SCA NEWS

PRESIDENT'S MESSAGE

Volume 20, Number 4 | August 2020

Getting Back to the Future

Stanton K. Shernan, MD, FAHA, FASE

Dear Friends,

While some of us in the healthcare profession are gradually returning to new normals, others are unfortunately still experiencing the wrath of the COVID 19 pandemic and its impact on our personal and professional well-being. While the leadership of the Society of Cardiovascular Anesthesiologists has not been spared from these significant challenges, we have nonetheless remained vigilant in assuring that our obligations to the SCA membership have remained a high priority as we move forward. I would like to take this opportunity to update all of you about the recent achievements that have resulted from these efforts.

Changes to the Board of Directors Infrastructure

The SCA Board of Directors has made significant investments in recognizing the importance of diversity and recognizing the need to be inclusive in the representation of its leadership members. Two of the new BOD members, Hilary Grocott, MD and Kenichi Tanaka, MD, are well known to our society members. We are fortunate to have these experienced leaders join us and provide invaluable advice and strategic vision. We

2021

Care
Knowledge
Investigation

SOCIETY OF
CARDIOVASCULAR
ANESTHESIOLOGISTS
Knowledge • Care • Investigation

are also proud and honored to introduce two new members to our BOD, Jessica Brodt, MD and Emily Methangkool, MD who were voted by the society membership specifically as Early Career Members. The SCA BOD firmly believes that the leadership must truly represent the diversity of its membership in order to remain optimally effective in pursuing the ideals of our mission.

Research

The SCA supports cardiothoracic and vascular research projects and is committed to promoting the representation of women and underrepresented minority investigators. Diversity is vitally important to advance scientific discovery. Starting with this year's 2020 funding cycle, the SCA is especially encouraging individuals from all racial, ethnic or gender groups to apply. This is the basis for the creation of the SCA/IARS Starter Grants (up to $25,000 per year for two years) and SCA/IARS Mid-Career Grants (up to $50,000 per year for two years). In addition, five Early Career Investigator Awards ($1,000 travel grant awards); a Kaplan Leadership Development Award ($10,000 award: $5,000 in funding from the SCA Endowment, and a matching $5,000 award from the applicant's institution) and a MiCOR Grant ($200,000 per year for up to 3 years, focusing on multicenter collaboration) are being offered.

The SCA BOD remains enthusiastically committed to supporting research. New funded proposals include a one-time only additional distribution of $25,000 per year for 2 years of funding of additional grants as well as $21,500 for a Participant User File Research Program (PUF) requested study of the SCA/STS Database.

Education

The program directors of our primary educational meetings have been exceptionally busy organizing the agenda for next year's events. We currently remain hopeful that at least part of these events will include conventional, in-person formats at their current venues.

The 2021 meetings of the SCA are currently scheduled as follows:

Echo Week	February 7-12, 2021	
Thoracic Anesthesia Symposium	April 23, 2021	Montreal, Canada
Annual Meeting & Workshops	April 24-27, 2021	Montreal, Canada

This year, the SCA has also established a specific On-Line Education Committee to address the importance of remote learning content and formats for the benefit of our membership.

PRESIDENT'S MESSAGE

International

The imposition of restrictions on both domestic and especially international travel has significantly impacted our ability to congregate together for educational endeavors. Consequently, several of our collaboratively endorsed international events have either been cancelled, postponed to a later time in the year, or are being held remotely. Nonetheless, the SCA remains an international organization which has maintained a healthy global presence on several different levels. The SCA and the European Association of Cardio-Thoracic Anesthesiologists (EACTA) have recently completed a document entitled *EACTA/SCA Recommendations for the Cardiac Anesthesia Management of Patients with Suspected or Confirmed Covid-19 Infection: An Expert Consensus from the European Association of Cardiothoracic Anesthesiology and Society of Cardiovascular Anesthesiologists* which is also endorsed by the Chinese Society of Cardiothoracic and Vascular Anesthesiology, and is now under review for formal publication. The SCA and EACTA have also conducted a survey which also focuses on *Current Practice of Cardiac Anaesthesia During the COVID-19 Outbreak,* and will hopefully be made available in the near future. Currently the SCA International Committee is planning on meeting remotely on August 26th to discuss further collaborative efforts in bringing global interests in the field of cardiac, thoracic and vascular anesthesia and perioperative medicine together for all of our benefit.

Management Company

The SCA BOD is very appreciative of the notable success our society has experienced under the management guidance of AMC over the past six years. Beginning this month, our society has become formally aligned with Veritas, a new management company under the leadership of its President, Susan O'Sullivan. We also welcome James Pavletich, our new Executive Director, and the rest of the Veritas management team as we pursue this new venture.

As we look forward to getting back on track, we are exceptionally optimistic about what is in store for our society. We certainly hope that we will meet again in person soon. However, in the meantime, please be assured that the leadership of the society is continuing to remain exceptionally vigilant in not only supporting our primary mission but also evolving while creating the future and exciting opportunities for the benefit of its membership.

Be safe and be well,

Stan

SCA ANNUAL MEETING

SOCIETY OF CARDIOVASCULAR ANESTHESIOLOGISTS
Knowledge • Care • Investigation

Join SCA in Montreal, Canada for the 2021 Annual Meeting

SCA and the Scientific Program Committee invite you to join us in Montreal, Canada, for the 2021 Annual Meeting & Workshops from April 24-27. Whether you are a beginner or an expert, the SCA Annual Meeting has educational content for you!

Start making your plans today to join us for the 2021 Annual Meeting!

LOCATION: Le Westin Montreal
270 Saint-Antonie West
Montreal, QC H2Y 0A3
Canada

PBLD Submissions for the Annual Meeting

Thank you to all those who submitted PBLDSs to be considered for presentation at the 2021 Annual Meeting. Disposition notifications will be sent in September.

If you have any questions, feel free to contact education@scahq.org email or 855.658.2828.

SCA ANNUAL MEETING

SOCIETY OF CARDIOVASCULAR ANESTHESIOLOGISTS
Knowledge • Care • Investigation

Submit an Abstract for the Annual Meeting!

Get ready to submit your scientific abstract or complex case to be considered for presentation at the 2021 Annual Meeting & Workshops!

Submissions will be accepted for the following calls:

- Scientific Program
- Fellow and Resident Complex Cases
- Super Echo

Visit www.scahq.org for more information. SCA website will be updated as more information becomes available.

SUBMIT YOUR ABSTRACT TODAY!

Call opens: **September 1, 2020**
Call closes: **October 30, 2020**

SCA THORACIC ANESTHESIA SYMPOSIUM

SOCIETY OF CARDIOVASCULAR ANESTHESIOLOGISTS
Knowledge • Care • Investigation

Save the Date for the 2021 TAS

On April 23, SCA will hold the 2021 Annual Thoracic Anesthesia Symposium in Montreal, Canada. TAS is focused entirely on thoracic anesthesia for academics and private practitioners.

This 1-day event features:

- Hands-on workshops
- Small-group discussions on the hottest topics in thoracic surgery
- Top submitted case and research presentations
- Continuing medical education (CME) credits, including MOCA® patient safety credits where applicable
- And more!

LOCATION:

Le Westin Montreal
270 Saint-Antonie West
Montreal, QC H2Y 0A3
Canada

SCA THORACIC ANESTHESIA SYMPOSIUM

SOCIETY OF CARDIOVASCULAR ANESTHESIOLOGISTS
Knowledge • Care • Investigation

TAS Abstracts – Here's Your Chance to Present

You are invited to submit a scientific abstract or complex case for consideration for the 2021 Thoracic Anesthesia Symposium!

Visit www.scahq.org for more information. SCA website will be updated as more information becomes available.

