients' total hospitalization costs were increased by $3,046 (p=0.02) when LAAL was included.

Conclusions: Contrary to our hypothesis, concomitant LAAL did not increase major morbidity or mortality of the index operation. After adjusting for baseline and operative risk factors, however, the inclusion of LAAL with an operation was associated with more postoperative AF and higher hospitalization costs, potentially due to patient selection.

Results of logistic and linear regression analyses of patients undergoing LAAL in conjunction with a primary cardiac surgical procedure.

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Odds Ratio</th>
<th>95% CI</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stroke</td>
<td>0.92</td>
<td>0.51-1.68</td>
<td>0.79</td>
</tr>
<tr>
<td>Atrial Fibrillation</td>
<td>1.45</td>
<td>1.20-1.75</td>
<td>&lt;0.01</td>
</tr>
<tr>
<td>STS Major Morbidity*</td>
<td>1.00</td>
<td>0.81-1.23</td>
<td>0.97</td>
</tr>
<tr>
<td>Operative Morbidity</td>
<td>0.82</td>
<td>0.63-1.34</td>
<td>0.66</td>
</tr>
<tr>
<td>STS Morbidity/Mortality</td>
<td>1.01</td>
<td>0.83-1.25</td>
<td>0.89</td>
</tr>
<tr>
<td>Outcome</td>
<td>Parameter Estimate</td>
<td>95% CI</td>
<td>p value</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>--------------------------------------------------</td>
<td>---------</td>
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<tr>
<td>Total Cost</td>
<td>$3,046</td>
<td>$295-$5,563</td>
<td>0.02</td>
</tr>
<tr>
<td>CPB Time (min)</td>
<td>0.65</td>
<td>-2.33-3.62</td>
<td>0.67</td>
</tr>
</tbody>
</table>

* Society of Thoracic Surgeons Major Morbidity includes prolonged ventilation, renal failure, deep sternal wound infection, permanent stroke, and reoperation.
53 Mechanical Versus Bioprosthetic Aortic Valve Replacement in Patients Aged 50 and Younger: Is Bioprosthetic Valve an Acceptable Option?

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Author Institution(s): Brigham and Women’s Hospital, Harvard Medical School, Boston, MA

Discussant: D* Gorav Ailawadi, University of Virginia, Charlottesville, VA

Objectives: Debate remains regarding optimal prosthesis choice for aortic valve replacement (AVR) in younger patients, and the controversy is further highlighted by recent guidelines now emphasizing patients' preferences over age. Future transcatheter valve-in-valve options may also impact clinical practice. We sought to evaluate outcomes in patients aged 50 and younger after mechanical and bioprosthetic AVR (AVRm and AVRb).

Methods: From 1994 to 2014, 557 patients underwent AVR (356 AVRm and 201 AVRb). Only concomitant CABG and mitral valve (MV) procedures were included. Primary endpoints were operative mortality and long-term survival. Secondary endpoints were stroke, major bleeding and reoperative AVR. Median observation time was 7.3 (IQR, 3.2 – 12.4) years.

Results: Mean age was 42.1 ± 7.0 years and 161/557 (28.9%) were females (Table). Use of AVRb increased from 16% in 1994 to 36% in 2014. AVRm group had more concomitant CABG [52/356 (14.6%) vs. 16/201 (8.0%), p<0.022] and MV procedures [76/356 (21.3%) vs. 19/201 (9.5%), p<0.001]. Operative mortality and stroke rate were similar in AVRm and AVRb; [11/356 (3.1%) vs. 5/201 (2.5%), p=0.40] and [8/356 (2.2%) vs. 4/201 (2.0%), p=1.0], respectively. At 10 years of follow-up, there was no survival difference between the two groups [AVRm (84.6%) vs. AVRb (86.6%), p=0.49] (Figure). AVRb were at higher risk for reoperative AVR [2.5% vs. 11.7%, p<0.001] while AVRm were at higher risk for major bleeding events [4.5% vs. none, p<0.009].

Conclusions: The increased risk of reoperation for AVRb and major bleeding incidents for AVRm was not reflected in 10-year survival differences between the two groups. Our results suggest that AVRb is an acceptable prosthesis choice for patients under age 50.
54 Concomitant Mitral Valve Procedures in Patients With Hypertrophic Cardiomyopathy Undergoing Septal Myectomy: Incidence and Outcomes in a National Cohort

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Authors: Kimberly Holst, Kristine T. Hanson, Steve R. Ommen, Rick A. Nishimura, Elizabeth B. Habermann, *Hartzell Schaff

Author Institution(s): Mayo Clinic, Rochester, MN

Discussant: Nicholas G. Smedira, Cleveland Clinic, Cleveland, OH

Objectives: Mitral regurgitation is common in patients with hypertrophic cardiomyopathy (HCM) due to systolic anterior motion of the mitral valve (MV). Large single-center series of septal myectomy (SM) for HCM, however, report relatively low (<10%) rates of MV intervention. The objective of this study was to assess the frequency and implications of MV surgery at time of SM in a national cohort.

Methods: The National Inpatient Sample (NIS) was used to analyze surgical outcomes in patients with HCM undergoing SM from 2003 to 2013. Univariate analyses were utilized to compare patients undergoing isolated SM and those with concomitant procedures. Actual number values ≤10 unable to be reported due to NIS data use agreement.

Results: The national cohort included 988 adults with a primary diagnosis of HCM undergoing SM. Overall age was 54.4±14.6 years and 45% (444/988) were male. Isolated SM was performed in 67% (664/988) and the remainder had concomitant cardiac procedures, most frequently MV repair/replacement (22%, 217/988).

Median hospital length of was increased in those with any concomitant procedure, 8 days, and with only concomitant MV surgery, 7 days, compared to isolated SM, 6 days (p<0.001).

Overall hospital mortality was 2.9% (29/988) and was increased in patients with any concomitant procedure (6.8%, 22/324, p<0.001) and patients with only concomitant MV surgery (<4%, ≤10/184, p=0.02) compared to those with isolated SM (<2%, ≤10/668).

Conclusions: The national frequency of MV surgery at time of SM for HCM was 22%, more than double rates reported in large, single-institutional series. Patients requiring any concomitant procedure and those undergoing only concomitant MV surgery had increased rates of hospital mortality and length of stay. These results suggest that intervention on the MV is more common outside specialized centers and concomitant MV intervention is associated with increased risk.
**55V PerOral Plication of the Esophagus (POPE): A Novel Approach to Megaesophagus**

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**Authors:** Janani Reisenauer, Louis M. Wong Kee Song, *Shanda H. Blackmon

**Author Institution(s):** Mayo Clinic, Rochester, MN

**Objectives:** Esophagectomy is reserved for patients who present with failed treatment for achalasia or megaesophagus. As an alternative, we propose a minimally invasive technique to plicate, narrow, and straighten the esophagus. This technique is a PerOral Plication of the Esophagus (POPE) procedure.

**Methods:** We describe the case of a 79-year-old woman with long-standing achalasia initially treated with a modified Heller esophagomyotomy through a laparotomy in 1977. She developed worsening dysphagia requiring multiple hospitalizations for aspiration. Because of her comorbidities, she was offered a therapeutic dilation/POEM of the EG junction.

The POPE procedure includes marking the esophagus in the planned areas to be plicated. A row of full thickness sutures is placed from distal to proximal using an endoscopic suturing device (Apollo Device, Austin, TX). A running triangular suture pattern alternates from the left lateral wall of the sump to its dependent portion and to the right lateral wall and is repeated until the conduit or esophagus is more narrow, straight, and without a residual sump. The suture anchor/needle is then released and the suturing sequence is tightened with the cinch device. The triangular pattern is repeated until the sump is collapsed.

**Results:** Post esophagoplasty, the endoscope advanced with ease through the esophagus. The upper esophagram revealed a more narrow and straightened esophagus without a residual sump. Improved esophageal emptying was demonstrated at 1 month following the procedure. The patient is tolerating soft food without regurgitation or dysphagia and has no further aspiration events.

**Conclusion:** In conclusion, endoscopic esophagoplasty is a promising novel technique for achalasia megaesophagus with sump formation in patients deemed poor surgical candidates for esophagectomy. Long-term follow-up will determine durability and sustained efficacy of the procedure.
56 Operative Outcomes and Evolving Techniques for Robotic Esophagectomy

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Authors: Kyle H. Cichos¹, Inderpal S. Sarkaria², Asem F. Ghanim¹, *Benjamin Wei¹, Paul L. Linsky¹, Olugbenga T. Okusanya², D*Robert J. Cerfolio³

Author Institution(s): ¹University of Alabama, Birmingham, AL; ²University of Pittsburgh, Pittsburgh, PA; ³New York University, New York, NY

Discussant: DBenny Weksler, University of Tennessee Health Science Center, Memphis, TN

Objectives: Our objective is to report lessons learned from the largest robotic esophagectomy series reported to date from two surgeons

Methods: This is a multi-institutional review of two academic surgeons’ prospective databases on a consecutive series of patients who were scheduled for robotic Ivor Lewis or robotic Mckeown esophagectomy (laparoscopic or robotic abdominal and robotic chest) for esophageal cancer.

Results: Between April, 2011 and April, 2017, 265 patients (214 men) underwent robotic esophagectomy (252 Ivor Lewis, 13 Mckeown). A total of 193 patients (73%) had preoperative chemo-radiotherapy, all had esophageal cancer. There were no abdominal or thoracic conversions for bleeding. Median operative time was 6 hours 52 minutes, median blood loss was 160 cc (no intraoperative transfusions), median number of resected lymph nodes was 24 and median length of stay was 10.5 days; 96% had an R0 resection. Conduit complications (anastomotic leak or conduit ischemia) occurred in 16 patients (6%). The 30-day mortality was 3/265 (1.1%) all secondary to respiratory complications. The 90-day mortality was 10/265 (3.8%, three secondary to recurrent cancer).

Conclusions: Robotic esophagectomy for esophageal cancer provides excellent intra-operative metrics of quality. Specific pre-operative, intra-operative and post-operative modifications are outlined which have decreased the anastomotic and conduit problems as well as the 30- and 90-day mortality.
57 Longitudinal Assessment of Quality of Life Measures and Outcomes in a Community Based Lung Volume Reduction Surgery Program

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Authors: *Stephen Hazelrigg, Benjamin Seadler, Justin Sawyer, Kyle McCullough, Nisha Rizvi, Stephen Markwell, Michael Thomas, *Traves D. Crabtree

Author Institution(s): Southern Illinois University, Springfield, IL

Discussant: *Allan Pickens, Emory University, Atlanta, GA

Objectives: While the National Emphysema Treatment Trial (NETT) demonstrated clinical improvement with Lung Volume Reduction Surgery (LVRS) versus medical management in selective patients, adoption of LVRS has been limited because of persistent concerns regarding the long-term impact in patients with severe emphysema. This study describes 1 year outcomes and quality of life (QOL) measures in a large single center community based LVRS program.

Methods: A retrospective analysis of 101 patients undergoing bilateral thoracoscopic LVRS from 2007 to 2015 was performed. Health related 36-item Short-Form health survey (SF-36) and the EuroQOL questionnaire (EQ) were administered before surgery and one year post-LVRS. Wilcoxon signed-rank test was used to examine changes in quality of life indices.

Results: One year mortality was 7.4% with a mean length of stay of 12 days. Compared to baseline, significant increase was evident for FVC (46%, p<0.0001), FEV1 (43%, p<0.0001), DLCO (16%, p<0.0001) and six minute walk distance (6MWD, 20%, p<0.0001) while RV was significantly decreased (23%, p<0.0001). Overall, 50% of patients reported improvement in their general health, 64% reported increase in energy level, 33% felt less down hearted, 38% were more likely to report themselves as being happy, 52% were less likely to indicate that their problems interfered with social activities, 49% were less likely to expect their health to get worse and 58% were more likely to report their health as excellent. Moreover, Spearman correlation coefficients demonstrated positive correlations between changes in QOL and improvements in FEV1 and 6MWD (Table 1).

Conclusions: LVRS in rigorously selected patients remains a valuable treatment option in patients with advanced stage emphysema. These data demonstrate reasonable 1 year mortality in a challenging population with notable improvements in QOL outcomes at 1 year that correlated with improvements in cardiopulmonary parameters.

Table 1: Spearman correlations between changes (baseline to 1-year) in QOL and clinical measures

<table>
<thead>
<tr>
<th></th>
<th>FEV1% predicted</th>
<th>6MWD</th>
<th>FEV1% predicted</th>
<th>6MWD</th>
</tr>
</thead>
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<tr>
<td></td>
<td>Corr p-value</td>
<td>Corr p-value</td>
<td>Corr p-value</td>
<td>Corr p-value</td>
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<td>0.23 0.031</td>
<td>0.30 0.005</td>
<td>0.20 0.059</td>
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<td>Energy</td>
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<td>0.24 0.026</td>
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</tr>
<tr>
<td>Happy</td>
<td>0.40 0.000</td>
<td>0.24 0.025</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Health is excellent</td>
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</table>
The Safety and Feasibility of Lung Resection Following Immunotherapy for Metastatic or Unresectable Solid Tumors

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Author Institution(s): Memorial Sloan Kettering Cancer Center, New York, NY

Discussant: *Boris Sepesi, University of Texas, MD Anderson Cancer Center, Houston, TX

Objectives: Increasingly, surgeons are asked to operate on patients with residual disease after treatment with immunotherapy agents. The safety and utility of surgical resection in this setting is unknown.

Methods: We performed a retrospective review of a prospectively maintained surgical database to identify patients who were referred for therapeutic resection of previously metastatic or unresectable cancer following treatment with these agents. Clinical and outcomes data were extracted and survival was estimated using the Kaplan-Meier approach from the time of first resection.

Results: Database query identified 19 patients undergoing 22 resections of suspected residual disease with therapeutic intent following immunotherapy since 2008. Lung cancer was the most common diagnosis (n=9, 47%) and followed by metastatic melanoma (n=7, 37%). The most common agents were nivolumab (n=7, 37%), pembrolizumab (n=6, 32%) and ipilimumab (n=4, 21%). Patients received a mean of 21 doses (range = 1-70), the last within an average of 75 days prior to surgery (range = 7-183). Anatomic resection (≥lobectomy) was performed in 11 cases (50%). Four lobectomies were attempted VATS and one of these required conversion to thoracotomy. Of resected lesions, 71% had viable tumor remaining on final pathology and R0 resection was achieved in 95% of cases. Mean case duration for lobectomy was 309 minutes (range 188-478). Complications occurred in 36% of cases but all were minor in severity (grade 1 or 2) (Table 1). 12 month OS and DFS for the cohort was 85% and 69%, respectively (Figure 1).

Conclusions: In the setting of previously metastatic or unresectable cancer, lung resection of suspected residual disease following immunotherapy is feasible with high rates of R0 resection. Operations can be technically challenging with prolonged operative times but significant morbidity appears rare. Outcomes are encouraging with reasonable OS and DFS over short interval follow-up.