SUBMIT YOUR ABSTRACT TODAY!

Call opens: **September 1, 2020**

Call closes: **October 30, 2020**

SCA ECHO WEEK

SOCIETY OF CARDIOVASCULAR ANESTHESIOLOGISTS
Knowledge • Care • Investigation

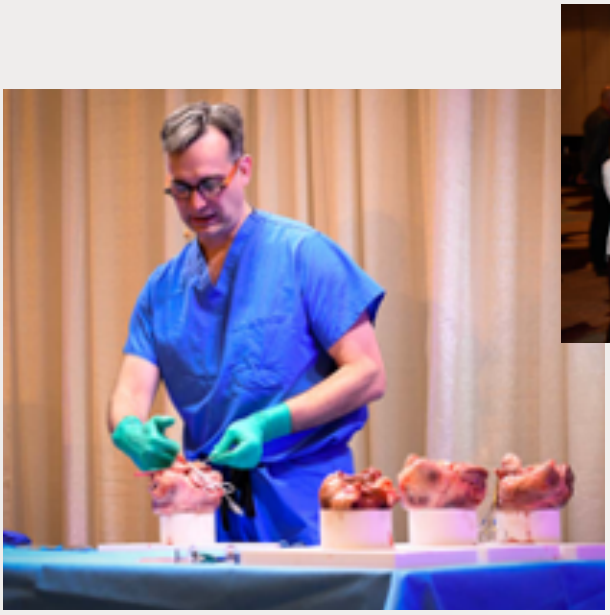
Make Plans to Attend 2021 Echo Week

The 2021 Annual Echo Week will take place in February 2021. This meeting is designed for anesthesiologists, cardiologists, cardiac surgeons, intensivists, sonographers, radiologists, and other medical professionals with an interest in perioperative echocardiography.

Participate in hands-on workshops, take pre- and post-tests to provide a baseline for your education in ultrasound and perioperative transesophageal echocardiography, network with your peers and sponsors, and earn CME credits!

Don't miss out on the 2021 event – mark your calendars now.

MEETING DATES: February 7-12, 2021



2020 Distinguished Service Award Winner

Linda Shore-Lesserson MD, FAHA, FASE

The Distinguished Service Award is given to an individual who has made significant contributions to the specialty of cardiovascular anesthesiology through research, education, service, or any combination of these activities.

Dr. Linda Shore-Lesserson is Professor of Anesthesiology at Zucker School of Medicine at Hofstra-Northwell and Director of Cardiothoracic Anesthesiology in the Northwell Health System in New York. She graduated magna cum laude from the University of Pennsylvania with her medical degree and anesthesiology residency and cardiothoracic anesthesiology fellowship from the Mount Sinai School of Medicine. She is a diplomate of the American Board of Anesthesiology, and National Board of Echocardiography.

Research Interests

Her research interests lie in the field of hemostasis and thrombosis as it relates to cardiovascular disease. The results of her research have been published in high impact peer-reviewed journals and she lectures frequently at national and international scientific meetings.

SCA Contributions

Dr. Shore-Lesserson is a clinical and an academic cardiac anesthesiologist, who has been a member of the SCA since 1990. Her contributions to the SCA have been extraordinary. She has served as a member of the Scientific Program Committee, and as Chair of the Committee in 2005 and 2006. She has been a member of the Blood Conversation Working Group, AKI Working Group, Clinical Practice Improvement Sub-Committee, and Women in Cardiothoracic Anesthesia. She is currently working with the STS and Perfusion societies on an interdisciplinary project "Best Practices in Perfusion Management". Linda served as President of the SCA 2015 – 2017, after serving many years on the Board of Directors and Executive Committee.

2020 Presidential Lifetime Outstanding Service Award Winner

Jonathan B. Mark, MD

The Presidential Lifetime Outstanding Service Award is given to an anesthesiologist who has made outstanding long-term contributions to the Society.

Jonathan B. Mark, MD has been a member of SCA since 1985. He is Professor of Anesthesiology at Duke University Medical Center and has been a practicing cardiac anesthesiologist for 38 years. Following anesthesiology residency and serving as chief resident at Stanford University, he completed (the inaugural) fellowship in cardiac anesthesia at Brigham and Women's Hospital/Harvard Medical School in 1982 and then joined the faculty there. In 1992, he moved to Duke University and served as Chief, Anesthesiology Service at Durham NC Veterans Affairs Medical Center for 26 years.

His academic focus has been cardiovascular monitoring, patient safety, and quality of care. He has contributed widely to the literature on cardiovascular monitoring and transesophageal echocardiography, including a textbook, Atlas of Cardiovascular Monitoring, and has played a significant role in establishing nationally promoted guidelines for clinical practice in these areas.

He has published more than 100 peer reviewed manuscripts and book chapters and delivered more than 200 invited lectures to national and international audiences. He has been recognized for his educational and academic contributions as the recipient of the Outstanding Achievement Award in Perioperative Echocardiography (American Society of Echocardiography, 2018) and the Master Clinician/Teacher Award (Duke University School of Medicine, 2019).

SCA Contributions

Dr. Mark has been highly involved with SCA and has spoken at numerous Annual and Echo Week meetings. He is best known for making complicated subjects easy to understand, especially the pressure waveforms from various locations within the heart, of which he authored an entire book! He was an early pioneer in teaching and authoring subject matter related to perioperative echocardiography, and has served as a mentor to countless early, mid-career, and emerging cardiac anesthesiologists both nationally and internationally.

2021 Call for Nominations Now Open!

Have you ever considered running for an SCA leadership position? Now is your chance to apply!

The SCA seeks nominations for the following positions:

- Officer Positions *(President-Elect, Secretary/Treasurer)*
- Director-at-Large *(2 openings)*
- CME Committee Member *(1 opening)*
- Nominating Committee-at-Large Member *(2 openings)*

If you are self-nominating or submitting your application:

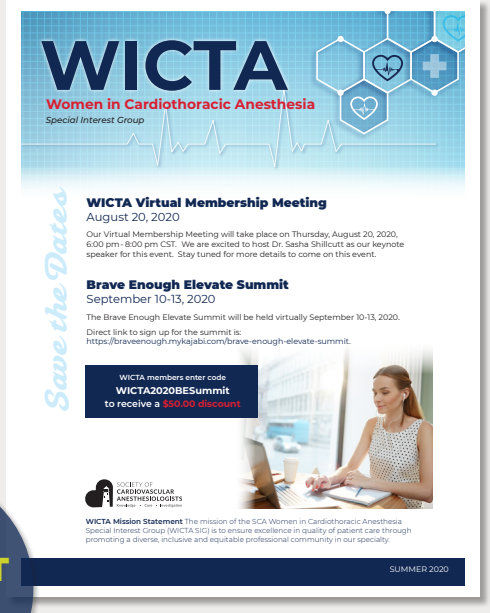
Please complete the online application: Click here to access the application.
Login with your SCA username and password.

If you are nominating another SCA member:
Please submit your letter of nomination to info@scahq.org.

Women in Cardiothoracic Anesthesia (WICTA)

Since the initiation of the SCA WICTA Special Interest Group in 2018, the group has been gaining members and momentum. They are so proud of the things they have accomplished thus far, and they are not slowing down anytime soon! They have more exciting projects in the coming year, and they are eager to share them with you.

Click here to read WICTA's Summer Newsletter.



CHECK OUT WICTA!

New MICoR Grant

The purpose of this funding opportunity announcement is to solicit applications that support a multi-institutional investigation addressing a key clinical and translational research question that aims to advance the care for perioperative patients with cardiovascular and thoracic disease.