Table 1: Complications in 22 cases of lung resection following immunotherapy:

<table>
<thead>
<tr>
<th>Complication</th>
<th>n (%)</th>
<th>Highest Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any Grade 1</td>
<td>0 (0)</td>
<td></td>
</tr>
<tr>
<td>Any Grade 2</td>
<td>3 (14)</td>
<td>2</td>
</tr>
<tr>
<td>Any Grade 3</td>
<td>5 (23)</td>
<td></td>
</tr>
<tr>
<td>Prolonged Air Leak</td>
<td>2 (9)</td>
<td>2</td>
</tr>
<tr>
<td>Arrhythmia</td>
<td>1 (5)</td>
<td>2</td>
</tr>
<tr>
<td>Pneumonia</td>
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<td>2</td>
</tr>
<tr>
<td>Urinary Retention</td>
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<tr>
<td>Hypotension</td>
<td>1 (5)</td>
<td>1</td>
</tr>
<tr>
<td>Nausea</td>
<td>1 (5)</td>
<td>1</td>
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</table>
59V Cor Triatriatum Sinister With an Intact Interatrial Septum and a Decompressing Vein in a Toddler

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Authors: Ziyad M. Binsalamah, Luis E. De Leon, *Lauren C. Kane, *Jeffrey S. Heinle

Author Institution(s): Texas Children’s Hospital/Baylor College of Medicine, Houston, TX

Objectives: Cor triatriatum sinister is a very rare cardiac anomaly that may lead to pulmonary hypertension, right ventricular dilation and eventually right heart failure.

Methods: We report a case of a toddler who was misdiagnosed with asthma as an infant who had progressive respiratory symptoms and was found to have cor triatriatum sinister with a restrictive communication, decompressing vertical vein, severe tricuspid regurgitation and severe right ventricular dysfunction.

Results: The surgical repair was uneventful and the right ventricular function had normalized on follow up echocardiograms.

Conclusion: To our knowledge, this is the first report of cor triatriatum sinister with a restrictive fenestration, a decompressing vertical vein, an intact interatrial septum and severe tricuspid regurgitation in a toddler. The treatment of which was successful as demonstrated by the follow up echocardiograms with normalization of the ventricular function and pulmonary artery pressure.
60V Minimally Invasive ASD Repair With Limited Resources

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Authors: Carson Hoffmann, *Tom C. Nguyen

Author Institution(s): University of Texas Medical School at Houston, Houston, TX

Objectives: In the past, atrial septal defects (ASD) have been repaired via open-heart surgery through a median sternotomy. Recent advances have allowed ASD closure via catheter inserted devices and also minimally invasive surgical techniques utilizing endoscopy and robot-assisted surgery. Described below is a minimally invasive approach to ASD closure performed without specialized equipment while utilizing basic equipment that is readily available to most surgeons.

Methods: This video describes the steps of a minimally invasive, resource limited ASD closure, and the relevant technical pearls and pitfalls are emphasized. Cannulation of the femoral artery and vein is performed for cardiopulmonary bypass. Upper extremity venous drainage is achieved with a peripheral bi-caval venous cannula. A 4 cm, anterior chest incision is required for ASD visualization. The pericardium is opened 2 cm above the phrenic nerve, and pericardial stay sutures provide retraction of the diaphragm. The superior and inferior vena cava are snared with vessel loops to provide a hemostatic seal. A vertical atriotomy is performed and extended toward the atrial appendage. Atrial retraction sutures allow excellent exposure without additional retractors. A bovine pericardial patch is used for closure using a running, 5-0 Prolene suture. The atrium is closed in two layers with a 4-0 Prolene suture. Cryoablation of the intercostal nerves two interspaces above and two interspaces below the incision and liposomal bupivacaine injections are performed for postoperative analgesia.

Results: A tension-free ASD closure with no inter-atrial communication on postoperative echocardiogram.

Conclusion: ASD closure can be accomplished through a variety of means. As outlined here, it is possible with a minimally invasive approach without the need for specialized equipment and with limited resources.
61V Transposition of the Great Arteries With Intact Ventricular Septum and Type 1 Aortopulmonary Window

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Authors: Ziyad M. Binsalamah, Luis E. De Leon, Gurpreet S. Dhillon, Caraciolo J. Fernandes, Asra Khan, Keila N. Lopez, *Jeffrey S. Heinle

Author Institution(s): Texas Children’s Hospital/Baylor College of Medicine, Houston, TX

Objectives: Aortopulmonary window is a rare form of congenital heart disease that can be seen in isolation or with associated other complex cardiac lesions. Although aortopulmonary window has been associated with other complex cardiac lesions, only a few cases have been reported in the literature of this condition associated with transposition of the great arteries with an intact ventricular septum.

Methods: We demonstrate the successful repair of transposition of the great arteries with an associated aortopulmonary window in a neonate.

Results: The repair consisted of an arterial switch operation, and repair of the aortopulmonary window.

Conclusion: Timing of surgical intervention for an aortopulmonary window depends on its size and location, as well as the associated complex congenital heart lesion. Repair of transposition of the great arteries in association with an aortopulmonary window can be successfully achieved in the neonatal period, with excellent outcomes.
62V Konno Aortoventriculoplasty and Mitral Valve Replacement in a Child With AV Septal Defect

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Authors: Janani Reisenauer, *Joseph Dearani

Author Institution(s): Mayo Clinic, Rochester, MN

Objectives: Pediatric patients with atrioventricular (AV) septal defects represent a congenital population that may require repeat operations on the AV valves over time. We present a previously repaired patient who also required left AV valve replacement after failed left AV valve repair and discuss Konno aortoventriculoplasty in conjunction with mitral re-replacement as a fourth reoperation to demonstrate feasibility and results.

Methods: An eight year old female with prior repair of atrioventricular septal defect underwent multiple prior reoperations including repair and subsequent mechanical left AV valve replacement. Her current problem was shortness of breath with patient prosthesis mismatch, severe aortic regurgitation with left ventricular fibromuscular outflow tract obstruction, and severe tricuspid regurgitation. Through a fourth time redo sternotomy we performed left AV valve re-replacement with a 19 mm St Jude mechanical valve, Konno aortoventriculoplasty using a 19 mm Onyx mechanical valve and eccentric banded tricuspid annuloplasty. Separation from bypass was uneventful with normal hemodynamics and sinus rhythm.

Results: The patient was extubated the night of surgery and was discharged on postoperative day seven without complications. Pre-dismissal echocardiogram revealed a mean gradient of 17 mmHg across the aortic prosthesis, and a mean gradient of 7 mmHg across the mitral prosthesis; heart rate was 106 and hemoglobin was 9.4 g/dL. The mean diastolic gradient across the tricuspid valve was 4 mm Hg with trivial regurgitation.

Conclusion: In pediatric patients with AV septal defects who develop recurrent valve problems and left ventricular outflow tract obstruction not amenable to conventional repair techniques, Konno aortoventriculoplasty with a mechanical valve and concomitant left AV valve (mitral) replacement with a mechanical valve can be performed safely and with good long term results.
63 Interaction of Donor and Recipient Age: Do Older Heart Transplant Recipients Require Healthier Hearts?

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Authors: Malini Daniel, Carol W. Chen, Jennifer J. Chung, D Lee Goldberg, Michael A. Acker, Pavan Atluri

Author Institution(s): University of Pennsylvania, Philadelphia, PA

Discussant: J. Michael DiMaio, Baylor University Medical Center, Dallas, TX

Objectives: Older patients (≥60) awaiting heart transplant often have numerous comorbidities that may limit overall survival independent of cardiac status. As such, the question arises whether there is an advantage to utilizing younger allografts in this cohort. We undertook this study to determine the impact of donor allograft age on outcomes in those patients ≥60 years of age.

Methods: We identified all transplant recipients age 60 and older in the United Network for Organ Sharing Database. Local regression analysis was performed to detect a change in post-transplant survival with increasing donor age. This transition point was used to group patients into two cohorts by donor age. Kaplan-Meier analysis was used to compare cumulative 5-year survival. To adjust for baseline recipient characteristics, Cox proportional hazard modelling was used to determine the hazards of death in the two groups.

Results: An inflection point in post-transplant survival was detected at approximately donor age 50. Of 14,113 transplant recipients age 60 and older, 86% received a standard-age donor heart (<50 years), and 14% received an advanced-age allograft ≥50 years. Baseline characteristics were comparable between groups except more patients were supported by a left ventricular assist device at time of transplant in the standard age group (15% vs. 9%, p < .001). 5-year survival was significantly lower among recipients who received an advanced-age heart compared to those receiving a standard-age heart (67% vs. 73%, logrank p < .001). Adjusting for relevant recipient baseline characteristics, patients receiving an advanced age heart were 30% more likely to die by 5 years compared to those receiving a standard-age heart.

Conclusions: Transplant recipients age 60 and older who receive a donor heart older than 50 have a significantly increased risk of mortality. Further analysis into the appropriate selection criteria for advanced age allografts is warranted.

<table>
<thead>
<tr>
<th></th>
<th>Univariate Analysis</th>
<th>Multivariate Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Hazard Ratio</td>
<td>p-value</td>
</tr>
<tr>
<td>Donor Age ≥ 50</td>
<td>1.3</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Recipient Age (Every 10-year increase)</td>
<td>1.1</td>
<td>.129</td>
</tr>
<tr>
<td>Male Recipient</td>
<td>1.0</td>
<td>.532</td>
</tr>
<tr>
<td>Recipient BMI (Every 5-point increase)</td>
<td>1.0</td>
<td>.067</td>
</tr>
<tr>
<td>ECMO at Transplant</td>
<td>3.2</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>IABP at Transplant</td>
<td>1.3</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>LVAD at Transplant</td>
<td>0.9</td>
<td>.138</td>
</tr>
<tr>
<td>Diabetes</td>
<td>1.1</td>
<td>.003</td>
</tr>
<tr>
<td>Cerebrovascular Disease</td>
<td>1.1</td>
<td>.115</td>
</tr>
<tr>
<td>Smoker</td>
<td>1.1</td>
<td>.126</td>
</tr>
</tbody>
</table>

Figure 1. Kaplan-Meier 5-Year Survival Curves for Recipients Age 60 and Older Stratified by Use of Normal Age Donor Compared to Advanced Age Donor

NOTES:
64 Risk Factors for Survival After Orthotopic Heart Transplantation for Pediatric and Congenital Cardiac Disease: A 21 Year Retrospective Study of 172 Transplants

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Authors: Shawn M. Shah1, Alfred Asante-Korang1, Gary Stapleton1, Mel Almodovar1, Tom R. Karl1,2, *James A. Quintessenza1, *Constantine Mavroudis1,2, Luca A. Vricella2, *Hugh Van Gelder1, Vyas Kartha1, Plato Alexander1, Jennifer Carapellucci1, Diane Krasnowski1, Jade Hanson1, Ernest Amankwah1, Devendra Amre1, Joeli Roth1, Marshall L. Jacobs1,2, *Jeffrey P. Jacobs1,2

Author Institution(s): 1 Johns Hopkins All Children’s Hospital, St. Petersburg, Tampa and Orlando, FL; 2 Johns Hopkins University, Baltimore, MD

Discussant: *Charles B. Huddleston, St. Louis University School of Medicine, St. Louis, MO

Objectives: We reviewed all patients who underwent orthotopic heart transplantation (OHT) at a single institution to describe diagnostic characteristics and assess risk factors for mortality.

Methods: Retrospective cohort study of all OHT (166 patients, 172 OHTs) from our first OHT (6/19/1995) through 7/15/2016. Univariate and multivariate Cox proportional hazard models estimate association between risk factors and survival. Kaplan-Meier analyses demonstrate longitudinal survival.

Results: Patients: 18 neonates, 76 infants, 76 children, and 2 adults (>18 years); median age = 248 days [range: 5-8,686 days]; median weight = 7.5 kg [range: 2.2 to 113 kg].

Table 1: primary diagnoses and 5 year survival rates stratified by diagnosis.

<table>
<thead>
<tr>
<th>Fundamental diagnosis</th>
<th>Number</th>
<th>Percentage</th>
<th>5 year survival rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>HLHS or HLHS-related malformation without prior cardiac surgery</td>
<td>32</td>
<td>18.6%</td>
<td>83.8% (65.4%-92.9%)</td>
</tr>
<tr>
<td>Cardiomyopathy</td>
<td>65</td>
<td>37.8%</td>
<td>78.0% (65.1%-91.4%)</td>
</tr>
<tr>
<td>Non-HLHS complex congenital heart disease</td>
<td>46</td>
<td>26.7%</td>
<td>71.9% (56.3%-82.6%)</td>
</tr>
<tr>
<td>HLHS or HLHS-related malformation after prior cardiac surgery</td>
<td>18</td>
<td>10.5%</td>
<td>33% (28.9%-37.2%)</td>
</tr>
<tr>
<td>Retransplant</td>
<td>11</td>
<td>6.4%</td>
<td></td>
</tr>
</tbody>
</table>

*For this analysis of 5 year survival rates, patients in the retransplant group were reclassified into one of the four fundamental cardiac diagnoses based on diagnosis prior to first transplant.

Table 1. Five year survival stratified by fundamental diagnosis

Figure 1 shows that overall 5-year survival for all transplants was 74% (95% CI: 67%-81%).

Notes:

Conclusions: Posttransplant mechanical circulatory support and a higher number of prior operations are risk factors for decreased survival after OHT. OHT after prior cardiac surgery for HLHS or HLHS-related malformation is also associated with decreased survival.
65 Single Versus Double Lung Transplantation in Pulmonary Fibrosis: Impact of Age, Allocation Score, and Pulmonary Hypertension in Decision-Making

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Authors: Mauricio Villavicencio1,2, Michael Kwon1,2, Asishana Osho1,2, Nathalie Roy1,2, Todd Astor1,2, Serguei Melnitchouk1,2, David D’Alessandro1,2, George Tolis1,2, Yuval Raz1,2, Isabel Neuringer1,2, *Thoralf Sundt1,2

Author Institution(s): 1Massachusetts General Hospital, Boston, MA; 2Harvard Medical School, Boston, MA

Discussant: *Scott B. Johnson, University of Texas Health Science Center, San Antonio, TX

Objectives: Double lung transplantation (DLT) has better long-term outcome than single (SLT) in pulmonary fibrosis. However, controversy persists whether older and/or sicker high lung allocation score (LAS) patients would benefit from a DLT. Moreover, the degree of pulmonary hypertension in which a SLT should be avoided is not clear.

Methods: The UNOS Thoracic Transplant Database was analyzed between 1987 and 2015. Kaplan-Meier SLT versus DLT survival was compared using age, LAS, and mean pulmonary artery pressures (mPAP) as dichotomic variables (Log Rank). A Cox regression multivariate analysis of survival was performed for these and a total of 27 donor/recipient characteristics.

Results: During this period, 9191 out of 29779 lung transplants were performed in pulmonary fibrosis. Ten-year survival in DLT: 55±15%, and in SLT 32±12% (p<0.001). In the univariate model: DLT is better than SLT, < 60-year-olds (yo) (p<0.001), > 60 yo (p<0.001), > 65 yo (p<0.004), but not > 70 yo (p=0.271). DLT was better than SLT in all LAS categories: LAS < 45, LAS > 45, LAS > 60, LAS > 75 (P<0.001). DLT was better than SLT in all mPAP categories: mPAP < 25, mPAP > 25, mPAP > 30, mPAP > 40 (P<0.001). Amongst 3979 SLT: mPAP > 25 did not affect survival (p=0.105). Conversely, mPAP >30, and mPAP > 40 decreased survival (p<0.001).

In Cox regression DLT had better survival Exp(B) 0.737, (CI 0.645-0.841, p <0.0001). Recipient age Exp(B) 1.011, (CI 0.645-0.841, p <0.007), ventilator support Exp(B) 2.037, (CI 1.597-2.599, p <0.0001), and donor smoking > 20 pack-year Exp(B) 1.413, (CI 1.165-1.713, p <0.0001), were significantly associated with worse outcome.

Conclusions: DLT is superior to SLT in pulmonary fibrosis, and we recommend it as the procedure of choice under the age of 70. SLT with mPAP > 30 may be discouraged. Donor smoking history of more than 20 pack-year had reduced survival.
66 Primary Graft Dysfunction After Heart Transplantation: Outcomes and Resource Utilization

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Author Institution(s): 1Virginia Commonwealth University, Richmond, VA; 2University of Virginia Health System, Charlottesville, VA; 3VCSQI, Charlottesville, VA

Discussant: D*Mark S. Slaughter, University of Louisville, Louisville, KY

Objectives: A unified definition of primary graft dysfunction (PGD) after heart transplantation was adopted in 2014, with moderate to severe PGD defined as a requirement for mechanical circulatory support. While risk factors for PGD are well identified, outcomes and resource utilization have not been well-studied. We examined the resource utilization and associated costs with PGD.

Methods: All adult heart transplantations (Jan 2001- June 2016) from a statewide STS database were analyzed by dividing them into two groups- with PGD (requiring mechanical circulatory support) and without PGD.

Results: Of the 718 heart transplants, 110 (15.3%) patients developed PGD. Prevalence of PGD varied from 3.7% to 22.7% with no significant trend. Most frequently used mechanical circulatory support device was intra-aortic balloon pump (88%), followed by ECMO (17%), and catheter based circulatory support devices (3%). In nine patients circulatory support was escalated from IABP to ECMO. There were no significant differences in demographics or preoperative variables between the two groups (Table). Resource utilization such as total intensive care unit hours, ventilation hours, reoperation for bleeding, blood product transfusions, and length of stay were significantly higher in the PGD group. Postoperative complications such as renal failure, sepsis, and multisystem organ failure were also higher in PGD group. Operative mortality was significantly higher in the PGD group (31.8% vs. 3.8%, p<0.0001). Total hospital cost was higher for the PGD group, ($217,518.23 vs. $104,937.77, p<0.0001).

Conclusions: Primary graft dysfunction following heart transplantation was noted in 15% of patients. Patients with PGD had significantly higher complications, resource utilization, mortality and cost of care. Preventive measures to address the development of primary graft dysfunction would reduce resource utilization and improve outcomes.

### Table

<table>
<thead>
<tr>
<th></th>
<th>Primary Graft Dysfunction</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient Age in years median (range) (n=110)</td>
<td>59 (18 - 69)</td>
<td>59 (18 - 73)</td>
</tr>
<tr>
<td>Gender – Male</td>
<td>71.8%</td>
<td>74.2%</td>
</tr>
<tr>
<td><strong>Pre-Operative Variables</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diabetes</td>
<td>30.3%</td>
<td>34.2%</td>
</tr>
<tr>
<td>Hypertension</td>
<td>58.7%</td>
<td>53.3%</td>
</tr>
<tr>
<td>Previous CABG</td>
<td>22.3%</td>
<td>17%</td>
</tr>
<tr>
<td>Renal Failure</td>
<td>24%</td>
<td>18.1%</td>
</tr>
<tr>
<td>Prior Stroke</td>
<td>15.6%</td>
<td>15.2%</td>
</tr>
<tr>
<td><strong>Post-Operative Variables</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intensive Care Unit Hours (n=110)</td>
<td>264.25 (16 - 4327)</td>
<td>163 (20.8 - 4033)</td>
</tr>
<tr>
<td>Prolonged Ventilation</td>
<td>85.0%</td>
<td>70.2%</td>
</tr>
<tr>
<td>Total Ventilation Support Hours (n=110)</td>
<td>96.48 (4 - 4029.95)</td>
<td>22.93 (2 - 1516.23)</td>
</tr>
<tr>
<td>Repeal Intubation</td>
<td>26.7%</td>
<td>11.3%</td>
</tr>
<tr>
<td>Re-Operation for Bleeding</td>
<td>28.0%</td>
<td>11.0%</td>
</tr>
<tr>
<td>Blood Products Transfused</td>
<td>81.8%</td>
<td>69.8%</td>
</tr>
<tr>
<td>Renal Failure</td>
<td>42.0%</td>
<td>21.7%</td>
</tr>
<tr>
<td>Pneumonia</td>
<td>11.0%</td>
<td>13.4%</td>
</tr>
<tr>
<td>Stroke</td>
<td>6.0%</td>
<td>6.0%</td>
</tr>
<tr>
<td>Sepsis</td>
<td>16.7%</td>
<td>5.6%</td>
</tr>
<tr>
<td>Multisystem Organ Failure</td>
<td>22.0%</td>
<td>4.7%</td>
</tr>
<tr>
<td>LOS in days (Surgery to Discharge)</td>
<td>24.5 (1 - 192)</td>
<td>15 (1 - 269)</td>
</tr>
<tr>
<td>Operative Mortality</td>
<td>31.8%</td>
<td>3.8%</td>
</tr>
<tr>
<td>Total Cost in US$</td>
<td>217,518.23 (50,013.79 - 968,203.90)</td>
<td>104,937.77 (50,074.75 - 1,095,079.90)</td>
</tr>
</tbody>
</table>

NOTES:
67 Mark M. Ravitch: Southern Comfort and Curmudgeonry

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Authors: *Stephen C. Yang

**Author Institution(s):** The Johns Hopkins Medical Institutions, Baltimore, MD

**Body of History Abstract:** It has been 50 years since Dr. Ravitch left his indelible mark at The Johns Hopkins Hospital (JHH), leaving in 1966 for Chicago and Pittsburgh to continue his brilliant career until his passing. His Baltimore years arguably were his most productive as an innovator in medical technology, surgical technique, and the art of surgical “curmudgeonry.”

After starting medical school in 1930, he stayed on at JHH doing internships in surgery and pediatrics, completing his surgical residency under Alfred Blalock in 1943. To memorialize Blalock’s contributions posthumously, Ravitch published the classic 2-volume complete works collection.

After serving as surgeon for 3 years at the European front lines in World War II, he was appointed the first director of JHH blood bank. He moved in 1952 to become the first chief of surgery at Mount Sinai School of Medicine. After an unpopular organizational plan, he returned to Baltimore in 1956 as surgeon-in-chief at the Baltimore City Hospital (now The Johns Hopkins Bayview Medical Center).

Back then, marriage was forbidden during residency. Still, he secretly married his wife Irene during his second year of training, furthermore, having 2 of his 3 children before finishing residency.

Near the end of his training, he worked with William Longmire to develop a novel artificial esophagus. This work, presented at the 1945 Southern Surgical Association meeting, describes a free jejunal segment isolating the mesenteric blood supply implanting a skin tube in the anterior chest wall. This was the first report of a free intestinal graft rather than transposing various GI segments. The next year, he introduced the concept of early ambulation in the immediate postoperative period.

Small selected papers on pectus excavatum at the time suggested this was becoming a surgical issue. Ravitch advocated a more radical sternal mobilization, excising all sternal attachments (xiphoid and costal cartilages) without using traction. On January 15, 1947, he performed his first procedure on a 10 year old boy; he completed 8 more that year with excellent results barring one death from infection. Nearly 70 years later, his surgical principles remain the mainstay of the operation.

As his focus in the pediatric surgery grew, he addressed many difficult diseases. Namely: an anal ileostomy for total colectomy; one-stage total colectomy for ulcerative colitis; and coining Cantrell’s pentalogy. Likely the most provocative and controversial proposal was the nonoperative approach for intussusception using hydrostatic pressure — still in use to this date. Credited as the founding father of making pediatric surgery a separate specialty, he highly influenced his intern Alex Haller (34th STSA President) to pursue this career, who became the first Chief of Pediatric Surgery at The JHH.

In 1958, Ravitch introduced surgical staplers to the US. While learning blood banking techniques in Russia, he observed prominent surgeon Nikolai Amosov’s “brilliant use of the staple instruments in pulmonary surgery.” On his return to JHH, he demonstrated the stapler closure on an autopsied lung bronchus with one stroke (rather than multiple silk sutures). Lead thoracic surgeon William Reinhoff commented “it looks awfully big and heavy. Besides, I love to sew.” With specific modifications, he collaborated with Leon Hirsch, founder of the United States Surgical Corporation, to manufacture the first stapler in 1967. As the notion of these staplers came to fruition, thoracic surgeons adopted this technology to reduce problems with bronchial stump leaks.

His surgical innovation was not outdone by his character, and fondly remembered by current surgical faculty for his wit, outlandish personality, and birth of the surgical curmudgeon. He always had a high standard for his compassionate approach to Socratic teaching. Today, friends and patients established in 1985 the Ravitch Endowed Professorship in Surgery, held by the Chief of the Ravitch Colorectal Service.
68 Long-term Outcomes Following Bioprosthetic Pulmonary Valve Replacement in Children With Repaired Tetralogy of Fallot

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Author Institution(s): Mayo Clinic, Rochester, MN

Discussant: *Brian E. Kogan, University of Mississippi Medical Center, Jackson, MS

Objectives: Pulmonary valve replacement (PVR) following complete repair of Tetralogy of Fallot (TOF) is infrequently required in children. Thus, data regarding risk factors for reoperation, late survival, and the bioprosthesis of choice in this population is lacking. We examined risk factors and late survival for bioprosthetic PVR.

Methods: From 1993 to 2015, 45 children with repaired isolated TOF underwent bioprosthetic PVR. Time from complete repair to first PVR was 10.7±4.3 yrs. Age at first PVR was 11.8±4.4 yrs and 26 (58%) were males. Indication for PVR was isolated pulmonary regurgitation (PR) in 41 and combined PR with pulmonary stenosis in 4. Common presenting symptoms were exercise intolerance (44%), palpitations (11%) and right-sided heart failure (4%); fatigue was present in almost all patients.

Results: Repeat sternotomy was performed in all patients. Mean bypass time was 64.3±34.55 mins and mean cross clamp time was 28.2±18.24 mins. Porcine PVR was performed in 39 (87%) and 6 (13%) had pericardial. Mean implant size was 24.6±2.99 mm; transannular right ventricular outflow tract-to-pulmonary artery roof augmentation with bovine pericardium was utilized in all. There were no early deaths. Median follow-up was 7.53 yrs, during which there was only one death. PVR deterioration required re-intervention in 12 pts; surgical redo-PVR in 7 and transcatheter valve-in-valve in 5. Freedom from reintervention at 1, 5 and 10 yrs was 100%, 87% and 54.2% respectively. Median time to reintervention was 5.2 yrs. Early age (p=0.043) and small implant size (p=0.006) were significant risk factors associated with need for reoperation, likely because of somatic outgrowth. There was no correlation between bioprosthetic valve type, gender, preoperative MRI and the subsequent need for reoperation.

Conclusions: PVR in children with repaired TOF can be performed with low early mortality and excellent late survival. There is a significant need for reintervention, despite intentional upsizing of the prosthesis.

Kaplan-Meier curve representing freedom from reoperation after the first PVR, in children with a history of isolated TOF repair.
Assessment of Neutrophil to Lymphocyte Ratio as a Predictor of Response to Chemoradiotherapy in Patients With Esophageal Squamous Cell Carcinoma


Author Institution(s): Memorial Sloan Kettering Cancer Center, New York, NY

Discussant: *Wayne L. Hofstetter, University of Texas MD Anderson Cancer Center, Houston, TX

Objectives: Chemoradiotherapy (CRT) is increasingly being used as definitive treatment for operable patients with locally advanced esophageal squamous cell carcinoma (SCC). However, clinical tools used to predict pathological complete response (pCR) are often inaccurate. Our aim was to assess neutrophil to lymphocyte ratio (NLR) as a clinical predictor of treatment response and prognosis in patients with esophageal SCC.

Methods: We performed a retrospective review of patients with locally advanced esophageal SCC. Patients treated with induction or definitive CRT who had complete blood work before and after CRT were included. Blood work data were collected retrospectively through medical records review. NLR was calculated by dividing the absolute neutrophil count by the absolute lymphocyte count. The differential ratio (χNLR) was defined as the posttreatment minus the pretreatment ratio. Patients with pCR after resection were compared with patients with residual disease (RD). The t test and Cox regression models were used to evaluate the prognostic accuracy of NLR for both response to CRT and disease-free survival (DFS).

Results: In total, 215 patients met the inclusion criteria; 81 underwent surgery, 47 (58%) had RD on pathology, and 34 (42%) had pCR. NLR for patients with pCR was 0.1 (±0.57 to 1.26) vs. 1.05 (±0.36 to 3.5) for patients with RD (p=0.027). Higher NLR was a negative predictor of treatment response (OR 0.85; 95% CI 0.74-0.99; p=0.036) and a positive predictor of recurrence (OR 1.16; 95% CI 1.01-1.3; p=0.033). Higher NLR was also predictive of shorter DFS in surgical patients (HR 1.1; 95% CI 1.03-1.2; p=0.006) and the overall cohort (HR 1.07; 95% CI 1.02-1.1; p=0.004).

Conclusions: NLR is an independent predictor of treatment response, risk of recurrence, and DFS in patients with esophageal SCC. NLR is a simple test that, in concert with other clinical tools, can help identify patients with pCR.
FIFTH SCIENTIFIC SESSION

70 Bronchoscopy Simulation Training as a Tool in Medical School Education

Unless otherwise noted in this program book or verbally by the speakers, speakers have no relevant financial relationship to disclose and will only be presenting information on devices, products, or drugs that are FDA approved for the purposes they are discussing. Authors listed with a D next to their name have indicated that they have a financial or other relationship with a healthcare-related business or other entity to disclose.

Authors: Mallika Gopal, Alexus A. Skabodzinski, Helene M. Sterbling, *Virginia R. Litle, Sowmya R. Rao, Christopher R. LaChapelle, Kei Suzuki

Author Institution(s): Boston University, Boston, MA

Discussant: *Andrew C. Chang, University of Michigan Health System, Ann Arbor, MI

Objectives: Procedural simulation training of any kind is rare at the pre-clinical level. Specifically, there is no insight into the usefulness of bronchoscopy simulation training (BSTAT) in improving anatomical knowledge and procedural confidence. Our aim is to assess the impact that individual training has on understanding of bronchial anatomy and mastery of technical skills.

Methods: First and second year medical students were recruited by email. After signing an IRB-approved consent, subjects completed a bronchoscopy-experience survey. A thoracic surgeon then measured their knowledge of airway anatomy using the Endo-VR simulator (CAE Healthcare in Sarasota, FL) and completed the Bronchoscopy Skills and Tasks Assessment Tool (BSTAT), a validated 65-point checklist. Students were instructed to perform four self-directed training sessions for a minimum of 15 minutes per week for four weeks. A post-training survey and BSTAT were completed after training. Change in average scores from Pre- to Post- were tested with two-sided paired t-test. A repeated measures analysis was conducted using a Generalized Linear Mixed Model to test for the significance of this change adjusting for total training time and education year.

Results: 36 (73%) of the 49 participants completed pre and post testing. Average total BSTAT scores increased significantly from 11.1 to 45.9 (p<0.0001). Multivariable regressions indicate that the average post BSTAT total score was higher for those with higher pre BSTAT totals [beta (standard error) = 1.1 (0.23); p<0.0001] and those in the first year of medical school [beta(SE)=6.1 (2.7); p=0.03].

Conclusions: Self-driven bronchoscopy simulation training in pre-clinical medical school students has demonstrated improvements in bronchial anatomy and bronchoscopy skills. Further investigation is needed to determine the extent of its impact on academic performance, future thoracic specialty interest, and long-term retention.