Background and Statement of Need

SCA funding of this project will:

- Offer an opportunity for larger scale investigation directly relevant to care for our specific patient population and to the mission of the SCA.
- Support a multi-center investigation that could not be otherwise accomplished through the work of investigators at a single institution, and studies that include larger and more diverse patient populations to promote robustness and broad applicability of study findings.
- Provide a steppingstone to federal funding for academic-clinician SCA members in an increasingly competitive funding environment.
- Foster inter-institutional collaboration, exchange of ideas, and sharing of resources between SCA members.
- Raise the profile of the SCA through the support of higher visibility and more impactful large research projects.

Research Objectives

To foster innovative collaborative approaches to research projects. ***The proposal must focus on the collaborative relationship,*** such that the scientific objectives could not be achieved without the efforts of the co-principal investigators.

Priorities

- Clinical trials, translational studies, and those including associated mechanistic studies are prioritized.
- Proposals should include a clearly outlined path to and plan for application for federal funding (NIH program project or other equivalent funding) to further support the collaborative work.
- Studies incorporating innovative applications of data science techniques or machine learning methods are encouraged.
- Studies leveraging the SCA/STS database as one resource are encouraged.
- SCA MICoR funding is not meant as bridge funding or as supplementary funding for projects with concurrent external funding, but may be used by investigators with existing funding to explore new areas of interest.

(continued)

Investigators:

- Co-Primary Investigators (Co-PIs) must be from two (or more) separate institutions.
- One of the co-PIs must be underrepresented in medicine
- Co-PIs with unique intellectual contributions/resources from each site are encouraged.
- Inter-institutional mentor/mentee co-investigator relationships are encouraged, particularly where appropriate mentorship is not present at the mentee's own institution.
- Co-PIs must convey that they will have an equal level of contribution to the project; otherwise, the applicants should classify additional personnel as collaborating investigators.
- Co-PIs must each hold faculty/staff appointments at their institutions at the time of application.
- A minimum 20% non-clinical commitment is required.
- Institutional commitment to support 20% non-clinical time for each co-PI investigator, in addition to that for which award funding is allocated, is required.
- Investigators at secondary sites proposed, mainly to strengthen patient recruitment or surgical case mix for clinical studies, are not to be considered co-PIs for the purpose of this application.
- The co-PI at the primary sponsoring department site must have been a member of the SCA for 3 years or longer prior to the time of application; all co-PIs must be members of the SCA throughout the award period.

Award details:

- Total award amount: $200,000 x 3 for a total of $600,000, including up to 10% allowed institutional indirect costs
- Award duration: Three years
- Letter of intent (required) deadline: October 15th, 2020
- Notification of invitation for full application: November 1st, 2020
- Application deadline for invited applicants: February 1st, 2021
- Award recipients announced: SCA Annual Meeting April 26th, 2021
- Earliest award dates: July 1, 2021

The SCA MICoR funding opportunity will NOT support research involving:

- Industry sponsored studies, or studies of investigational medical devices supplied by or paid for by manufacturers
- Studies in which any investigator, collaborator, study personnel or other sponsor have a conflict of interest

SCA Member Corner

SOCIETY OF CARDIOVASCULAR ANESTHESIOLOGISTS
Knowledge • Care • Investigation

SCA Career Center

Looking to advance your career or find top talent, the SCA Career Center gives you access to the jobs, candidates, and resources to be successful. A new position or a top candidate is just a few clicks away!

Visit https://careercenter.scahq.org/ for more details and to get started on your job search.

Renew Your Membership Today!

You're a valued member of the SCA community! Don't miss out. Continue receiving your SCA benefits uninterrupted by renewing today.

Renew Online – You can login to your member account to pay your dues online with the option to enroll in auto renew.

If you have any questions about your membership or the renewal process, please contact SCA by calling 855.658.2828 (US) or 847.375.6313 (International) or emailing info@scahq.org.

JCVA Discounted Rates for Members

All SCA members are eligible to subscribe to the *Journal of Cardiothoracic and Vascular Anesthesia* (Red Journal) at discounted rates. JCVA is primarily aimed at anesthesiologists who deal with patients undergoing cardiac, thoracic, with contributions from cardiac, vascular, and thoracic surgeons; cardiologists; and other related specialists.

Interested in purchasing a subscription? Visit www.scahq.org/JCVA for more details on the journal and to take advantage of the SCA member rates!

SOCIETY OF CARDIOVASCULAR ANESTHESIOLOGISTS
Knowledge • Care • Investigation

Lung Transplantation for Pulmonary Hypertension with Giant Pulmonary Artery Aneurysm

Schwarz S, Benazzo A, Prosch H, et al. *J Thorac Cardiovasc Surg*. 2020 Jun;159(6):2543-2550.

Reviewer: Archer Kilbourne Martin, MD

Division of Cardiovascular and Thoracic Anesthesiology
Mayo Clinic College of Medicine
Jacksonville, Florida

Background

Lung transplantation is the gold standard for the treatment of end-stage lung disease (ESLD), and the necessity for transplantation arises from a wide variety of etiologies of ESLD.[1] Perioperative management of lung transplantation is impacted by the underlying cause of ESLD, and one of the highest risk groups are those presenting with primary pulmonary hypertension (PPH).[2] Historically treated with heart-lung transplantation, PPH patients are now predominately treated with bilateral lung transplantation (BOLT).[3] Despite this shift in clinical strategy, PPH patients who have cardiopulmonary disease complicated by giant pulmonary artery aneurysms (PAA) are still commonly treated with heart-lung transplantation owing to the impact of complex pulmonary trunk anatomy on the surgical approach.[4] The aim of this current manuscript was to present the largest published series of patients with PPH complicated by PAA who successfully underwent BOLT for definitive treatment of their ESLD.[4]

Methods

This was a single-center, retrospective analysis from the multidisciplinary lung transplant group at the Medical University of Vienna. They included all patients with PPH who received BOLT from January 1996 to November 2018. A total of 127 patients were included in the study, with 7 patients presenting for BOLT complicated by the presence of a severe PAA (mean diameter, 70.4 mm). Procurement of donor organs was only performed in donors who had hearts which were rejected for implantation, as the implanting surgeons required the entire donor pulmonary trunk from procured hearts for their BOLT surgical technique. In contrast to the previously reported Vienna technique of veno-arterial extracorporeal membrane oxygenation (VA ECMO), patients underwent BOLT with the use of intraoperative cardiopulmonary bypass (CPB). Comparisons between the two groups included differences in clinical management and in-hospital mortality, with a median duration follow-up of 1,744 days.

Results

The authors described clinical characteristics and in-hospital mortality within their results section. They noted that patients who had PH complicated by PAA did not have concomitant aneurysms of their thoracic aorta, and that the age at time of transplantation for patients with PAA ranged from 27-61 years. While all patients in the PAA group underwent intraoperative CPB, 42.9% underwent post-operative prolongation of VA ECMO to allow for left ventricular remodeling in the postoperative period. This contrasts with the PPH only group who predominately underwent intraoperative VA ECMO for support with 50% also requiring postoperative VA ECMO prolongation. No statistically significant differences in renal replacement therapy, length of intensive care stay, in-hospital death, or transplantation were reported.

(continued)

Discussion

The perioperative management of lung transplantation for patients with an underlying etiology of PPH has evolved significantly over the past several decades.[2,3] Initially treated with heart-lung transplantation, it is now predominately treated with BOLT. Despite this shift, which has included an emergence of post-operative prolongation of VA ECMO to provide smooth transition of biventricular remodeling, patients presenting with PPH complicated by PAA have continued to receive heart-lung transplantation as the predominant form of surgical therapy.[4]

This study, which was conducted at one of the world's premier lung transplantation programs in terms of both outcomes and volumes, is the largest published series to date examining the outcomes of lung transplants in this specific population. A key aspect of the study which is unique, beyond the reported similar outcomes between the PAA and non-PAA PPH patient groups, is the description of the surgical technique. The authors report that if a BOLT approach is to be successful in these patients, that the donor must have a non-transplantable heart to allow for full harvesting of the pulmonary trunk.