Bronchoscopy Skills and Tasks Assessment Tool (BSTAT)

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<th>Educational Item*</th>
<th>Yes/No</th>
<th>Score</th>
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<tr>
<td>1. Identification of Right sided anatomy (2 points each, target 20 points)</td>
<td>Yes/No</td>
<td>Score 20</td>
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<td>□ RB1 apical □ RB2 posterior □ RB3 anterior □ RB4 lateral □ RB5 medial □ RB6 superior □ RB7 inferior □ RB9 anterobasal □ RB9 posterobasal □ RB10 posterobasal</td>
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<td>2. Identification of Left sided anatomy (2 points each, target 16 points)</td>
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<td>□ LB1+2 apicalposterior □ LB3 anterior □ LB4 superior □ LB5 inferior □ LB6 superior □ LB7 anterobasal □ LB8 posterobasal □ LB9 anterobasal □ LB9 posterobasal</td>
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<tr>
<td>3. Identify and enter RB 4+5+6 on demand (All three segments must be entered to earn 5 points, no partial points given, target 5 points)</td>
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<td>□ RB 4+5+6</td>
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<td>4. Identify and enter LB 8+9+10 on demand (All three segments must be entered to earn 5 points, no partial points given, target 5 points)</td>
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<td>□ LB 8+9+10</td>
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<td>5. Posture/Hand positions/Equipment safety (3 points each, target 9 points)</td>
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<td>6. Scope centered and kept in midline (5 points, no partial points given)</td>
<td>Yes/No</td>
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<td>□ Scope centered in airway lumen</td>
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<td>7. Airway wall trauma avoided (5 points, no partial points given)</td>
<td>Yes/No</td>
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<td>□ Airway wall trauma avoided</td>
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FINAL GRADE: PASS / FAIL

Score: 5 / 65

Time to complete test: ________________

Modified from: Bronchoscopy International 2010

NOTES:
**71 Long-term Impact of Endoscopic Thoracic Sympathectomy on Quality of Life for Patients With Primary Palmar Hyperhidrosis**

Unless otherwise noted in this program book or verbally by the speakers, speakers have no relevant financial relationship to disclose and will only be presenting information on devices, products, or drugs that are FDA approved for the purposes they are discussing. Authors listed with a D next to their name have indicated that they have a financial or other relationship with a healthcare-related business or other entity to disclose.

**Authors:** Leah C. Horslen, Candice L. Wilshire, Brian E. Louie, Ralph W. Aye, Alexander S. Farivar, Eric Vallières

**Author Institution(s):** Swedish Medical Center, Spokane, WA

**Discussant:** Daniel T. DeArmond, University of Texas Health Science Center, San Antonio, TX

**Objectives:** Endoscopic thoracic sympathectomy (ETS) is the gold standard treatment for primary palmar hyperhidrosis, with excellent short-term results. The potential for adverse effects, particularly compensatory sweating (CS), may however affect long-term satisfaction. We aimed to examine the long-term results, patient satisfaction and quality of life (QOL) of patients following ETS for the management of primary palmar hyperhidrosis.

**Methods:** A review of all patients who had undergone ETS for primary palmar hyperhidrosis from 02/2004-05/2015 was performed. Utilizing a modified questionnaire with validated components, eligible patients were contacted to obtain responses designed to measure outcomes, patient satisfaction and QOL domains. Peri-operative data was obtained with a subsequent chart review.

**Results:** Of the 96 eligible patients, 58 (60%) consented and completed the questionnaire. The median time of survey from surgery was 75 months (interquartile range: 35-122). Increased QOL was reported in 84% of patients (49/58), 10% reported no change (6/58); while an increased ability to perform tasks was reported in 86% (50/58), 14% reported the same ability (8/58). Mean satisfaction with surgery was 95%, with a score of 4.75 on a 5 point scale. The incidence of CS was 84% (49/58), ranging from minor to constant head-to-toe sweating. There were 146 total areas involved by CS for the 49 who experienced it, most commonly the back [78%, 38/49]. Nonetheless, 78% (38/49) reported CS to be less disruptive than their preoperative hyperhidrosis. One ETS reversal, indicated for extreme CS, was performed. Overall, 93% (54/58) of patients reported they would recommend the procedure.

**Conclusions:** This study confirms that the benefits of ETS are maintained in the long-term. Although CS is the main cause for discontent following surgery, it is still preferred over the distress experienced from hyperhidrosis, and QOL is increased despite CS.
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* Deceased
CLIFFORD VAN METER PRESIDENT’S AWARD
Formerly known as the President’s Award, the Clifford Van Meter President’s Award was established in 2008 to recognize the best scientific paper delivered at the STSA Annual Meeting. In 2013, this Award was augmented to specifically recognize the best adult congenital heart surgery paper delivered at the Annual Meeting. The award is given on the basis of originality, content, and presentation. Previous award recipients have uniformly displayed excellence in all areas. The selected author receives a certificate identifying the award and a suitable monetary reward. The recipient is chosen by the President with assistance from the Council.

1964–Bertram A. Glass
1965–Harold C. Urschel, Jr.
1966–Thomas J. Yeh
1967–Yale H. Zimberg
1968–J. Alex Haller, Jr.
1969–William H. Sewell
1970–George R. Daicoff
1971–Charles E. Eastridge
1972–J. Kent Trinkle
1973–Donald L. Bricker
1974–Harvey W. Bender, Jr.
1975–Charles E. Martin
1976–Gordon F. Murray
1977–Denis H. Tyras
1978–Joseph L. Miller, Jr.
1979–M. Wayne Flye
1980–Francis Robicsek
1981–Ellis L. Jones
1982–William G. Malette
1983–Robert H. Breyer
1984–Blair A. Keagy
1985–John W. Hammon, Jr.
1986–William H. Frist
1987–Jean-Nicolas Vauthey
1988–Robert A. Gustafson
1989–Harvey I. Pass
1990–Vincent L. Gott
1991–Ross M. Ungerleider
1992–William H. Frist
1993–Kirk R. Kanter
1994–Thomas L. Spray
1995–Constantine Mavroudis
1996–David A. Fullerton
1997–Christopher J. Knott-Craig
1998–James L. Zeller
1999–Thomas D’Amico
2000–Joseph C. Cleveland, Jr.
2001–Neal D. Kon
2002–Joseph S. Coselli
2003–Robert J. Cerfazio
2004–Malcolm DeCamp
2005–Seenu V. Reddy
2006–Andrew W. ElBardissi
2007–John Stulak
2008–G. Chad Hughes
2009–Scott H. Johnson
2010–Kenneth A. Kessler
2011–Robert Stewart
2012–Haritha Reddy
2013–Bartosz Ryblik
2014–Stephano Mastrobouoni
2015–Anthony L. Estrella
2016–A. Michael Borkon

New Orleans, Louisiana
Dallas, Texas
Savannah, Georgia
Richmond, Virginia
Baltimore, Maryland
Sayre, Pennsylvania
St. Petersburg, Florida
Memphis, Tennessee
San Antonio, Texas
Lubbock, Texas
Nashville, Tennessee
Nashville, Tennessee
Chapel Hill, North Carolina
St. Louis, Missouri
Atlanta, Georgia
Galveston, Texas
Charlotte, North Carolina
Atlanta, Georgia
Omaha, Nebraska
Springfield, Massachusetts
Chapel Hill, North Carolina
Nashville, Tennessee
Nashville, Tennessee
New Orleans, Louisiana
Morgantown, West Virginia
Bethesda, Maryland
Baltimore, Maryland
Durham, North Carolina
Nashville Tennessee
Atlanta, Georgia
St. Louis, Missouri
Chicago, Illinois
Denver, Colorado
Oklahoma City, Oklahoma
Charleston, South Carolina
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Winston-Salem, South Carolina
Houston, Texas
Birmingham, Alabama
Boston, Massachusetts
San Antonio, Texas
Rochester, Minnesota
Rochester, Minnesota
Durham, North Carolina
Lansing, Michigan
Indianapolis, Indiana
Cleveland, Ohio
Ann Arbor, Michigan
Freiburg, Germany
Brussels, Belgium
Houston, Texas
Kansas City, Missouri

CAROLYN REED PRESIDENT’S AWARD
The Carolyn Reed President’s Award was established in 2013 to recognize the best general thoracic surgery scientific paper delivered at the STSA Annual Meeting. Named in memory of STSA Past President, Carolyn E. Reed, MD, (STSA President, 2006-07), this award will be given on the basis of originality, content, and presentation. The selected author receives a certificate identifying the award and a suitable monetary reward. The recipient is chosen by the President with assistance from the Council.

2013–R. Douglas Adams
2014–Pamela Samson
2015–Jonathan Spicer
2016–Thoralf Sundt

Merrillville, Indiana
Webster Groves, Missouri
Montreal, Quebec
Boston, Massachusetts

GEORGE R. DAICOFF PRESIDENT’S AWARD
The George R. Daicoff President’s Award was established in 2013 to recognize the best congenital heart surgery scientific paper delivered at the STSA Annual Meeting. Named for longtime active member, George R. Daicoff, MD, this award will be given on the basis of originality, content, and presentation. The selected author receives a certificate identifying the award and a suitable monetary reward. The recipient is chosen by the President with assistance from the Council.

2013–Vincent K.H. Tam
2014–Jennifer Solms Nelson
2015–James D. St. Louis
2016–William Patrick

Fort Worth, Texas
Chapel Hill, North Carolina
Wayzata, Minnesota
Menlo Park, California

TIKI AWARD
The quality of slides can greatly enhance or detract from a scientific presentation. In order to emphasize the importance of well-planned and prepared slides, the Southern Thoracic Surgical Association has created the Tiki Award.

This award is given to the person who presents a slide at the annual meeting which is judged by a committee appointed by the President to be the most memorable and noteworthy. This slide can be selected because it is unintelligible, confusing, cluttered, irrelevant, or conversely because it is superbly clear, concise, colorful, pertinent, and/or utilizes state of the art graphics.
OSLER ABBOTT AWARD

The Osler Abbott Award was first given in 1960 and has been awarded annually to that member of the Association who excels in the art of discussionmanship. It was named for Osler Abbott, MD of Atlanta, Georgia, who, in 1950, somehow managed to discuss 26 papers, no mean feat since only 25 were presented and one was his own!

In the early years, sheer volume of discussion was sufficient to earn at least an honorable mention, but volume alone never won the award. More important were factors such as pomposity, arrogance, irrelevancy, and the use of outdated slides which had been shown on two or more occasions. In recent years, the tactics have ranged from extreme subtlety to blatant exhibitionism and from apparent indifference to obvious covetousness.

To place this traditional award on a somewhat higher plane of competition, the Council, in its wisdom, decided to base the decision on Oslerian principles, and selection would come from evaluation of the more memorable of discussions during the scientific sessions.

Thus, the reincarnated purposes of the Osler Abbott Award of the Southern Thoracic Surgical Association are:

1. To focus on the importance of open, frank, and candid discussion in the spirit and substance of the Southern Thoracic Surgical Association and, in this way, to encourage more objective and active participation by all members attending the Annual Meeting.
2. To stimulate a healthy give-and-take among the members and, thereby, enhance the camaraderie and esprit-de-corps which have traditionally characterized the Southern Thoracic Surgical Association.
KENT TRINKLE EDUCATION LECTURESHP
The Kent Trinkle Educational Lectureship is dedicated to J. Kent Trinkle, (STSA President, 1981-82) for his contributions to cardiothoracic surgery and STSA. Each year, in honor of Dr. Trinkle’s remarkable dedication to student education, an STSA member is selected to present on his/her training program. Presenters are selected by the STSA President.

1993–Benson R. Wilcox Chapel Hill, North Carolina
1994–George C. Kaiser St. Louis, Missouri
1995–J. Kent Trinkle San Antonio, Texas
1996–Irving L. Kron Charlottesville, Virginia
1997–William A. Baumgartner Baltimore, Maryland
1998–Donald C. Watson, Jr. Memphis, Tennessee
1999–Fred A. Crawford, Jr. Charleston, South Carolina
2000–Robert A. Guyton Atlanta, Georgia
2001–Joel D. CooperSt. Louis, Missouri
2002–W. Steves Ring Dallas, Texas
2003–Walter G. Wolfe Durham, North Carolina
2004–Joseph Coselli Houston, Texas
2005–Neal Kon Winston-Salem, North Carolina
2007–Walter H. Merrill Cincinnati, Ohio
2008–Curt Tribble Gainesville, Florida
2009–Irving L. Kron Charlottesville, Virginia
2010–Michael R. Mill Chapel Hill, North Carolina
2011–John H. Calhoon San Antonio, Texas
2012–Bartley P. Griffith Baltimore, Maryland
2013–Michael Argenziano New York, New York
2014–Mark S. Slaughter Louisville, Kentucky
2015–John S. Ikonomidis Charleston, South Carolina
2016–William A. Baumgartner Baltimore, Maryland

HAROLD URSCHEL HISTORY LECTURESHP
The Harold Urschel History Lectureship is dedicated to long-time STSA member and contributor, Harold C. Urschel, Jr., MD, (STSA Historian, 2001-12). This lectureship was established in memory of Dr. Urschel in 2013. The lecturer will be selected annually by the Program Committee as the abstract author who submitted the most exemplary history abstract.

2013–Joseph S. Coselli Houston, Texas
2014–Daniel L. Miller Marietta, Georgia
2015–Erle H. Austin Louisville, Kentucky
2016–Robert M. Sade Charleston, South Carolina

HAWLEY H. SEILER RESIDENTS COMPETITION AWARD
The Hawley H. Seiler Residents Competition Award is presented for an outstanding paper by a cardiothoracic or general surgery resident. It is bestowed upon the resident excelling in the following categories regarding their abstract submission: quality of abstract as well as manuscript and oral presentation. The award is named after STSA Past President and founding member, Hawley H. Seiler.

Dr. Seiler’s many contributions to STSA included serving as Secretary for 15 years and presenting on numerous topics at Annual Meetings.

1997–Elaine E. Tseng Baltimore, Maryland
1998–Stephen Langley Durham, North Carolina
1999–Aron Goldberg Charleston, South Carolina
2000–Cullen D. Morris Atlanta, Georgia
2001–Sitaram M. Emani Durham, North Carolina
2002–Thomas H. Maxey Charlottesville, Virginia
2003–Brian T. Beheea Baltimore, Maryland
2004–Tara Karamlou Portland, Oregon
2006–Thomas K. Varghese Portland, Oregon
2007–Tara Karamlou Sacramento, California
2008–David T. Cooke Baltimore, Maryland
2009–Jeremiah Geoff Allen Charlottesville, Virginia
2010–Castiglano M. Bhamidipati Rochester, Minnesota
2011–Sameh Said Baltimore, Maryland
2012–Timothy George Atlanta, Georgia
2013–Rachel L. Medbery Charlottesville, Virginia
2014–Damian J. LaPar Charlotte, North Carolina
2015–Emily A. Downs Charlotte, North Carolina
2016–J. Trent Magruder Baltimore, Maryland
**AWARDS**

**MAVROUDIS-URSCHEL AWARD**
The Mavroudis-Urscel Award was established in 2006 to recognize and honor an STSA member who has not only made important contributions to the STSA scientific program, but who has also uniquely personified the social spirit, camaraderie, and fun for which STSA is famous. The award is named for STSA Past Presidents Constantine Mavroudis and Harold Urscel, who both contributed significantly not only to the scientific value of the STSA Annual Meeting but also, and just as importantly, to the organization’s high spirits (and high-jinx).

There is more to an organization than its bylaws, and there is more to its Annual Meeting than the slides and presentations. To many, STSA meetings are as much about social interactions as they are about new research findings in cardiothoracic surgery. Meeting highlights also happen at social events, such as the president’s mixer, receptions, sports events, and during the exhibit hall breaks. The Award goes to a member who has enhanced both aspects of the organization, scientific and social, and done so with a distinctive, even flamboyant, personal style—in the manner of its namesakes.

The Mavroudis-Urscel Award is made at the discretion of the President with input and recommendation from the double-secret Tiki and Osler-Abbot committee chairs. When given, the award is announced at the annual dinner/dance.

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<thead>
<tr>
<th>Year</th>
<th>Name</th>
<th>Location</th>
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<tbody>
<tr>
<td>2007</td>
<td>Kit V. Arom</td>
<td>Bangkok, Thailand</td>
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<tr>
<td>2009</td>
<td>John H. Calhoon</td>
<td>San Antonio, Texas</td>
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<td>2010</td>
<td>Keith S. Naunheim</td>
<td>St. Louis, Missouri</td>
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<td>2011</td>
<td>Francis Robicsek</td>
<td>Charlotte, North Carolina</td>
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<tr>
<td>2012</td>
<td>Harold C. Urscel, Jr.*</td>
<td>Dallas, Texas</td>
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<tr>
<td>2013</td>
<td>Kevin D. Accola</td>
<td>Orlando, Florida</td>
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<tr>
<td>2014</td>
<td>Andrea J. Carpenter</td>
<td>San Antonio, Texas</td>
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<tr>
<td>2015</td>
<td>Kamal A. Mansour*</td>
<td>Atlanta, Georgia</td>
</tr>
<tr>
<td>2016</td>
<td>Shanda Blackmon</td>
<td>Rochester, Minnesota</td>
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**STSA INSPIRATION AWARD**
The STSA Inspiration Award was established in 2007 to recognize the important contribution of mentorship to the specialty and the organization, and to encourage upcoming generations of CT surgeons by helping to cultivate mentors worthy of emulation.

The future of cardiothoracic surgery is in the hands and hearts of its medical students and residents. Inspiring a resident or medical student to become a CT surgeon—to become a great CT surgeon—is among the most far-reaching and important contributions one can make to the specialty and ultimately to the Southern Thoracic Surgical Association.

The residency program directors and faculty at teaching programs affiliated with the STSA are developing and inspiring future cardiothoracic surgeons every day—teaching them to become leaders in their future institutions, practices, and communities. And mentorship is not limited to program directors and faculty. Surgeons in private practice hire young graduates and become influential mentors providing career guidance and support often for years to come.

To acknowledge the crucial importance of mentorship in developing CT surgeons and to recognize and positively reinforce STSA members who have excelled in their mentorship roles, STSA established its Inspiration Award in 2007. The Inspiration Award is given to the STSA member who has demonstrated exceptional efforts in motivating, inspiring, and cultivating the clinical and research talents of medical students, residents and/or early career CT surgeons.

Nominations must be submitted in writing by September 1 to the sitting STSA President to be considered for possible presentation at the subsequent STSA Annual Meeting. Recommendation letters should outline the specific merits of the nominee and his or her positive influences for the ‘mentee(s).’ Recipient must be a member of STSA in good standing. The award is given at the discretion of the President in consultation with the Council.

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<tr>
<th>Year</th>
<th>Name</th>
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<tr>
<td>2007</td>
<td>Robert J. Cerfolio</td>
<td>Birmingham, Alabama</td>
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<tr>
<td></td>
<td>Hooshang Boloaki</td>
<td>Miami, Florida</td>
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<tr>
<td>2009</td>
<td>Irving L. Kron</td>
<td>Charlottesville, Virginia</td>
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<tr>
<td>2010</td>
<td>Kamal A. Mansour</td>
<td>Atlanta, Georgia</td>
</tr>
<tr>
<td></td>
<td>Francis Robicsek</td>
<td>Charlotte, North Carolina</td>
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<tr>
<td>2012</td>
<td>Harvey W. Bender, Jr.</td>
<td>Nashville, Tennessee</td>
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<tr>
<td></td>
<td>Frederick L. Grover</td>
<td>Aurora, Colorado</td>
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<tr>
<td>2013</td>
<td>James Robert Headrick</td>
<td>Chattanooga, Tennessee</td>
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<tr>
<td>2014</td>
<td>Curtis G. Tribble</td>
<td>Charlottesville, Virginia</td>
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<tr>
<td>2015</td>
<td>L. Henry Edmunds</td>
<td>Bryn Mawr, Pennsylvania</td>
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<tr>
<td>2016</td>
<td>Clinton E. Baisden</td>
<td>San Antonio, Texas</td>
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**JAMES W. BROOKS MEDICAL STUDENT SCHOLARSHIP**
The STSA James W. Brooks Medical Student Scholarship was established in 2010 to pay tribute to Dr. Jim Brooks, past president of STSA and a great mentor to countless residents and students. The Brooks Scholarship seeks to identify 2nd, 3rd, and 4th year medical students in the STSA region who are interested in cardiothoracic surgery. Each year a scholarship recipient will be invited to attend the STSA Annual Meeting and the unique opportunity to benefit from the guidance of STSA members, thus extending Dr. Brooks’ legacy as a great mentor. It has become increasingly important to begin mentoring future CT surgeons at the medical student level. In establishing the Brooks Scholarship and providing first-rate mentorship, STSA hopes to annually inspire promising medical students to become great CT surgeons, thus making a far-reaching and important contribution to the future of the specialty and ultimately to the STSA.

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<tr>
<th>Year</th>
<th>Name</th>
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<tr>
<td>2010</td>
<td>Elizabeth A. Spradlin</td>
<td>Richmond, Virginia</td>
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<tr>
<td>2011</td>
<td>Carlo Bartoli</td>
<td>Louisville, Kentucky</td>
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<tr>
<td>2012</td>
<td>Vernissia Tam</td>
<td>Baltimore, Maryland</td>
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<tr>
<td>2013</td>
<td>Sahar Saddoughi</td>
<td>Charleston, South Carolina</td>
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<tr>
<td>2014</td>
<td>Mickey Ising</td>
<td>Louisville, Kentucky</td>
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<td></td>
<td>Xiaoying Lou</td>
<td>Chicago, Illinois</td>
</tr>
<tr>
<td>2015</td>
<td>Bogdan Kindzielski</td>
<td>Potomac, Maryland</td>
</tr>
<tr>
<td></td>
<td>Graham Ungerleider</td>
<td>Winston-Salem, North Carolina</td>
</tr>
<tr>
<td>2016</td>
<td>Caitlin Brown</td>
<td>Portland, Oregon</td>
</tr>
<tr>
<td></td>
<td>Andrew Percy</td>
<td>Richmond, Virginia</td>
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<tr>
<td>2017</td>
<td>Trevor Davis</td>
<td>Baltimore, Maryland</td>
</tr>
<tr>
<td></td>
<td>John Kelly</td>
<td>Atlanta, Georgia</td>
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<tr>
<td></td>
<td>Raymond Strobel</td>
<td>Ann Arbor, Michigan</td>
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**JAMES W. BROOKS RESIDENT SCHOLARSHIP**
The James W. Brooks Resident Scholarship was established in 2014 and seeks to identify a general surgery or thoracic surgery resident who is committed to CT surgery. Each year a scholarship recipient will be invited to attend the STSA Annual Meeting where they will be mentored by an STSA surgeon leader.

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<thead>
<tr>
<th>Year</th>
<th>Name</th>
<th>Location</th>
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<tbody>
<tr>
<td>2014</td>
<td>Zachary Kon</td>
<td>Baltimore, Maryland</td>
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<tr>
<td>2015</td>
<td>Erin Schumer</td>
<td>Louisville, Kentucky</td>
</tr>
<tr>
<td></td>
<td>Mansi Shah</td>
<td>Chapel Hill, North Carolina</td>
</tr>
<tr>
<td>2016</td>
<td>Sameer Hirji</td>
<td>Alston, Massachusetts</td>
</tr>
<tr>
<td></td>
<td>David Ranney</td>
<td>Durham, North Carolina</td>
</tr>
<tr>
<td>2017</td>
<td>Charles Fraser</td>
<td>Baltimore, Maryland</td>
</tr>
</tbody>
</table>
EXHIBIT HOURS AND FLOOR PLAN

THURSDAY, NOVEMBER 9
EXHIBITS OPEN
10:00 am – 12:00 pm
1:30 pm – 3:30 pm

FRIDAY, NOVEMBER 10
EXHIBITS OPEN
7:45 am – 12:00 pm
12:45 pm – 3:30 pm

The exhibit hall will be closed during the lunch hour. On Thursday, the exhibit hall will close from 12:00-1:30 pm and on Friday, from 12:00–12:45 pm. Exhibit hours will resume after lunch each day.

• Exhibits are located in the Cibolo Canyon Ballroom 7-11
• All coffee breaks scheduled during exhibit hours are in the exhibit area
• Complimentary coffee and pastries will be served

EXHIBITORS*

*CONFIRMED AS OF SEPTEMBER 27, 2017
Acelity (KCI) Booth: 209
San Antonio, TX 78249
Acelity L.P. Inc. and its subsidiaries are a global advanced wound care company that leverages the strengths of Kinetic Concepts, Inc. and Systagenix Wound Management, Limited. Available in more than 80 countries, the innovative and complementary ACELITY™ product portfolio delivers value through solutions that speed healing and lead the industry in quality, safety and customer experience. Headquartered in San Antonio, Texas, Acelity employs nearly 5,000 people around the world.

AtriCure, Inc. Booth: 109
Mason, OH 45040
AtriCure provides solutions designed to decrease the Afib epidemic. AtriCure’s Synergy™ Ablation System is approved for the treatment of persistent and longstanding persistent Afib in patients undergoing certain concomitant procedures.

CryoLife Booth: 203
Kennesaw, GA 30144
Headquartered in suburban Atlanta, Georgia, CryoLife® is a leader in the manufacturing, processing, and distribution of implantable living tissues and medical devices used in cardiac surgical procedures. CryoLife® markets and sells products in more than 80 countries worldwide. For additional information about CryoLife®, visit our website, www.cryolife.com.

Delacroix-Chevalier Booth: 205
Chaumont, France
For 70 years, Delacroix-Chevalier is proud of marrying famous French manufacturer know-how to surgical excellence, to create instrumentation of today and tomorrow and convert surgical acts into successes. Our worldwide clients’ confidence comes from our legendary quality and passion to simply bring you innovations.

Edwards Lifesciences Booth: 304
Irvine, CA 92614
Edwards Lifesciences, based in Irvine, Calif., is the global leader in patient-focused medical innovations for structural heart disease, as well as critical care and surgical monitoring. For more information, visit www.Edwards.com and follow us on Twitter @EdwardsLifesci.

Johnson & Johnson Medical Devices Booth: 105
Cincinnati, OH 45242
Having made significant contributions to surgery for more than a century, the Johnson & Johnson Medical Devices Companies are in the business of reaching more patients and restoring more lives. The group represents the most comprehensive surgical technology and specialty solutions business in the world, offering an unparalleled breadth of products, services, programs and research and development capabilities directed at advancing patient care while delivering clinical and economic value to health care systems worldwide.

KLS-Martin Booth: 308
Jacksonville, FL 32245
KLS-Martin, a responsive company, is focused on the development of innovative products for oral, plastic and cranio-maxillofacial surgery. New product developments in our titanium osteosynthesis plating systems allow these products to be used for rapid sternal fixation and reconstruction.

LifeNet Health Booth: 101
Virginia Beach, VA 23453
LifeNet Health helps save lives, restore health, and give hope to thousands of patients each year. We are the world’s most trusted provider of transplant solutions, from organ procurement to new innovations in bio-implant technologies and cellular therapies—a leader in the field of regenerative medicine, while always honoring the donors and healthcare professionals that allow the healing process.

LSI Solutions Booth: 201
Victor, NY 14564
RAM® DEVICE
Automated dual curved needle annular suturing device places a 3.5mm wide horizontal mattress subannular suture in one squeeze.

SEW-EASY™ DEVICE
Automated dual straight needle prosthetic suturing device places sutures through the sewing cuff in one squeeze. With 10 years of proven clinical results and over 3 million fasteners sold worldwide, COR-KNOT® is suture fastening technology you can trust.

Medtronic Booth: 301 & 305
Minneapolis, MN 55432
Through innovation and collaboration, Medtronic improves the lives and health of millions of people each year. Learn more about our technology, services and solutions at Medtronic.com.

Quest Medical Booth: 204
Allen, TX 75002
Quest Medical, Inc., a medical device manufacturer and worldwide distributor specializing in protecting the heart during cardiac surgery with Quest MPS 2®. Quest focuses on providing better patient outcomes through superior quality products.

Scanlan International, Inc. Booth: 300
St. Paul, MN 55107
Highest quality surgical products designed and manufactured by the Scanlan family since 1921. 3,000 stainless steel & titanium precision instruments, VATS Dennis Rib Cutter & Rocco Nodule Clamps, Single-Use Products.

Terumo Cardiovascular Group Booth: 103
Brighton, MI 48103
At Terumo Cardiovascular Group, we develop, manufacture, and distribute medical devices for cardiac and vascular surgery with an emphasis on cardiopulmonary bypass, intra-operative monitoring and vascular grafting.

Transonic Booth: 111
Ithaca, NY 14850
Transonic, the pioneer in CABG flow assessment, offers state-of-the-art technology for on-the-spot quantitative confirmation of bypass flow to guarantee early graft patency.
VasoPrep Surgical LLC
Booth: 307
Morristown, NJ 07960
VasoPrep Surgical is a medical device company with products focused on the importance of vein prep and why it’s critical to patient outcomes.

Veran Medical Technologies
Booth: 200
St. Louis, MO 63114
Veran has been empowering earlier cancer diagnoses since 2005. Our mission is to save lives by helping doctors diagnose cancer earlier and provide precision guidance to deliver potentially lifesaving therapy.

Vitalcor, Inc./Applied Fiberoptics
Booth: 302
Westmont, IL 60559
Coronary Artery Perfusion Cannula Balloon. LED light source (20,000+ hours) & Gemini Plus headlight with camera. Axiom Wound Drains with specialized Clot Stop. Titanium and stainless steel specialty instruments & retractors.

Wexler Surgical
Booth: 202
Houston, TX 77035
Wexler Surgical designs and manufactures a variety of titanium and stainless steel specialty surgical instruments and products for Cardiac, Vascular, Thoracic, and Micro Surgery.
Come see our VATS/MICS instruments and ask about our Optimus Series. Visit us online at www.wexlersurgical.com for more information about our products and services.

Zimmer Biomet
Booth: 206
Jacksonville, FL 32218
Founded in 1927 and headquartered in Warsaw, Indiana, Zimmer Biomet is a global leader in musculoskeletal healthcare. We design, manufacture and market a comprehensive portfolio of innovative Thoracic products and treatment solutions for surgeons and patients including, the RibFix™ Blu Thoracic Fixation System and the SternalLock® Blu Primary Closure System.
CONSTITUTION AND BYLAWS

SOUTHERN THORACIC SURGICAL ASSOCIATION
CONSTITUTION AND BYLAWS
(as amended November 11, 2016)

CONSTITUTION
ARTICLE I: NAME
The name of the Corporation shall be the SOUTHERN THORACIC SURGICAL ASSOCIATION, INC. (hereinafter designated as “the Association”).

ARTICLE II: OBJECTIVES
The Association is a not-for-profit corporation whose principle objectives are to disseminate knowledge and information and to stimulate progress in the field of thoracic and cardiovascular surgery in the designated geographic area. The mission of the organization is to: support southern and southern trained members of the cardiothoracic surgery community and their families in the pursuit of the highest quality patient care, education, scientific achievement, collegiality, and life balance.

The Association will:

1. Disseminate knowledge, encourage research and report at the annual meeting, scientific session and postgraduate course on the advancements within the field of thoracic and cardiovascular surgery.