This surgical necessity is vital for transplanting teams to consider in their approach when managing PAA patients, as is the importance of a full transesophageal echocardiogram (TEE) evaluation of the recipient pulmonary valve. Recent literature has described the importance of TEE in the management of lung transplantation, but to date, no specific literature has described in detail the assessment of the pulmonary valve during lung transplantation.[5]

The study has several limitations, including being a single-center retrospective analysis, and a large numerical difference between the respective groups. Nevertheless, it remains an important addition to the literature regarding management of this specific patient population undergoing lung transplantation.

References

1) Martin AK, Renew JR, Jayaraman AL, et al. Analysis of Outcomes in Lung Transplantation. *J Cardiothorac Vasc Anesth.* 2019 May;33(5):1455-1466.

2) Martin AK, Fritz AV, Wilkey BJ. Anesthetic Management of Lung Transplantation: Impact of Presenting Disease. *Curr Opin Anaesthesiol.* 2020 Feb;33(1):43-49.

3) Moser B, Jaksch P, Taghavi S, et al. Lung Transplantation for Idiopathic Pulmonary Arterial Hypertension on Intraoperative and Postoperatively Prolonged Extracorporeal Membrane Oxygenation Provides Optimally Controlled Reperfusion and Excellent Outcome. *Eur J Cardiothorac Surg.* 2018 Jan 1;53(1):178-185.

4) Schwarz S, Benazzo A, Prosch H, et al. Lung Transplantation for Pulmonary Hypertension with Giant Pulmonary Artery Aneurysm. *J Thorac Cardiovasc Surg.* 2020 Jun;159(6):2543-2550.

5) Abrams BA, Melynk V, Allen WL, et al. TEE for Lung Transplantation: A Case Series and Discussion of Vascular Complications. *J Cardiothorac Vasc Anesth.* 2020 Mar;34(3):733-740.

SOCIETY OF CARDIOVASCULAR ANESTHESIOLOGISTS
Knowledge • Care • Investigation

Positive End-Expiratory Pressure and Recruitment Maneuvers During One-Lung Ventilation: A Systematic Review and Meta-Analysis

Peel J, Funk D, Slinger P, et al. *J Thorac Cardiovasc Surg*. 2020 Feb 29;S0022-5223(20)30515-8.

Reviewer: Ashley Virginia Fritz, DO

Division of Cardiovascular and Thoracic Anesthesiology
Mayo Clinic College of Medicine
Jacksonville, Florida

Background

The concept of airway isolation and gas exchange has been around since Loewy and von Schrotter designed the first human airway separator in 1905.[1] However, it wasn't until 1949 when one lung ventilation (OLV) was first introduced, Carlens used it successfully in the resection of a tuberculosis abscess.[1] Since then, OLV has been traditionally used in patients undergoing thoracic surgery. Thoracic surgery patients present a unique challenge for anesthesiologists. They are tasked with translating conventional lung protective ventilation techniques to a patient population who often have lung disease at baseline, surgical manipulation of the nondependent lung, suboptimal positioning, and relying on the ventilation of a single lung to support the patient's entire metabolic demand.[2] Currently, there are no large scale studies demonstrating if lung protective ventilation strategies will benefit patients undergoing OLV given these challenges. The authors aimed to publish the largest review of oxygenation and ventilation in OLV to the dependent lung, and how it is affected by lung protective strategies in the adult population undergoing thoracic surgery.[2]

Methods

This was systematic review and meta-analysis from the anesthesia department at the University of Toronto and University of Manitoba. The authors reviewed 926 articles, including both randomized controlled trials (RCT) and observational studies. Exclusion criteria for this study comprised studies where patients underwent cardiopulmonary bypass, lung transplantation, or studies where airway devices and lung deflation were compared. Adults receiving OLV during thoracic surgery, including those studied in comparison of protocols for intraoperative ventilation or anesthesia protocols were included in their review. A total of 16 studies (11 RCT), and 826 patients were included in their final meta-analysis of recruitment maneuvers and PEEP in one lung ventilation. The authors evaluated for quality and bias of each study. Each paper was assessed for primary outcomes which were arterial oxygen tension (PaO_2) and compliance for the meta-analysis of PEEP, and PaO_2 and dead-space fraction (Vd/Vt) for recruitment maneuvers. The mean difference with standard deviation was calculated and reported.

Results

Within their results section, the authors described the physiologic advantages to PEEP and recruitment maneuvers during OLV. Lung recruitment was evaluated in 5 studies, PEEP was evaluated in 12 studies. They noted that recruitment maneuvers and PEEP increased PaO_2 by 80mmHg and 30.3 mmHg respectively and recruitment maneuvers reduced dead space by 5.9%. However, not all subgroups showed the same improvement. The authors identified that patients treated with PEEP at baseline did not benefit from increased PaO_2 with additional PEEP. In addition, subgroups of patients who were

(continued)

co-administered with PEEP, lung recruitment, and low tidal volumes did not show statistically significant improvement in PaO_2. The authors noted that the majority of studies demonstrated a high propensity for bias, likely due to the absence of blinding.

Discussion

The authors conducted a comprehensive search of existing literature and proved that recruitment maneuvers and PEEP to the dependent lung have a clear physiologic advantage in OLV. However, despite universal implementation of OLV, there remains a void in the literature for research based on patient-centered clinical outcomes utilizing lung protective strategies during OLV.

In more recent years, OLV has been utilized more frequently in robotic mitral valve surgery[3], minimally invasive cardiac surgery, and anterior approach for thoracic spine surgery. It is important to include these patient populations in the future when investigating lung protective strategies during OLV in order to optimize perioperative outcomes.

This review has several limitations including source data relying on physiologic outcomes rather than clinical outcomes, high risk of bias, and the considerable heterogeneity in the comparisons of data, which the authors acknowledged. The authors also limited their patient population to thoracic surgery, when the use of OLV has expanded well beyond the realm of thoracic surgery. All the same, this manuscript focuses our attention to the dearth of studies focused on clinical outcomes in OLV and the need for additional research in the future.

References

1) McGrath B, Tennuci C, Lee G. The History of One-Lung Anesthesia and the Double-Lumen Tube. J Anesth Hist 2017;3:76-86.

2) Peel JK, Funk DJ, Slinger P, Srinathan S, Kidane B. Positive end-expiratory pressure and recruitment maneuvers during one-lung ventilation: A systematic review and meta-analysis. J Thorac Cardiovasc Surg 2020.

3) Rehfeldt KH, Andre JV, Ritter MJ. Anesthetic considerations in robotic mitral valve surgery. Ann Cardiothorac Surg 2017;6:47-53.

SOCIETY OF CARDIOVASCULAR ANESTHESIOLOGISTS
Knowledge • Care • Investigation

How to Bridge? Management of Anticoagulation in Patients with Mechanical Heart Valves Undergoing Noncardiac Surgical Procedures

Tan CW, Wall M, Rosengart TK, Ghanta RK. *J Thorac Cardiovasc Surg*. 2019 Jul; 158 (1):200-203.

Reviewers:
Suneel Veerwani, MD
University of Massachusetts Medical School - Baystate

Frederick Conlin, MD, FASE
Assistant Professor of Anesthesiology
University of Massachusetts Medical School – Baystate

Introduction

Approximately 14,000 mechanical heart valves (MHVs) are implanted yearly and an estimated 13% of patients with mechanical heart valves will subsequently require non-cardiac surgery[1]. Patients with MHVs require anticoagulation with a vitamin K antagonist (VKA), with the INR goal varying based upon type of valve, site of valve replacement and the presence or absence of underlying risk factors for bleeding or thrombus formation. Recommendations from the American Heart Association[2], the American College of Cardiology, and the American College of Chest Physicians state that for mechanical bileaflet aortic valve with no other risk factors for thromboembolism, anticoagulation with a VKA to achieve an INR range of 2.5 is advised. Mechanical mitral valves or mechanical aortic valve with additional thromboembolic risk factors should be maintained at a target INR of 3. These additional risk factors include atrial fibrillation, previous thromboembolism, left ventricular systolic dysfunction, or known hypercoagulable condition. While there are clear guidelines on maintenance anticoagulation for patients with MHVs, they provide limited guidance for bridging of anticoagulation in the perioperative period.

The authors of this current paper provide a set of guidelines for perioperative anticoagulation management in patients with MHVs undergoing non-cardiac surgery based on available evidence and institutional experience. It is clear that withholding anticoagulation during the perioperative period can potentially lead to thromboembolism in the form of stroke, transient ischemic attacks, unstable angina, myocardial infarction, or systemic embolism. Conversely, bridging therapy may itself increase the risk of major bleeding after non-cardiac surgery. Thromboembolism risk is highest with double MHVs, followed by mitral MHVs, and lowest in patients with an aortic MHV.

Summary

The authors of this paper reference a scoring system called **BleedMAP**[3] that helps clinicians assess peri-procedural bleeding risk based on four clinical variables (1 point each for a history of previous **B**leeding, **M**itral mechanical heart valves, **A**ctive cancer, and **P**latelet count: <150,000 cells/uL). The developers of BleedMAP examined more than 2,100 patients and found that bleeding rates increased with higher BleedMAP score and thromboembolism rates were nonexistent for patients with BleedMAP score of three or four.

This paper recommends stratifying the patients according to both the thromboembolic risk and bleeding

(continued)

risk. Patients with low thromboembolic risk are defined as those with bileaflet aortic mechanical heart valves in normal sinus rhythm and no previous history of thromboembolism. All other patients with MHVs are categorized as being at moderate to high risk (these include those with mitral mechanical heart valves, older generation bileaflet aortic mechanical heart valves, and additional risk factors for thromboembolism). Patients with a BleedMAP score of 1 or less have a low bleeding risk, whereas Patients with a BleedMAP of at least 2 have a moderate to high bleeding risk.

They recommend patients undergoing minor surgery like endoscopy, dental procedures, and percutaneous intervention can continue warfarin with an adjusted target INR of 2 instead of 2.5, and 2.5 instead of 3. For patients with low thromboembolic risk and moderate to high risk of bleeding, warfarin should be held 4 days preoperatively with target INR <1.5. These patients do not require bridging. Warfarin can be resumed when a patient is tolerating oral diet. In patients with high thromboembolic risk undergoing major surgery with high risk of bleeding, warfarin should be held 4 days preoperatively with target INR <1.5, and bridging should occur. LMWH is most frequently used for bridging at a dose

Adult: Perioperative Management: Expert Opinion

TABLE 1. Management algorithm based on bleeding and thromboembolic risk

	Low bleeding risk (minor procedure or BleedMAP ≤1)		Moderate to high bleeding risk (major procedure or BleedMAP ≥2)	
	Preoperative	**Postoperative**	**Preoperative**	**Postoperative**
Low TE risk				
• Mechanical bileaflet aortic valve in normal sinus rhythm	• No interruption of warfarin or lower target INR (2 instead of 2.5, 2.5 instead of 3)	• Continue or resume standard-dose warfarin	• Hold warfarin 4 d before with target INR <1.5 • No bridging heparin or LMWH	• Resume warfarin once tolerating oral diet • No bridging heparin or LMWH unless unable to administer warfarin • Appropriate mechanical and pharmacologic VTE prophylaxis
Moderate to high TE risk				
• Mechanical mitral valve or mechanical aortic valve with additional risk factors — Hypercoagulable state — Atrial fibrillation — Previous TE event — LVEF <35%	• No interruption of warfarin or lower target INR (2 instead of 2.5, 2.5 instead of 3)	• Continue or resume standard-dose warfarin	• Hold warfarin 4 d before with target INR <1.5 • Bridge with LMWH* • If CKD stage IV or V, bridge with heparin	• Resume warfarin once able to tolerate oral diet • Bridging heparin or LMWH on postoperative day 2 • Appropriate mechanical and pharmacologic VTE prophylaxis

TE, Thromboembolic; *INR*, international normalized ratio; *LMWH*, low–molecular weight heparin; *VTE*, venous thromboembolism; *LVEF*, left ventricular ejection fraction; *CKD*, chronic kidney disease. *Initiate bridging once international normalized ratio is below therapeutic range *or* 2 days after warfarin has been held.

bleeding profile and its cost efficiency, which is due to the ability to administer it on an outpatient basis. The dosing of the more commonly used LMWH enoxaparin should be twice daily 1 mg/kg dosing *or* 1.5 mg/kg once daily dosing after INR falls below the therapeutic range or 2 days after warfarin has been held, with 0.5 mg/kg dosing

(continued)

of 1 mg/kg twice daily or 1.5 mg per kilogram once daily, after INR falls below the target or two days after the warfarin has been held. A dose of 0.5 mg/kg LMWH dosing on the morning of the day before the surgery is advised. Patients with CKD stage IV or V and decreased creatinine clearance less than 30 ml/min should be bridged with unfractionated heparin and the heparin drip should be stopped 4-6 hours before surgery. Postoperatively, warfarin should be resumed as soon as an oral diet can be tolerated, as early as 12 to 24 hours postoperatively. For those with moderate to high thromboembolic risk, it is recommended to initiate postoperative bridging with unfractionated heparin or LMWH on the second postoperative day. For patients who have undergone major operations and in the judgment of the surgeon remain an elevated risk of bleeding, unfractionated heparin may provide less risk of bleeding and greater reversibility then low molecular weight heparin. Bridging is continued until INR exceeds the lower limit of the therapeutic range for at least 24 hours. For all patients, venous thromboembolic prophylaxis is recommended.

Discussion

The authors of these guidelines have done an outstanding job of highlighting the challenges of balancing thromboembolic risk and bleeding risk in patients with MHVs in the perioperative period. They succinctly review the evidence on the topic and point out that the existing valvular anticoagulation guidelines offer little guidance regarding perioperative bridging. Using the BleedMAP score as their cornerstone, they have built a clear and rational approach to this daunting clinical problem.

References

1) Carrel TP, Klingenmann W, et al. Perioperative bleeding and thromboembolic risk during non-cardiac surgery in patients with mechanical prosthetic heart valves: an institutional review. *J Heart Valve Dis*. 1999;9:392-8.

2) Nishimura RA, Otto CM, et al. 2017 AHA/ ACC focused update of the 2014 AHA/ACC guideline for the management of patients with valvular heart disease: a report of the American College of Cardiology/ American Heart Association task force on clinical practice guidelines. J *Am Coll Cardiol*. 2017; 70:252-89.

3) Tarfur AJ, Mcbane R II, et al. Predictors of major bleeding in peri-procedural anticoagulation management. *J Thromb Haemost*. 2012; 10:261-7.