2. Promote fellowship among thoracic and cardiovascular surgeons throughout the designated geographic area.

3. Assure that the activities of the Association are undertaken without any discrimination with regard to race, color, religious creed, national origin, ancestry, physical handicap, medical condition, marital status or sex.

ARTICLE III: OFFICES
The Association shall have and continuously maintain a registered office and a registered agent in the State of Illinois, and may have such other offices in or outside the State of Illinois at the Council’s discretion.

ARTICLE IV: MEMBERS
SECTION 1. Membership. There shall be six (6) categories of members: Active, Senior, Candidate, Pre-Candidate, Associate, and Honorary Member. Members shall be individuals who support the purpose of the Association and who agree to comply with the Association’s rules and regulations. Active and Senior members shall be entitled to hold office and shall have voting privileges. Active and Senior Members must be board certified by the American Board of Thoracic Surgery or its foreign equivalent. If an Active Member moves from the designated membership geographical area outlined in SECTION 2, he or she may retain membership as long as all other requirements for membership are satisfied. Members whose practices have been limited because of disability, or who have reached the age of 65 years, may apply for Senior Membership. The Association shall not be required to subscribe to The Annals of Thoracic Surgery for Senior members. Associate Members include support staff for practicing cardiothoracic surgeons including, but not limited to, nurses, nurse practitioners, perfusionists, physician assistants, and research staff. Honorary membership can be bestowed upon a worthy recipient upon recommendation of the Council and ratification by a two-thirds majority of the votes at the annual meeting. Honorary Members are broadly defined as physicians who have made significant contributions to the field of cardiothoracic surgery. Nomination for Honorary Membership can be made to the Council in writing for review prior to the spring Council Meeting. Honorary Members are welcomed at all scientific and business meetings of the Association, but have no obligations or responsibilities in the organization. Candidate Members must be matched or enrolled in a thoracic surgery educational program accredited by the Residency Review Committee for Thoracic Surgery under the authority of the Accreditation Council for Graduate
CONSTITUTION AND BYLAWS

Medical Education that is within the STSA region provided for in SECTION 2 to be classified as a Candidate Member. Candidate Members may retain membership up to three years following the completion of their thoracic surgery training. Candidate members who have been certified in thoracic surgery by the American Board of Thoracic Surgery (ABTS) may, upon written request to the Association and with approval of the Membership Committee and the Council, transition directly, with no initiation fee applied, to Active Membership. If no such official request is forthcoming, Candidate Membership will be terminated and reinstatement will be dependent upon a formal application for Active Membership, with its associated requirements, including initiation fee and approval by the full membership. Pre-Candidate Members may apply for membership by expressing a desire to enter the field of cardiothoracic surgery. Pre-Candidate Members may transfer to Candidate Member status once they have matched or enrolled in a thoracic surgery educational program accredited by the Residency Review Committee for Thoracic Surgery under the authority of the Accreditation Council for Graduate Medical Education that is within the STSA region.

SECTION 2. Applicants. An applicant for Active Membership must at the time of acceptance reside, or have previously practiced cardiothoracic surgery for at least one year, or have completed a thoracic or general surgery residency program, or have completed a thoracic or cardiovascular research or clinical fellowship for at least twelve consecutive months in one of the following states or regions: Alabama; Arkansas; Florida; Georgia; Kentucky; Louisiana; Maryland; Mississippi; Missouri; North Carolina; Oklahoma; South Carolina; Tennessee; Texas; Virginia; District of Columbia; the U.S. territories and commonwealths in the Caribbean. An applicant for active membership must be certified by the ABTS. Applicants who meet the practice requirement above but whose training has been in countries other than the United States of America, and who are certified as proficient in thoracic and cardiovascular surgery by appropriate authorities in their home country, may apply. At least seventy-five percent of the practice of the applicant must be devoted to the field of thoracic and cardiovascular surgery, which may include research and peripheral vascular surgery. If an applicant is unsuccessful in obtaining membership in two successive years, an interval of two years must elapse before he/she may reapply. The Membership Committee and the Council may recommend acceptance of foreign training and certification by stating that, in their opinion, it represents equivalent status. The Membership Committee and Council may recommend acceptance of individuals who, despite not meeting membership criteria regarding training, practice or research in the STSA region, have demonstrated significant involvement with the organization through their participation in the annual meeting, contributions to the scientific program, and service to the organization. Applicants so approved by the Membership Committee and the Council may become Active Members upon election by the membership at an annual meeting.

An applicant for Candidate Membership must at the time of acceptance be matched or enrolled in a thoracic surgery educational program accredited by the Residency Review Committee for Thoracic Surgery under the authority of the Accreditation Council for Graduate Medical Education in one of the following states or regions: Alabama; Arkansas; Florida; Georgia; Kentucky; Louisiana; Maryland; Mississippi; Missouri; North Carolina; Oklahoma; South Carolina; Tennessee; Texas; Virginia; West Virginia; District of Columbia; the U.S. territories and commonwealths in the Caribbean. Individuals who have completed their education in one of the above programs and are in the process of acquiring certification in thoracic surgery by the ABTS are eligible to apply for Candidate Membership.

An applicant for Associate Membership must at the time of acceptance be working in field of allied health related to the practice of cardiothoracic surgery in one of the following states or regions: Alabama; Arkansas; Florida; Georgia; Kentucky; Louisiana; Maryland; Mississippi; Missouri; North Carolina; Oklahoma; South Carolina; Tennessee; Texas; Virginia; West Virginia; District of Columbia; the U.S. territories and commonwealths in the Caribbean.

An applicant for Pre-Candidate Membership must at the time of acceptance be enrolled in medical school or general surgery residency in one of the following states or regions: Alabama; Arkansas; Florida; Georgia; Kentucky; Louisiana; Maryland; Mississippi; Missouri; North Carolina; Oklahoma; South Carolina; Tennessee; Texas; Virginia; West Virginia; District of Columbia; the U.S. territories and commonwealths in the Caribbean. They must submit a written statement of interest in cardiothoracic surgery.

Active Membership status will not become effective, nor a certificate of membership presented, unless and until such elected applicant registers at one of the next four annual meetings following his/her initial election to membership. Resident and Associate Membership status will not become effective, nor a certificate of membership presented, unless and until such elected applicant registers for and attends an annual meeting following his or her election to membership. Exception for this requirement may be granted by a majority vote of the Council. Failure to comply with this procedure will require reapplication for membership.

SECTION 3. Applications. Application forms for Active, Resident, Associate, and Pre-Candidate Membership are available from the Secretary-Treasurer or at www.stsa.org and are forwarded to the Chairman of the Membership Committee for verification. Applications will be verified by the Membership Committee in accordance with the policies and procedures established by the Council.

SECTION 4. Certificates. The Council shall issue a Certificate of the Association evidencing the member’s admission to the Association and indicating membership status. These certificates remain the sole property of the Association and shall be surrendered upon written demand and/or for non-payment of dues.

SECTION 5. Resignation. Members may resign from the Association at any time by giving written notice to the Secretary/Treasurer of the Association. Such resignation shall not relieve the member of any obligation for dues, assessments or other charges previously accrued and unpaid. Membership is not transferable or assignable.

SECTION 6. Termination of Membership. The Council, by affirmative vote of two-thirds of all Council members present and voting at any duly constituted meeting of the Council, may suspend or expel a member for cause after an appropriate hearing in accordance with policies and procedures established by the Council. The Council, by affirmative vote of a majority of all Council members present and voting at any duly constituted meeting of the Council may terminate the membership of any member who has become ineligible for membership in accordance with the policies and procedures established by the Council.

SECTION 7. Application for Reinstatement. Any former members of the Association may apply for reinstatement through the regular application procedure.
ARTICLE V: DUES AND ASSESSMENTS
The initiation and annual dues for each category of member of the Association, the time for paying such dues, and other assessments, if any, shall be determined by the Council. Annual dues are not refundable.

ARTICLE VI: MEETING OF MEMBERS
SECTION 1. Annual Meeting. The annual meeting of the members shall be held at a date, time and place determined by the Council and shall be held in conjunction with the scientific session of the Association.

SECTION 2. Purpose. The purpose of the annual meeting is to: elect officers and councilors; receive reports from the Association on the activities of the Council; provide members an opportunity to express their opinions on matters affecting the Association; and to dispense with such other business, as necessary. The order of business for a meeting shall be determined in advance by the President and subsequently adopted at a called meeting.

SECTION 3. Special Meetings. Special meetings of the membership may be called by the President or the Council. Such special meetings shall be held at a date, time and place as determined by the Council.

SECTION 4. Notice of Meetings. Written notice stating the date, time and place of any annual or special meeting shall be delivered no less than seven (7) days, nor more than 30 days, before the date of the meeting to each member entitled to vote at the meeting. In the case of removal of one or more Council members, a merger, consolidation, dissolution or sale of assets, a written notice of no less than twenty (20) days or more than sixty (60) days before the date of the meeting will be given by, or at the direction of, the President, the Secretary, or the Council.

SECTION 5. Quorum. The quorum for the transaction of business at a meeting of members or special meeting shall be a majority of the members attending that meeting.

SECTION 6. Voting. Each member with voting rights shall be entitled to only one (1) vote. A majority of the votes present at a meeting where a quorum is present shall be necessary for the adoption of any matter voted upon by the members, except where otherwise provided by law, the articles of incorporation of the Association or these bylaws.

SECTION 7. Informal Action. Required action may be taken without a meeting if a consent in writing, setting forth the action taken, is signed by not less than the minimum number of members necessary to authorize such action at a meeting, except for dissolution of the Association, which must be voted on at a special meeting of the members entitled to vote.

ARTICLE VII: OFFICERS AND THE COUNCIL
SECTION 1. General Powers. The property, business and affairs of the Association shall be managed by the Council. The Council may adopt such rules and regulations for the conduct of its business as shall be deemed advisable and may, in the execution of the power granted, appoint such agents as necessary. In addition, the Council shall act as a Board of Censors for the trial of all alleged offenses against the bylaws. A report by the Chairman of the Council shall be made to the members at the annual meeting.

SECTION 2. Number, Tenure and Qualifications. The Council shall consist of the Past President, the Chairman of the Council (Immediate Past President), the President, the President-Elect, the Vice President, the Secretary/Treasurer, the Director of Continuing Medical Education, the Historian and three Councilors-At-Large. The Secretary/Treasurer Elect, the representative of the Board of Governors of the American College of Surgeons, representative of the Advisory Council for Cardiothoracic Surgery of the American College of Surgeons, the Editor of The Annals of Thoracic Surgery, the Chairman of the Program Committee, the Chairman of the Membership Committee, and the Chairman of the Postgraduate Program Committee shall attend the Council meetings without vote.

SECTION 3. Election. The eligible members will elect the Council. Officers shall be elected annually to serve a one-year term, except the Secretary/Treasurer whose term shall be for four years and the historian whose term shall be for four years and who can be re-elected. The President, Vice President and Secretary/Treasurer are not eligible for re-election. The term of office of councilors-at-large shall be two years. Two Councilors shall be elected one-year and one Councilor the next year to replace the retiring members, unless a vacancy or vacancies has occurred, in which case an additional Councilor(s) shall be appointed by the President to fill the vacant term(s).

SECTION 4. Resignation. Any Council member may resign at any time by giving written notice to the President. Such resignation shall take effect when the notice is delivered, unless the notice specifies a future date. Another exception would be, unless otherwise specified therein, the acceptance of such resignation shall not be necessary to make it effective.

SECTION 5. Annual Meetings. The annual meeting of the Council shall be held at the time and place designated by the Council in connection with the annual members meeting.

SECTION 6. Regular Meetings. The Council may hold regular meetings at such place and at such times as designated by the Council.

SECTION 7. Special Meetings. Special meetings of the Council may be held at any time and place on the call of the President or at the request in writing of any three Council members.

SECTION 8. Notice of Meetings. Notice of special meetings of the Council shall be delivered by, or at the direction of, the Secretary/Treasurer to each Council member at least seven (7) days before the date on which the meeting is to be held. Notice may be waived in writing by a Council member, either before or after the meeting. Neither the business to be transacted at, nor the purpose of any special meeting of the Council, need be specified in the notice or waiver of notice of such meeting.

SECTION 9. Quorum. A majority of the Council members entitled to vote shall constitute a quorum for the transaction of business at any meeting of the Council.

SECTION 10. Manner of Acting. The act of a majority of the Council members at a meeting at which a quorum is present shall be the act of the Council, unless the act of a greater number is required by law, the articles of incorporation, or by these bylaws.

SECTION 11. Informal Action. Action may be taken by the Council without a meeting if a consent in writing, setting forth the action so taken, is signed by all the Council members.

SECTION 12. Participation at Meetings by Conference Telephone. Members of the Council, or of any committee designated by the Council, may take any action permitted or authorized by these bylaws by means of conference telephone, or similar telecommunications equipment, in which all persons participating in the meeting can communicate with each other. Participation in such a meeting shall constitute presence in person at such meeting.

SECTION 13. Compensation. Council members, as such, shall not receive any stated compensation for their services on the Council, but the Council may, by resolution, authorize reimbursement for reasonable expenses incurred in the performance of their duties. The Council will occasionally review the reimbursement policies.
ARTICLE VIII: OFFICERS AND EXECUTIVE DIRECTOR

SECTION 1. Officers. The officers of the Association shall consist of the President, the President-Elect, the Vice President, the Secretary/Treasurer, the Chairman (Immediate Past President), the Past President, the Historian, and such other officers and assistant officers as may be elected in accordance with the provisions of this Article. The Council may elect or appoint such other officers as it shall deem necessary. These officers shall have the authority to perform such duties as may be prescribed from time-to-time by the Council.

SECTION 2. President. The President shall be the principal elected officer of the Association. The President shall preside at all meetings of the Association. The President shall appoint members to the standing committees and to any other special committee, which may be deemed necessary for the welfare of the association. The President shall perform all other duties appropriate to the conduct of the office. At the conclusion of the annual meeting, the retiring President shall automatically become a Councilor for a two-year term of office in the capacity of Chairman the first year and Past President the second year.

SECTION 3. President-Elect. The President-Elect shall participate in all the meetings and deliberations of the Council during the year elected and shall accede to the office of President the following year.

SECTION 4. Vice President. In the absence of the President, or in the event of his or her inability or refusal to act, the Vice President shall perform the duties of the President. When so acting, the Vice-President shall have all the powers, and be subject to all the restrictions, of the President. The Vice President shall perform such other duties as may be assigned by the President or by the Council.

SECTION 5. Secretary/Treasurer. As Secretary he/she shall: keep the minutes of the meetings of the members and of the Council in one or more books provided for that purpose; see that all notices are duly given in accordance with the provisions of these bylaws, or as required by law; be custodian of the Council’s records; keep a register of the post office address of each member, which shall be furnished to the Secretary by such member; notify candidates of their election to membership; and in general perform all duties incident to the office of Secretary, and such other duties that may be assigned by the President or by the Council. The administrative duties of the Secretary may be assigned, in whole or in part, to the Executive Director by the Council.

As Treasurer, he/she shall keep an account of all monies received and expended by the Association and shall make disbursements authorized by the Council. All sums received shall be deposited or invested in such bank, trust company, or other depositories authorized by the Council. The Treasurer shall perform all the duties incident to the office of Treasurer and such other duties as may be assigned by the President or by the Council. The administrative duties of the Treasurer may be assigned, in whole or in part, by the Council, to the Executive Director. He/she shall present an annual report to the membership for audit.

SECTION 6. Secretary/Treasurer-Elect. The Secretary/Treasurer-Elect shall serve as understudy to the Secretary/Treasurer for a term of one year.