SOCIETY OF CARDIOVASCULAR ANESTHESIOLOGISTS
Knowledge • Care • Investigation

Mortality and Pulmonary Complications in Patients Undergoing Surgery with Perioperative SARS-CoV-2 Infection: an International Cohort Study

COVIDSurg Collaborative

Reviewer:
Sohail K. Mahboobi, MD, FASA

Introduction

COVID 19 pandemic is widespread throughout the world and due to the pro-inflammatory cytokine and immunosuppressive responses; patients having surgery are a vulnerable group at risk of getting infected and have subsequent complications. Historically overall baseline rates of postoperative pulmonary complications (up to 10%) and subsequent mortality (up to 3%) after surgery has been shown[1]. In this study, authors report the clinical outcomes of surgery with perioperative SARS-CoV-2 infection.

Methods

This is an in international, multicenter, observational study in patients with SARS-CoV-2 infection who had surgery at 235 hospitals in 24 countries. All patients underwent surgery and had SARS-CoV-2 infection diagnosed within 7 days before or 30 days after the procedure were included. All surgical procedures and both children and adults were included. In case of multiple surgeries, the procedure closest to the time of confirmation of SARS-CoV-2 infection was defined as the index procedure.

Hospitals prospectively screened patients for eligibility. Laboratory testing for SARS-CoV-2 infection was based on viral RNA detection by quantitative RT-PCR. Individual hospital protocols were followed for sample analyses. Patients were also included based on either clinical or radiological findings. Clinical diagnosis was made by a senior physician based on patient's presentation. If a subsequent test was negative, the patient was excluded from the study.

Results

The primary outcome was 30-day mortality, with the day of surgery defined as day 0. Secondary outcomes were the rate of pulmonary complications such as pneumonia, acute respiratory distress syndrome (ARDS), or unexpected postoperative ventilation. Total patients followed were 1128 with 605 (53·6%) men and 523 (46·4%) women, 214 (19·0%) younger than 50 years, 353 (31·3%) aged 50–69 years, and 558 (49·5%) were aged 70 years or older. SARS-CoV-2 infection was diagnosed preoperatively in 294 (26·1%) patients and postoperatively in 806 (71·5%). SARS-CoV-2 diagnosis was confirmed by laboratory testing in 969 (85·9%) patients, radiological findings in 80 (7·1%), and clinical findings in 68 (6·0%). Emergency surgery was done in 835 (74·0%) patients and elective surgery in 280(24·8%) patients.

30-day mortality was 23·8% (268 of 1128). Men had higher 30-day mortality than women (28·4% [172 of 605] vs. 18·2% [94 of 517], p<0·0001). Patients aged 70 years or older had higher mortality than patients younger than 70 years (33·7% [188 of 558] vs. 13·9% [79 of 567], p<0·0001). Mortality was higher after emergency surgery (25·6% [214 of 835]) than elective surgery (18·9% [53 of 280]; p=0·023). In adjusted analyses, having ASA grades 3–5 versus grades 1–2 was associated with increased odds of 7-day

(continued)

mortality (OR 2·52 [95% CI 1·10–5·77], p<0·029). Patients who developed pulmonary complications had a higher 30-day mortality than those who did not (38·0% [219 of 577] versus 8·7% [46 of 526], p<0·0001). Among patients who developed pulmonary complications, 30-day mortality was highest in those who developed ARDS (102 [63·0%] of 162). Pulmonary complications were associated with high 30-day mortality rates across elective patients with a postoperative SARS-CoV-2 diagnosis (39 [28·3%] of 138), emergency patients with a preoperative SARS-CoV-2 diagnosis (53 [39·6%] of 134), and emergency patients with a postoperative SARS-CoV-2 diagnosis (125 [43·1%] of 290). In adjusted analyses, predictors of 30-day mortality were male sex and ASA grades 3–5. The only independent predictor for 30-day pulmonary complications was ASA grades 3–5.

Discussion

This study identified that postoperative pulmonary complications has a higher incidence in patients with SARS-COV-2 and are associated with high mortality. These increased risks should be balanced against the risks of delaying surgery. This study identified men, people aged 70 years or older, those with comorbidities (ASA grades 3–5), those having cancer surgery, and those needing emergency or major surgery as being most vulnerable to adverse outcomes. Thresholds for surgery during the SARS-CoV-2 pandemic should be higher than during normal practice[2]. Consideration should be given for postponing non-critical procedures and promoting non-operative treatment to delay or avoid the need for surgery. The overall 30-day mortality in this study was 23·8%, and was high across all patient subgroups. Protocols for laboratory testing and radiological interpretation were not standardized across participating centers. Therefore, patients who did not have a laboratory test or CT scan were eligible for inclusion on the basis of clinical diagnosis.

References

1) Neto AS, da Costa LGV, Hemmes SNT, et al. The LAS VEGAS risk score for prediction of postoperative pulmonary complications: an observational study. *Eur J Anaesthesiol* 2018; 35: 691–701.

2) American College of Surgeons. COVID-19: guidance for triage of non-emergent surgical procedures. March 17, 2020. https://www. facs.org/covid-19/clinical-guidance/triage (accessed April 17, 2020).

SOCIETY OF CARDIOVASCULAR ANESTHESIOLOGISTS
Knowledge • Care • Investigation

Neurologic Complications After the Frozen Elephant Trunk Procedure: A Meta-Analysis of More Than 3000 Patients

Preventza O, Liao J, Olive J, et al. *J Thorac Cardiovasc Surg.* 2020; 160(1): 20-33.

Reviewer: Jared Feinman, MD

Assistant Professor
Hospital of the University of Pennsylvania
Philadelphia, PA

Background

Complex thoracic aortic disease, whether due to acute dissection or chronic aneurysmal disease or dissection, has always represented a challenge for safe surgical repair. An early advance in the surgical management of these patients came in 1982, when Borst and colleagues developed the elephant trunk technique (now referred to as the conventional elephant trunk or cET).[1] cET is a two-stage repair technique that consists, first, of an open total aortic arch repair during which a free floating extension of aortic graft (the "trunk") is left suspended in the descending thoracic aorta. During the second stage this graft is used as the proximal clamp site and subsequently serves as the anastomotic site for the distal aortic graft. While single-center reports of outcomes following cET repair were quite good, the mortality between surgical stages was significant[2].

The frozen elephant trunk (FET) is a newer, hybrid approach that allows single-stage repair of thoracic aortic disease by combining open arch repair with an anterograde-delivered endovascular stent to treat disease in the proximal descending thoracic aorta (DTA). Depending on the severity of disease in the DTA, subsequent thoracic endovascular aortic repair (TEVAR) can be performed using another stent device, with the FET stent serving as an optimal landing zone. Because the stent portion of the FET is either sutured to the graft by the manufacturer or, in modified FET techniques, by the surgeon, there is little chance of stent migration[3]. The downside of FET repair is a higher risk of spinal cord injury (SCI) compared to cET, with rates above 10% in several small studies compared to 0.4-2.8% in studies of cET repair[2]. Unfortunately, most of the data on neurologic outcomes in FET repair come from small case series or single center experiences.

The current meta-analysis seeks to pool together these smaller studies to draw some conclusions regarding the real risks of transient or permanent neurologic injury and mortality following FET repair.

Methods

The authors performed keyword searches on the EMBASE, Pubmed/Medline, Scopus, and Cochrane databases using a variety of germane terms, and uncovered 745 publications. 390 of these were eliminated as duplicates, while another 320 were excluded based on the authors' inclusion criteria, which notably defined the FET procedure as consisting of a total arch replacement, thereby excluding any hemiarch procedures from the meta-analysis. The primary endpoints of the meta-analysis were stroke, SCI (paralysis, paraplegia, or paraparesis), and operative mortality at either 30-days or prior to hospital discharge. Two subgroup analyses were also performed. The first compared acute Type A dissection repairs to chronic dissection or aneurysm surgery, while the second examined those patients who received longer stent grafts (defined as ≥15 cm or spinal cord coverage to T8 or beyond) versus those who received a shorter (10 cm) stent.