SECTION 7. Chairman. The immediate Past President shall be the Chairman of the Council and perform such duties as occasionally may be designated by the President or by the Council. Upon termination of the term of office as President, the President shall become Immediate Past President for a one-year term.

SECTION 8. Past President. The Past President shall serve on the Council and perform such duties as may be designated by the President, Chairman of the Council, or by the Council. Upon termination of the term of office as Immediate Past President, the Immediate Past President shall become Previous Past President for a one-year term.

SECTION 9. Director of Continuing Medical Education. The Director of Continuing Medical Education shall be appointed by the President for a term of four years and shall oversee and coordinate the Program and Postgraduate Programs, and the administration aspects of continuing education, and chair the Continuing Education Committee.

SECTION 10. Executive Director. The administrative duties and day-to-day operation of the Association shall be conducted by a salaried staff head or firm employed or appointed by the Council. The Executive Director shall be responsible to the Council. The Executive Director may carry out the duties of the Secretary of the Association and may carry out the duties of the Treasurer as directed by the Council. The Executive Director may carry out the duties of the Secretary of the Association and may carry out the duties of the Treasurer as directed by the Council. The Executive Director shall have the authority to execute contracts on behalf of the Association and as approved by the Council. The Executive Director may employ and may terminate the employment of staff members necessary to carry out the work of the Association and shall perform such other duties as may be specified by the Council.

SECTION 11. Historian. The Historian shall record the history of the Association, keep archives of the programs and minutes of the Business and Council meetings, and report the deaths of members at the annual business meeting. In addition, he/she shall perform all other duties appropriate to this office and other duties assigned by the President for Council.

ARTICLE IX: COMMITTEES

The President shall appoint committees as may be necessary for the proper conduct and management of the Association. The standing Committees of the Association shall be:

SECTION 1. Executive Committee. The Executive Committee shall consist of the officers of the Association and the Executive Director. The Executive Director shall be ex-officio, a member of the Executive Committee without the right to vote. The Executive Committee may exercise the authority of the Council in the management of the affairs of the Association during the intervals between meetings of the Council, subject at all times to the bylaws of the Association, and the prior resolutions, regulations and directives issued, adopted or promulgated by the Council. A majority of the members of the Executive Committee shall constitute a quorum for the transaction of business. Meetings may be called by the President or by any two Executive Committee members.

SECTION 2. Program Committee. The Program Committee shall consist of the President, the Director of Continuing Medical Education, the Secretary/Treasurer, and additional members appointed to the Program Committee. Appointment to the Program Committee shall be for a period of three years. Appointment(s) to this committee shall be made by the President each year. The senior member of the appointed members shall serve as Chairman. It shall be the duty of the committee to review the abstracts of scientific papers submitted by the members and arrange the program for the annual meeting. Seventy-five percent or more of abstracts presented during the regular scientific program the STSA Annual Meeting should include a member of the association as an author.
SECTION 3. Postgraduate Program Committee. The Postgraduate Program Committee shall consist of the Director of Continuing Medical Education and appointed members. Appointment to the Postgraduate Program Committee shall be for a period of three years. Appointments to this committee shall be made by the President each year. The senior appointed member of the committee shall act as chair. It shall be the duty of this committee to arrange a Postgraduate Continuing Medical Education Program to cover broad and varied aspects of thoracic surgery to be presented at the time of the annual meeting.

SECTION 4. Membership Committee. This committee shall consist of four members. Appointment to the Membership Committee shall be for a period of four years. One new appointee to this committee shall be made by the President each year. The senior member of the committee shall serve as Chairman. This committee shall receive applications for membership in the association and after consideration of the applicants may propose them to the Council for approval and to the membership for election.

SECTION 5. Continuing Medical Education Committee. This committee shall consist of the Chairman of the Postgraduate Committee, the Chairman of the Program Committee, and the Director of Continuing Medical Education who shall serve as Chairman. It shall be the duty of this committee to set up the objectives of the next annual meeting with the said objectives being presented for approval by the Council at their interim meeting and forwarded to members prior to the annual meeting.

SECTION 6. Nominating Committee. This committee shall consist of the four Immediate Past Presidents with the most senior Past President serving as Chairman. This committee shall prepare a slate of nominees for officers and Councilors for the following year. This report is submitted to the organization at its annual meeting. The recommendations of the Nominating Committee are not intended to exclude direct nominations from the floor.

SECTION 7. Scholarship Committee. This committee shall consist of four members. Appointment to the Scholarship Committee shall be for a period of four years. One new appointee to this committee shall be made by the President each year. The senior member of the committee shall serve as Chairman. This committee shall receive applications for all STSA sponsored scholarship programs and after consideration of the applicants may propose scholarship recipients and finalists to the Council for approval.

SECTION 8. Other Committees. Other committees may be designated by a resolution adopted by a majority of the Council present at a meeting at which a quorum is present (Ad Hoc Committees may be designated by the President with approval of the Council). Except as otherwise provided in such resolution, members of each committee shall be members of the Association, and the President of the Association shall appoint the members thereof. Any member may be removed by the person or persons authorized to appoint such member whenever in their judgment the best interests of the Association shall be served by such removal.

SECTION 9. Term of Office. Each member of a committee shall continue as such until the next annual meeting of the Council or until a successor is appointed, unless the committee is terminated, or the member is removed from the committee, ceases to qualify as a member, or the member resigns from the committee.

SECTION 10. Vacancies. Vacancies in the membership of any committee may be filled by appointments made in the same manner as provided in the case of the original appointments.

SECTION 11. Quorum. Unless otherwise provided in the resolution of the Council designating a committee, a majority of any committee shall constitute a quorum for committee action. The act of a majority of committee members present and voting at a meeting, at which a quorum is present, shall be the act of the committee.

SECTION 12. Participation at Meetings by Conference Telephone. Committee members may participate in and act at any committee meeting through the use of a conference telephone or other communications equipment by means of which all persons participating in the meeting can communicate with each other. If the Chairman of a committee so orders, participation in such meetings shall constitute attendance at the meeting.

SECTION 13. Meetings of Committees. Subject to action by the Council, each committee by a majority vote of its members shall determine the time and place of meetings and the notice required.

SECTION 14. Informal Action. Any action required or taken at a meeting of a committee may be taken without a meeting if a consent in writing, setting forth the action so taken, is signed by all of the committee members.

SECTION 15. Rules. Each committee may adopt rules for its own government not inconsistent with these bylaws or with rules adopted by the Council.

ARTICLE X: OFFICIAL ORGAN

The Annals of Thoracic Surgery shall be the official publication of the Southern Thoracic Surgical Association. Papers read before the Association shall be forwarded to the Editor of The Annals of Thoracic Surgery for consideration for publication at the time requested by the Program Committee Chair and Editor of The Annals.

ARTICLE XI: CONTRACTS, CHECKS, DEPOSITS AND FUNDS, BONDING

SECTION 1. Contracts. The Council may authorize any officer or officers, agent or agents of the Association, in addition to the officers so authorized by these bylaws, to enter into any contract or execute and deliver any instrument in the name of, and on behalf of, the Association. Such authority may be general or confined to specific instances.

SECTION 2. Depositories. All funds of the Association not otherwise employed shall be deposited to the credit of the Association in such banks, trust companies or other depositories as the Council may designate.

SECTION 3. Checks, Drafts, Notes, Etc. All checks, drafts or other orders for the payment of money and all notes or other evidences of indebtedness issued in the name of the Association shall be signed by such officer or officers, or agent or agents, of the Association and in such manner as shall be determined by resolution of the Council.

SECTION 4. Bonding. The Council shall provide for the bonding of such officers and employees of the Association, as needed.

SECTION 5. Delivery of Notice. Any notices required to be delivered pursuant to these bylaws shall be deemed to be delivered when transferred or presented in person or deposited in the United States mail addressed to the person at his/her or its address as it appears on the records of the Association, with sufficient first-class postage prepaid thereon.
SECTION 6. Investments. Unless otherwise specified by the terms of a particular gift, bequest or devise, grant or other instrument, the funds of the Association may be invested, in such manner as the Council may deem advantageous, without regard to restrictions applicable to trusts or trust funds.

ARTICLE XII: BOOKS AND RECORDS
The Association shall keep correct and complete books and records of accounts and shall also keep minutes of the proceedings of its members, Council, and committees having any of the authority of the Council, and shall keep at the registered or principal office a record giving the names and addresses of the members entitled to vote. All books and records of the Association may be inspected by any member, or his or her agent or attorney, for any proper purpose at any reasonable time.

ARTICLE X, III: FISCAL YEAR
The fiscal year of the Association shall be established by the Council.

ARTICLE XIV: WAIVER OF NOTICE
Whenever any notice is required to be given under the provisions of the General Not For Profit Corporation Act of the State of Illinois or under the provisions of the articles of incorporation or the bylaws of the Association, a waiver in writing signed by the person or persons entitled to such notice, whether before or after the time stated therein, shall be deemed equivalent to the giving of such notice. Attendance at any meeting shall constitute waiver of notice unless the person at the meeting objects to the holding of the meeting because proper notice was not given.

ARTICLE XV: INDEMNIFICATION OF DIRECTORS, OFFICERS, EMPLOYEES AND AGENTS; INSURANCE
SECTION 1. Right to Indemnification. Each person who was or is a party or is threatened to be made a party to, or is involved in, any action, suit or proceeding—whether civil, criminal, administrative or investigative—by reason of the fact that he/she, or a person of whom he/she is the legal representative, is or was a director, officer, employee or agent of the Association, or is or was serving at the request of the Association, shall be indemnified and held harmless by the Association to the fullest extent authorized by the laws of Illinois against all costs, charges, expenses, liabilities and losses reasonably incurred or suffered by such person in connection with and such indemnification shall continue to a person who has ceased to be associated with the Association. This includes attorneys’ fees, judgments, fines, ERISA excise taxes or penalties and amounts paid, or to be paid, in settlement. The right to indemnification conferred in this Article XV shall be a contract right and shall include the right to be paid by the Association the expenses incurred in defending any such proceeding in advance of its final disposition. For the purpose of determining the reasonableness of indemnifiable expenses, the fees and expenses of separate counsel from counsel for the Association, or other joint defendants being indemnified by the Association, shall not be indemnifiable unless there exists a bona fide conflict of interest.

SECTION 2. Right of Claimant to Bring Suit. If a claim under Section 1 of Article XV is not paid in full by the Association within a reasonable amount of time after a written claim has been received by the Association, the claimant may at any time thereafter bring suit against the Association to recover the unpaid amount of the claim and, if successful in whole or in part, the claimant shall also be entitled to be paid the expenses of prosecuting such a claim. It shall be a defense to any action that the claimant has failed to meet a standard of conduct which makes it permissible under Illinois law for the Association to indemnify the claimant for the amount claimed. But the burden of proving such defense shall be on the Association.

SECTION 3. Non-Exclusive of Rights. The right to indemnification and the payment of expenses incurred in defending a proceeding in advance of its final disposition conferred in Article XV shall not be exclusive of any other right which any person may have or hereafter acquire under any statute, provision of the articles of incorporation, bylaws, agreement, vote of members or disinterested directors or otherwise.

SECTION 4. Insurance. The Association shall maintain insurance to the extent of availability at commercial reasonable rates, at its expense, to protect itself and any director, officer, employee or agent of the Association or another corporation, partnership, joint venture, trust or other enterprise against any expense, liability or loss, whether or not the Association would have the power to indemnify such person against such expense, liability or loss under Illinois law.

SECTION 5. Expenses as a Witness. To the extent that any director, officer, employee or agent of the Association is by reason of such position, or a position with another entity at the request of the Association, a witness in any proceeding, he shall be indemnified against all costs and expenses actually and reasonably incurred by him or on his behalf in connection therewith.

SECTION 6. Notification. If the Association has paid indemnity or has advanced expenses under this Article XV to a director, officer, employee or agent, the Association shall report the indemnification or advance in writing to the members with or before the notice of the next meeting of the members.

SECTION 7. Effect of Amendment. Any amendment, repeal or modification of any provision of this Article XV by the members or the directors of the Association shall not adversely affect any right or protection of a director or officer of the Association existing at the time of such amendment, repeal or modification.

ARTICLE XVI: DISSOLUTION
Upon the dissolution of the Association, and after payment of all indebtedness of the Association, any remaining funds, investments and other assets of the Association shall be distributed to such organization or organizations which are then qualified as exempt from taxation under Section 501(c) 6 of the Internal Revenue Code of 1986, as amended (or the corresponding provision of any future Internal Revenue Law of the United States). This distribution shall only occur if the purposes and objectives of such organization(s) are similar to the purposes and objectives of the Association, as may be determined by vote of the then voting members of the Association.

ARTICLE XVII: AMENDMENTS
These bylaws may be altered, amended, or repealed at the time of the annual meeting by a two-thirds vote of the membership present, provided that the amendment has been presented to the membership in writing at least 30 days prior to the time of the annual meeting.

ARTICLE XV, III: PARLIAMENTARY AUTHORITY
The deliberations of the Association, Council, and committees shall be governed by the parliamentary rules and usages contained in the then current edition of “Roberts Rules of Order, Newly Revised”, when not in conflict with the bylaws of the Association.
STSA would like to thank the following STSA leaders for planning the educational content of the STSA 64th Annual Meeting. Unless otherwise noted, these STSA leaders have no relevant commercial relationships to disclose.

David R. Jones: President, Program Committee

Faisal G. Bakaeen: Program Committee
COMMERICAL RELATIONSHIPS: Consultant/Advisory Board: JACE Medical

Matthew Bott: Postgraduate Committee

Andrea J. Carpenter: Program Committee, Postgraduate Committee

Joseph A. Dearani: Program Committee

Robert J. Dabal: Postgraduate Committee Co-Chair, CME Committee

Elizabeth A. David: Program Committee

Melanie Edwards: Postgraduate Committee Co-Chair, CME Committee

Richard K. Freeman: Program Committee, Postgraduate Committee, CME Committee Chair

S. Adil Husain: Program Committee Co-Chair, CME Committee

Kirk Kanter: Postgraduate Committee

Ahmet Kilic: Postgraduate Committee

Richard L. Lee: Program Committee Co-Chair, CME Committee

Scott A. LeMaire: CME Committee
COMMERICAL RELATIONSHIPS: Consultant/Advisory Board: Vascutek Terumo; Other Research Support: Principal Investigator Baxter Healthcare, Co-Investigator CytoSorbants, Principal Investigator Vascutek Terumo, Co-Investigator W. L. Gore & Associates, Co-Investigator Medtronic

Daniel L. Miller: Program Committee, Postgraduate Committee
COMMERICAL RELATIONSHIPS: Consultant/Advisory Board: Ethicon, Speakers Bureau/Honoraria: Medtronic

Daniela Molena: Program Committee

Chad Stasik: Postgraduate Committee

COMMERCIAL RELATIONSHIPS OF ABSTRACT REVIEWERS
STSA would like to thank the following leaders for reviewing the abstracts submitted for consideration for presentation at the STSA 64th Annual Meeting. Unless otherwise noted, the abstract reviewers have no relevant commercial relationships.

Kevin D. Accola
COMMERCIAL RELATIONSHIPS: Speakers Bureau/Honoraria: Edwards Lifesciences

Mara B. Antonoff

Faisal G. Bakaeen
COMMERCIAL RELATIONSHIPS: Consultant/Advisory Board: JACE Medical
Vinod H. Thourani  
**COMMERCIAL RELATIONSHIPS**: Consultant/Advisory Board: Edwards Lifesciences, Abbott Vascular; Research Grant: Edwards Lifesciences, Abbott Vascular, Medtronic; Other Research Support: Boston Scientific

**COMMERCIAL RELATIONSHIPS OF STSA STAFF**  
Unless otherwise noted, staff members have no relevant commercial relationships.

Beth Winer: Executive Director  
Laura Medek: Affiliate Manager  
Rachel Pebworth: Affiliate Manager  
Maricruz Carreno: Affiliate Organizations Coordinator

**RELATIONSHIP DISCLOSURES FROM PRESENTERS**  
The following presenters have indicated, in accordance with the Accreditation Council for Continuing Medical Education Standards and the STSA Disclosure Policy, that they have a financial or other relationship with a healthcare-related business or other entity whose products or services may be discussed in, or directly affected in the marketplace by the educational program/product under consideration. Listed too are abstracts whose content describes the use of a device, product, or drug that is not FDA approved, or the off-label use of an approved device, product, or drug. Unless noted in this program book or verbally by the speakers, speakers have no relevant financial relationships to disclose and will only be presenting information on devices, products, or drugs that are FDA approved for the purposes they are discussing.

**THURSDAY, NOVEMBER 9, 2017**  
**BASIC SCIENCE FORUM**

**Moderator Commercial Relationships**  
Min P. Kim, Speakers Bureau/Honoraria: Boston Scientific, Olympus, Medtronic  
T. Brett Reece, Nothing to Disclose  
Xiaoying Lou, Nothing to Disclose

**1B. Programmed Death Ligand 1: A Step Toward Immunoscore for Esophageal Cancer**  
**COMMERCIAL RELATIONSHIPS**: M. Blair Marshall: Consultant/Advisory Board: Ethicon, Elsevier, ClinicalKey

**5B. The Association of Novel Cardiac Biomarkers and 1-Year Readmission or Mortality After Cardiac Surgery**  
**COMMERCIAL RELATIONSHIPS**: Donald S. Likosky: Research Grant: NIH: Co-Investigator; Other Research Support: AHRQ: PI

**6B. Thoracic and Cardiovascular Surgeons Achieve High Rates of K Award Conversion into R01 Funding**  
**COMMERCIAL RELATIONSHIPS**: Gorav Ailawadi: Consultant/Advisory Board: Medtronic, Abbott, Edwards Lifesciences, Cephea; Speakers Bureau/Honoraria: Convatec

**FIRST SCIENTIFIC SESSION**

**Moderator Commercial Relationships**  
David R. Jones, Nothing to Disclose  
Daniel L. Miller, Consultant/Advisory Board: Ethicon, Inc.; Speakers Bureau/Honoraria: Medtronic

**1. Favorable Early and Midterm Outcomes of Transcatheter Aortic Valve Replacement in Patients With Bicuspid Aortic Valve: A Single Center Study**  
**COMMERCIAL RELATIONSHIPS**: R. David Anderson: Consultant/Advisory Board:
PRESIDENT’S INVITED LECTURER

Moderator Commercial Relationships
5. Adil Husain, Nothing to Disclose

Picking Your Battles: Clinical Life vs. Research and the CardioThoracic Surgeon
COMMERCIAL RELATIONSHIPS: Pedro del Nido: Ownership Interest: Founder, Nido Surgical

SECOND SCIENTIFIC SESSION

Moderator Commercial Relationships
5. Adil Husain, Nothing to Disclose
Richard Lee, Nothing to Disclose

11. Amiodarone Protocol Provides Cost Effective Reduction in Postoperative Atrial Fibrillation
COMMERCIAL RELATIONSHIPS: John Kern: Research Grant: St. Jude, LivaNova; Gorav Ailawadi: Consultant/Advisory Board: Medtronic, Abbott, Edwards Lifesciences, Cephea; Speakers Bureau/Honoraria: Convatec

12. Outcomes of an Intensive, Pre-Operative Smoking Cessation Program
COMMERCIAL RELATIONSHIPS: DISCUSSANT: Daniel L. Miller: Consultant/Advisory Board: Ethicon, Speakers Bureau/Honoraria: Medtronic

FRIDAY, NOVEMBER 10, 2017

FOURTH SCIENTIFIC SESSION A
ADULT CARDIAC BREAKOUT

Moderator Commercial Relationships
Faisal G. Bakaeen, Consultant/Advisory Board: JACE Medical
Michael J. Mack, Consultant/Advisory Board: Medtronic; Other Research Support: Abbott Vascular, Edwards Lifesciences
Alexander Brescia, Nothing to Disclose

23. Repair of Thoracic and Thoracoabdominal Mycotic Aneurysms and Infected Aortic Grafts Using Cryopreserved Allograft
RELATIONSHIP DISCLOSURE INDEX

25V. Leaflet Reconstructive Techniques for Aortic Valve Repair

26. The David V Valve Sparring Aortic Root Replacement Provides Excellent Mid to Long Term Outcomes for Bicuspid Valve Aortopathy Irrespective of the Degree of Preoperative Aortic Insufficiency
COMMERCIAL RELATIONSHIPS: Bradley Leshnower: Speakers Bureau/ Honoraria: Medtronic

27. Functional Outcomes of Non-aneurysmal Type I Bicuspid Aortic Valve Repair With Annular Stabilization: Subcommissural Annuloplasty Versus External Subannular Aortic Ring
COMMERCIAL RELATIONSHIPS: Wilson Szeto: Research Grant: Edwards Lifesciences, Medtronic, Boston Medical, WL Gore

28V. Open Surgical Repair for the Removal of an Atrial Septal Amplatzer™ Device Eroding the Aortic Root

FOURTH SCIENTIFIC SESSION A
THORACIC BREAKOUT

Moderator Commercial Relationships
Daniela Molena, Nothing to Disclose
Jennifer Marks, Nothing to Disclose
David Hall, Nothing to Disclose

29. Risk Factors for Occult N2 Disease in Patients With Non-Small Cell Lung Cancer
COMMERCIAL RELATIONSHIPS: Robert J. Cerfolio: Speakers Bureau/Honoraria: Intuitive Surgical, Myriad Genetics; Consultant/Advisory Board: Covidien, C-SATS, Bovie, Bard Medical, Community Health Systems, Ethicon

30. Current State of Empyema Management
COMMERCIAL RELATIONSHIPS: Margaret Olsen: Research Grant: Sanofi Pasteur, Pfizer; Consultant/Advisory Board: Pfizer

31V. Hybrid Superior Sulcus Tumor Resection
COMMERCIAL RELATIONSHIPS: John Mitchell: Consultant/Advisory Board: Medtronic

34. Comprehensive Program for Air Leak Prevention and Management After Lobectomy for Lung Cancer is Associated With Reduced Length of Stay
COMMERCIAL RELATIONSHIPS: Donald Lazarus: Other Research Support: Spirion; Ourania Preventza: Consultant/Advisory Board: WL Gore, Medtronic, Inc.

FOURTH SCIENTIFIC SESSION A
CONGENITAL BREAKOUT

Moderator Commercial Relationships
Carl Backer, Nothing to Disclose
Brian J. Clark, Nothing to Disclose

COMMERCIAL RELATIONSHIPS: DISCUSSANT: James Tweddell: Consultant/Advisory Board: CorMatrix

39. Porcine Small Intestine Submucosa Patch is a Suitable Material for Norwood Arch Reconstruction
COMMERCIAL RELATIONSHIPS: James Tweddell: Consultant/Advisory Board: CorMatrix

FOURTH SCIENTIFIC SESSION B
ADULT CARDIAC BREAKOUT

Moderator Commercial Relationships
Richard L. Prager, Nothing to Disclose
Dawn Hui, Nothing to Disclose
John Kelly, Nothing to Disclose

41. Nadir Hematocrit on Bypass and Rates of Acute Kidney Injury in Coronary Artery Bypass: Does Sex Still Matter?

42. Sternotomy Closure Using Rigid Plate Fixation Versus Wire Cerclage: Patient Reported and Economic Outcomes from a Multicenter, Randomized Trial

44. STS Predicted Risk of Mortality Score Predicts Thirty-day Readmission Following Coronary Artery Bypass Grafting

FOURTH SCIENTIFIC SESSION B
THORACIC BREAKOUT

Moderator Commercial Relationships
Theolyn N. Price, Nothing to Disclose
Traves D. Crabtree, Nothing to Disclose
Meredith A. Harrison, Nothing to Disclose

45. Can Liquid (Blood) Biopsies Replace Tissue Biopsies in Patients With Non-Small Cell Lung Cancer?
COMMERCIAL RELATIONSHIPS: Robert J. Cerfolio: Speakers Bureau/Honoraria: Intuitive Surgical, Myriad Genetics; Consultant/Advisory Board: Covidien, C-SATS, Bovie, Bard Medical, Community Health Systems, Ethicon

48. Induction Chemoradiotherapy Versus Chemotherapy Alone for Superior Sulcus (Pancoast Tumors) Lung Cancers
ECMO BREAKOUT

Moderator Commercial Relationships
Joseph A. Dearani, Nothing to Disclose
Mark S. Slaughter, Consultant/Advisory Board: Oregon Heart

ECMO: When, Where, and by Whom?
COMMERCIAL RELATIONSHIPS: Joseph B. Zwischenberger: Research Grant: Xenios Austria GmbH, NIH; Speakers Bureau/Honoraria: CytoSorb, Inc.; Ownership Interest: W-Z Biotech, Avalon (Maquet) – (royalties for licensed patent | no actual ownership)

FOURTH SCIENTIFIC SESSION C
ADULT CARDIAC BREAKOUT

Moderator Commercial Relationships
Tom Nguyen, Consultant/Advisory Board: Edwards LifeSciences, St. Jude Medical
Todd Rosengart, Nothing to Disclose
Mehrdad Ghoreishi, Nothing to Disclose

51V. Hybrid Surgical Mitral Valve Replacement With a Transcatheter Valve in the Setting of Mitral Annular Calcification
COMMERCIAL RELATIONSHIPS: Raymond Lee: Speakers Bureau/Honoraria: Abiomed Speaker Honorarium; Issac George: Consultant/Advisory Board: Edwards

52. Concomitant Left Atrial Appendage Ligation: Is It Worth the Risk?
COMMERCIAL RELATIONSHIPS: Alan Speir: Consultant/Advisory Board: Medtronic; John Kern: Research Grant: St. Jude, LivaNova; Gorav Ailawadi: Consultant/Advisory Board: Medtronic, Abbott, Edwards Lifesciences, Cephea; Speakers Bureau/Honoraria: Convatec

53. Mechanical Versus Bioprosthetic Aortic Valve Replacement in Patients Aged 50 and Younger: Is Bioprosthetic Valve an Acceptable Option?
COMMERCIAL RELATIONSHIPS: DISCUSSANT: Gorav Ailawadi: Consultant/Advisory Board: Medtronic, Abbott, Edwards Lifesciences, Cephea; Speakers Bureau/Honoraria: Convatec

FOURTH SCIENTIFIC SESSION C
THORACIC BREAKOUT

Moderator Commercial Relationships
Mara Antonoff, Nothing to Disclose
Matthew Steliga, Nothing to Disclose
Melanie Subramanian, Nothing to Disclose

56. Operative Outcomes and Evolving Techniques for Robotic Esophagectomy
COMMERCIAL RELATIONSHIPS: Robert J. Cerfolio: Speakers Bureau/Honoraria: Intuitive Surgical, Myriad Genetics; Consultant/Advisory Board: Covidien, C-SATS, Bovie, Bard Medical, Community Health Systems, Ethicon

Benny Weksler, Speakers Bureau/Honoraria: Intuitive Surgery, Bard

FOURTH SCIENTIFIC SESSION C
CONGENITAL BREAKOUT

Moderator Commercial Relationships
James Tweddell, Consultant/Advisory Board: CorMatrix
Ross Ungerleider, Nothing to Disclose

60V. Minimally Invasive ASD Repair With Limited Resources
COMMERCIAL RELATIONSHIPS: Tom Nguyen: Consultant/Advisory Board: Edwards Lifesciences, St. Jude Medical

FOURTH SCIENTIFIC SESSION C
TRANSPLANT BREAKOUT

Moderator Commercial Relationships
Jay Pal, Consultant/Advisory Board: HeartWare
Mani Daneshmand, Nothing to Disclose

63. Interaction of Donor and Recipient Age: Do Older Heart Transplant Recipients Require Healthier Hearts?
COMMERCIAL RELATIONSHIPS: Lee Goldberg: Research Grant: Respircardia; Consultant/Advisory Board: Respircardia

66. Primary Graft Dysfunction After Heart Transplantation: Outcomes and Resource Utilization
COMMERCIAL RELATIONSHIPS: Gorav Ailawadi: Consultant/Advisory Board: Medtronic, Abbott, Edwards Lifesciences, Cephea; Speakers Bureau/Honoraria: Convatec; Alan Speir: Consultant/Advisory Board: Medtronic

UPDATE ON PRACTICE MANAGEMENT: EXPERT PANEL
Incorporating New Technology and New Operations into Clinical Practice: How I Do It

Moderator and Panelists Commercial Relationships
Moderator: Richard L. Prager, Nothing to Disclose
Panelists: Robert J. Cerfolio: Speakers Bureau/Honoraria: Intuitive Surgical, Myriad Genetics; Consultant/Advisory Board: Covidien, C-SATS, Bovie, Bard Medical, Community Health Systems, Ethicon
Joseph A. Dearani, Nothing to Disclose
Michael J. Mack, Consultant/Advisory Board: Medtronic; Other Research Support: Abbott Vascular, Edwards Lifesciences
M. Blair Marshall, Consultant/Advisory Board: Ethicon, Elsevier, ClinicalKey
Todd K. Rosengart, Nothing to Disclose

FIFTH SCIENTIFIC SESSION
Moderator Commercial Relationships
Kevin Accola, Speakers Bureau/Honoraria: Edwards Lifesciences
Andrea J. Carpenter, Nothing to Disclose

69. Assessment of Neutrophil to Lymphocyte Ratio as a Predictor of Response to Chemoradiotherapy in Patients With Esophageal Squamous Cell Carcinoma
COMMERCIAL RELATIONSHIPS: Yelena Janjigian: Consultant/Advisory Board: Merck, Bristol Myers Squibb; Other Research Support: Lilly, Bayer, Roche, Gentech, Amgen, Pfizer, Boehringer; Abraham Wu: Research Grant: CivaTech Oncology, Inc.

SATURDAY, NOVEMBER 11, 2017

POSTGRADUATE PROGRAM
GENERAL SESSION

Moderator Commercial Relationships
Robert J. Dabal, Nothing to Disclose
Melanie A. Edwards, Nothing to Disclose

A Conversation with a Legend
ADULT CARDIAC BREAKOUT
Advances in Adult Cardiac Surgery: New Techniques and Technologies

Moderator Commercial Relationships
Ravi K. Ghanta, Nothing to Disclose
Faisal G. Bakaeen, Consultant/Advisory Board: JACE Medical

Non-aortic Valve Transcatheter Therapies: Beyond TAVR
COMMERCIAL RELATIONSHIPS: Gorav Ailawadi: Consultant/Advisory Board: Medtronic, Abbott, Edwards Lifesciences, Cephea; Speakers Bureau/Honoraria: Convatec

CONGENITAL BREAKOUT
Advances in Congenital Heart Surgery: New Techniques and Technologies

Moderator Commercial Relationships
S. Adil Husain, Nothing to Disclose
Bahaaldin Alsoufi, Nothing to Disclose

New VAD Technology in Congenital Surgery
REGULATORY DISCLOSURE: Kristine J. Guleserian: This presentation addresses the off-label use of FDA approved ventricular assist devices (VAD) in adults for the pediatric patient using Jarvik Heart, HeartWare MVAD, and SynCardia TAH.
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