(continued)

Results

The 35 included studies were published between 2002-2015 and included a total of 3154 patients with a mean age of 55.3 years. Emergency repair was performed in 53.2% of the cases. The grafts and stents used in the studies were wide ranging and included both commercially available hybrid devices as well as custom made stent grafts. The stroke rate in the included studies ranged from 0-40.9%, with a pooled estimate for stroke rate of 7.6%, but with a high degree of heterogeneity (95% prediction interval 2.9-12.3%). The incidence of SCI in the included studies ranged from 0-24.0%, resulting in a pooled estimate for SCI of 4.7% with low heterogeneity (95% prediction interval 2.8-6.6%). Operative mortality ranged from 0-21.6% with a pooled rate of 8.8% with moderate heterogeneity (95% prediction interval 6.4-11.2%).

The first subgroup analysis performed by the authors compared those patients who underwent emergent Type A repair with a FET to those who underwent a planned procedure for chronic aortic disease. Patients with acute Type A dissections had a higher reported mortality rate (9.2% vs 7.6%) and stroke rate (9.3% vs 6.6%) after FET than those who underwent elective repair, although neither finding reached statistical significance. Interestingly, the risk of SCI was significantly lower in the acute Type A subgroup (2.4% vs 5.2%, $p=0.05$). In the second subgroup analysis, those patient who received a longer (≥15 cm) stent graft had a much higher rate of SCI (11.6% vs 2.5%, $p<0.001$) than patients who received a 10 cm stent.

Discussion

Most of the data on FET procedures have come from smaller, single-center experiences with few meta-analyses to aggregate and make sense of the varied study methodologies and outcomes. The overall pooled mortality rate of 8.8% was similar to that found in prior meta-analyses, although these included both total and partial arch replacement in combination with DTA stenting, but was lower than the 14.5% morality rate reported in a recent meta-analysis examining cET repair[4]. The authors posited that some of this reduction in mortality may be due to the fact that FET procedures are likely to be performed only at centers with dedicated aortic surgery expertise. The pooled stroke rate of 7.6% was similar to that reported in cET procedures, but higher than the stroke rate seen in prior meta-analyses of FET repair.[4,5]

This difference is likely due to the prior meta-analysis including both hemiarch and total arch procedures, while the current study only examined FET with total arch replacement.

The current meta-analysis found a much greater risk of SCI in those patients who received a longer stent (≥15 cm or coverage to T8 or beyond), which correlates to findings in other studies that have examined the risk of SCI in TEVAR or FET and correlated risk to extent of coverage. Unfortunately, few of the included studies used cerebrospinal fluid drainage catheters or a uniform methodology for conducting hypothermic circulatory arrest, so assessing any benefit these interventions could bring is impossible in the current meta-analysis. The authors were also limited by the fact that most of the included studies were observational studies and did not include patient-level data, making assessment of risk factors for the included outcomes impossible. Finally, the wide variety of devices used in the included studies may introduce unknown variables into the analysis. Despite all of these problems, this meta-analysis provides valuable large-scale data on the use of FET repairs for acute and chronic thoracic aortic disease and points the way towards areas that would benefit from further investigation in the future.

(continued)

References

1) Hans G Borst. The birth of the elephant trunk technique. *J Thorac Cardiovasc Surg*. 2013; 145(1):44.

2) Davut Cekmecelioglu and Joseph Coselli. Aortic arch repair with frozen elephant trunk vs conventional elephant trunk. Ann Thorac Surg. 2020; 9(3):223-5.

3) DePaulis R, DiBartolomeo R, Murana G, et al. Frozen versus conventional elephant trunk technique: applications in clinical practice. *Eur J Cardiothorac Surg*. 2017; 51:i20-28.

4) Hanif H, Dubois L, Ouzounian M, et al. Aortic arch reconstructive surgery with conventional techniques vs frozen elephant trunk: a systematic review and meta-analysis. *Can J Cardiol*. 2018; 34:262-73.

5) Tian DH, Wan B, DeEusanio M, et al. A systematic review and meta-analysis on the safety and efficacy of the frozen elephant trunk technique in aortic arch surgery. *Ann Cardiothorac Surg*. 2013; 2:581-91.

SOCIETY OF CARDIOVASCULAR ANESTHESIOLOGISTS
Knowledge • Care • Investigation

Reoperation After Transcatheter Aortic Valve Replacement. An Analysis of the Society of Thoracic Surgeons Database

Reviewer: Igor Zhukov, MD

Assistant Professor
University of Wisconsin
Madison, WI

Background

Transcatheter aortic valve replacement (TAVR) has been a disruptive innovation in the realm of aortic valve disease intervention. Progressive inclusion of lower risk patients into the indications for TAVR has been the next frontier for this technology. Given the relative novelty of this intervention, as well as the rapidly changing indications, there is no definite long-term prediction of durability of the transcatheter valve implant. The long-term surveillance of early cohorts of TAVR are limited by the initially elderly age of the patients and thus a high loss of patients for subsequent follow-up, while relatively young patients were treated with TAVR only recently, and thus there is an inadequate cohort to make long-term durability predictions[2].

Methods

This is a retrospective analysis of the STS database, specifically seeking for patients that underwent surgical AVR (SAVR) with a previous history of TAVR implantation. Patients that were a part of the early TAVR era, those with procedure pre 2006 and those with greater than 100-month-old prosthesis were excluded due to the concern of confounding by the early valve designs. The database was then reviewed to select those patients who were treated with SAVR. Indications for SAVR were structural prosthetic deterioration, prosthetic valve endocarditis, valve thrombosis, failed repair, paravalvular leak, valve entrapment, sizing or position issue, or other. Failed repair, paravalvular leak and valve malposition were treated as one group owing to the common cause of the events and a small subgroup size.

Postoperative data of interest included stroke, prolonged ventilation, new renal failure, new onset Atrial Fibrillation, new need for pacemaker, intraoperative (within 30 day) mortality and discharge location. Patients were classified according to the risk of mortality prediction model by STS-PROM for future analysis.

Results

A total of 123 patients met the inclusion criteria, median age 77 and IQR of 67-84. 17% of patients were classified as low risk (<4%) intraoperative mortality, 24% were intermediate (4-8%) and 59% were in the high risk (>8%) group.

Overall, the cohort exhibited a 17% early mortality, and that was broken down into 14% for the low-risk group, 10% for intermediate, and 21% for high risk. Additionally, patients that carried the indication of endocarditis or a failed repair had elevated observed mortality of 25 and 24 per cent. Observed vs Expected mortality for all groups appeared to be higher, with O/E ratio of 5.48 in the low risk, 1.66 in the intermediate risk, and 1.16 in the high-risk group.

Discharge home occurred in 43% of patients, and 45% required an extended care facility.

(continued)

Discussion

While TAVR implantation has been demonstrated to be at least non-inferior to the SAVR, the long-term risks and outcomes of this procedure are still under investigation. Authors postulated, citing small observational studies on operative findings of SAVR after TAVR, that prolonged CPB and operative times, difficulty extracting the endothelialized prosthesis, potential redo sternotomy in patients who had cardiac surgery prior to TAVR, and endocarditis cases all can potentially be the contributors of high mortality.

Authors also mentioned the observation of unexpectedly high mortality for SAVR post TAVR needs further investigation, as reintervention of a failed TAVR via a second TAVR procedure yields mortality figures quite lower than seen in this study[3].

Finally, the predictive model used to stratify the patients into low, intermediate, and high risk (STS PROM) was not specifically validated in the post-TAVR cohort, thus potentially underestimating the expected mortality appraisals.

References

1) Jawitz et.al. Reoperation After Transcatheter Aortic Valve Replacement. An Analysis of the Society of Thoracic Surgeons Database JACC: Cardiovascular Interventions. In press.

2) Durand et. al. Assessment of Long-Term Structural Deterioration of Transcatheter Aortic Bioprosthetic Valves Using the New European Definition. A Multicenter French Study. Circulation: Cardiovascular Interventions. 2019;12 pp 1-8.

3) Landes et. al. Repeat Transcatheter Aortic Valve Replacement for Transcatheter Prosthesis Dysfunction. JACC 2020:75(16) .

Echo Corner

The Left Main Coronary Makes an Unexpected Entrance

Chase P Jones, MD1; Himani Bhatt, DO2; Joseph Gallombardo, MD3

1 Primary Author, Involved in Patient Care, Anesthesiology Resident, Department of Anesthesiology, Mount Sinai St. Luke's and Mount Sinai West, New York, NY

2 Contributing Author, Involved in Patient Care, Associate Professor, Department of Anesthesiology, Mount Sinai St. Luke's and Mount Sinai West, New York, NY

3 Contributing Author, Involved in Patient Care, Associate Professor, Department of Anesthesiology, Mount Sinai St. Luke's and Mount Sinai West, New York, NY

The patient involved in this case gave permission for its publication.
The authors have no conflicts of interest or financial disclosures.

CASE REPORT

A 57-year-old male with nonrheumatic aortic valve insufficiency and ostium secundum atrial septal defect who received general anesthesia for replacement of aortic valve and patent foramen ovale closure. Transesophageal echocardiography (TEE) was used for intraoperative management and guidance which confirmed severe left ventricular systolic dysfunction, moderate to severe aortic valve regurgitation and mild to moderate right to left shunting. Further inspection revealed an unusual finding in the midesophageal aortic valve short axis view.

VIEW ECHO CORNER WITH VIDEOS

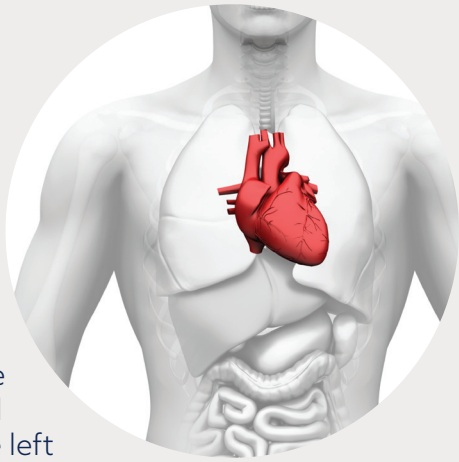
QUESTION 1

What explains the unusual finding in this image?

A. Coronary artery fistula
B. An anomalous insertion of the left main coronary artery
C. Aortic valve cyst
D. Dilated coronary artery

(continued)

Echo Corner



ANSWER/EXPLANATION

Answer: B

Isolated congenital coronary artery anomalies are not uncommon. In fact the incidence of anomalous coronary anatomy is reported to be about 0.5% to 1% of patients undergoing aortic valve replacement1 and as high as 1.3% of the population[2]. The majority, between 80-90% of these are anomalies of origin and distribution, with the second major anatomical classification of anomalies being coronary artery fistulae.[2] In this patient (as seen in image 1) the left main, which took an intramyocardial course, inserted posteriorly at the base of the hinge points of the native valve. The cardiac surgeon was informed of the finding. In the field the surgeon had to search rather diligently to find the left main coronary ostium because it was anomalous in its origin. Interestingly, the ostium originated below the level of the aortic annulus, immediately below the commissure between the noncoronary leaflet and the left coronary leaflet of the aortic valve. In the region of this commissure, both of these leaflets were furled and misshapen, and this was the region of most regurgitation of the valve. It was clear that this was also necessary to perfuse the left main coronaryostium, which was large in caliber but which was located beneath the level of the aortic valve, running in the aorto-mitral curtain. After careful excision of the native aortic valve, a #27 Inspiris bovine pericardial bovine bioprosthesis was implanted 30 degrees counterclockwise en face sagittally.

In the region of the noncoronary sinus adjacent to the coronary ostium and the left coronary sinus adjacent to the left coronary ostium, the sutures were placed well below the level of the aortic annulus in the aorto-mitral curtain. In the region of the commissure between the left and right leaflets and between the noncoronary and right leaflets, the pledgets were placed in normal locations. The valve seated well below the left main coronary ostium, free of any impingement. The surgeon rotated the usual location of the commissure to place it within the noncoronary sinus, leaving a low portion of the aortic valve prosthesis beneath the coronary ostium of the left main coronary artery. This ensured no obstruction of that ostium. The surgeon then rotated this approximately 30 degrees, allowing for the positioning of the opposing commissure to the right-hand side of the right coronary ostium. Interestingly, the right coronary ostium was somewhat leftward than usual in the right sinus of Valsalva. This facilitated the rotation of the valve without any obstruction of the either coronary ostium.

On repeat examination using TEE, mild aortic insufficiency was seen centrally as well as peripherally along the left neo and non-coronary commissure. It is evident that perioperative echocardiography provided key information in this case helping to avoid potentially deadly outcomes that have been associated with aortic valve replacement such as sudden death syndrome and acute coronary ischemia.[1]

(continued)

Echo Corner

References

1) Yamanaka O1, Hobbs RE. Coronary artery anomalies in 126,595 patients undergoing coronary arteriography. Cathet Cardiovasc Diagn. 1990; Sep;21(1):28-40.

2) Patrick T. Roughneen, MD, FRCS, and Ghannam A. Al-Dossari, MD, MS. The Anomalous Coronary Artery in Aortic Valve Replacement: A Case For Caution. Annals of Thoracic Surgery. 2016; Aug;102(2): e113-115.

Echo Corner

Increased LV Thickness — Differential Diagnosis

Kathirvel Subramaniam, MD, MPH, FASE
Department of Anesthesiology and Perioperative Medicine,
University of Pittsburgh Medical Center, Pittsburgh PA 15213

CASE REPORT

74 year old male with permanent atrial fibrillation and history of stroke develops hematuria secondary to therapy with anticoagulation (Apixaban). He presented for left atrial appendage closure. He also has history of renal insufficiency, severe polyneuropathy and esophageal dysmotility. Pre-operative baseline echocardiogram is shown in Video 1-3. Intraoperative transesophageal echocardiography has shown similar features (Video 4 and 5).

VIEW ECHO CORNER WITH VIDEOS

QUESTION 1

Differential diagnosis includes all of the following except

1. Sarcoidosis
2. Hypertrophic cardiomyopathy (HOCM)
3. Amyloid heart
4. Fabry's disease

QUESTION 2

Characteristic Echocardiographic findings of Cardiac Amyloidosis include all except

1. Increased left ventricular wall thickness and small cavity
2. Speckled appearance of myocardium
3. Systolic anterior motion of the mitral valve
4. Early onset of systolic dysfunction

(continued)

Echo Corner

ANSWER/EXPLANATION

Answer 1

Hyper trophic obstructive cardiomyopathy, amyloid heart and Fabry's disease all produce increased left ventricular wall thickness from different pathologic process. Sarcoidosis in contrast produce thinned ventricular walls, dilated ventricles with aneurysm formation and regional wall motion abnormalities similar to coronary artery disease.

Answer 2

Amyloidosis is characterized by early onset diastolic dysfunction and systolic dysfunction occurs very late. Amyloid deposits cause typical speckled appearance of the myocardium and increased wall thickness. Dilated atria, thickened inter atrial septum, thickened valves and pulmonary vasculature are other echocardiographic features of cardiac amyloidosis. It is sometimes difficult to differentiate Cardiac Amyloidosis from other cardiomyopathies (Fabry's, HOCM) without patient's history of systemic disease.