SCA NEWS
APRIL 2021

PRESIDENT'S MESSAGE

Stanton K. Shernan
MD, FAHA, FASE
President, Society of Cardiovascular Anesthesiologists

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Until We Meet Again

Two years ago, I was exceptionally honored to formally assume the title and role of the 22nd President of the Society of Cardiovascular Anesthesiologists. I am humbled to have been allowed to contribute to this extraordinary legacy that began over 40 years ago.

My first Presidential address given at the last onsite SCA Annual Meeting in 2019 included a historical perspective focused on my role as the anchor leg for my highly successful high school track relay team, which I presented as an analogy of teamwork and its association with receiving "the baton" from my Presidential predecessor, Chris Troianos.

As SCA President, I expressed that my expectations would first be to maintain the substantial progress in the Society's strategy and vision that had previously been achieved. I also committed to extending the "lead" even further with significant assistance from the essential contributions of the SCA Board of Directors, leadership, and management.

Several unanticipated hurdles made their way into this relay race over the past two years that presented unprecedented challenges not only to the SCA and its mission but to the entire world. During this time, the SCA has not only been confronted with managing the consequences of the pandemic, including the cancelation of our two premier annual meetings in 2020, the transposition of three annual meetings from a conventional, onsite format to remote and virtual, but also with the transition to a new management company.

Despite being presented with these challenges, the SCA has still been exceptionally successful in maintaining its fiscal responsibilities and educational offerings through a continuation of its annual meetings and the addition of several new, very well-attended webcasts and podcasts.

We have also already begun plans for the future by bringing together our annual meeting program directors and committees to coordinate the respective schedules for 2022. Discussions have begun for both the International Congress of Cardiothoracic and Vascular Anesthesia (ICCVA) meetings in South Africa in 2023 and Australia/New Zealand in 2025.

SCA leadership has also still been able to facilitate the expansion of every aspect of its mission, including new processes for leadership succession; the

> **"I am confident that history will evaluate us not only as survivors of this storm, but as individuals committed to evolving into a wiser, more robust, versatile, and insightful academic organization."**

promotion of diversity, equity, and inclusion (DEI) principles, including the development of a DEI Committee and a continued commitment to the rise of a Women in Cardiothoracic Anesthesia Special Interest Group. We have expanded communication with our membership through a new social media program, a redesigned and launched website, and a Social and Q&A app that enables polling and real-time engagement with meeting attendees and faculty.

In collaboration with the American Board of Anesthesiology, the SCA's development of a Board Certification in Cardiac Anesthesiology is also well on its way to fruition. SCA's research funding has expanded over the past two years by introducing both a novel Multi-Institutional Collaborative Clinical/Translational Research (MICoR) Grant and a new Diversity and Inclusion Grant. Finally, we have continued to expand our national collaborations with the American Heart Association (AHA), Society of Thoracic Surgeons (STS), American Association of Thoracic Surgeons (AATS), the American Society of Echocardiography (ASE), the National Board of Echocardiography (NBE) and the National Quality Forum (NQF) along with our international colleagues representing academic societies with a shared interest in cardiovascular and thoracic anesthesia in Europe, Asia, Australia/New Zealand, South America, and South Africa.

It's been said that leaders should be evaluated not only by their successes but perhaps even more so by how they respond to adversarial challenges. The SCA has undoubtedly been challenged over the past couple of years. However, as I now look ahead to continuing the race and passing the relay baton to the next SCA President, Andy Shaw, I know that SCA's "lead" will be well extended as I had initially promised. I am confident that history will evaluate us not only as survivors of this storm, but as individuals committed to evolving into a wiser, more robust, more versatile, and more insightful academic organization that has continued as an international leader in furthering the "promotion of excellence in patient care through education and research in the perioperative care of patients undergoing cardiothoracic and vascular procedures."

I consider myself truly blessed to have had the support and guidance of my friends and colleagues among the SCA Board of Directors, Program Directors, Committee and Task Force Chairs/Members, employees of Veritas Association Management, and to all of the society's members. There is no way we could have been as successful without a team effort – thank you very much!!! Finally, I am very enthusiastically looking forward to the excitement that lies ahead and, of course, to see all of my friends and colleagues in person as soon as possible – I miss you all.

Until we meet again,

SOCIETY OF CARDIOVASCULAR ANESTHESIOLOGISTS
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THORACIC ANESTHESIA SYMPOSIUM

Join Us April 23

Highlights for the Thoracic Anesthesia Virtual Symposium

Still Time to Register for the First TAS Virtual Meeting!

We are excited for the 9th Annual Thoracic Anesthesia Symposium on April 23, 2021! The TAS Planning Committee has been hard at work preparing for this virtual event.

This year's meeting features the following:

WORKSHOP SESSIONS:

TOPIC A: Lung Isolation

- Tube Exchangers
- Cohen & Arndt Blockers
- R/L DLTs and Vivasight
- EZ Blocker

TOPIC B: Thoracic Ultrasound: Diagnosis and Management

- Tube Exchangers
- Cohen & Arndt Blockers
- R/L DLTs and Vivasight
- EZ Blocker

TOPIC C: Regional Anesthesia

- Erector Spinae
- PVB
- 3-D Anatomy
- Serratus Plane

TOPIC D: Critical Procedural Skills

- Chest Tube/Pigtail
- Needle Decompression/Thoracentesis
- Cricothyrotomy Station
- RV Monitoring Station

Problem Based Learning Discussions (PBLDs) Offered

- Lung Transplantation Management
- ECMO In Thoracic Surgery
- How to Design and Implement a Thoracic ERAS Program at Your Hospital
- Patient on LVAD for Thoracic Surgery
- Esophagectomy
- Airway Crisis in the Thoracic Surgical Patient

Register for this one-day event to maximize your virtual interaction between attendees and faculty!

Click Here to view the TAS agenda.

TAS Virtual April 23

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Important CME Information

The Society of Cardiovascular Anesthesiologists is accredited by the Accreditation Council for Continuing Medical Education to provide continuing medical education for physicians.

The Society of Cardiovascular Anesthesiologists designates this activity for a maximum of 8.75 AMA PRA Category 1 Credits™. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

JOIN US APRIL 24 - 27

Message from the Scientific Program Chair and SCA President

Dear Colleagues,

Welcome to the SCA 43rd Annual Meeting and Workshops! We are grateful and excited that you have decided to join us for this virtual educational event. We know how challenging this year has been for all of us in medicine, and we want to take a moment to express our thankfulness for each of you who have taken care of critically ill patients, while also taking care of your families and one another.

We recognize how precious your time is and how hard you have all been working. In response to this, your Scientific Program Committee has created a virtual program with three goals in mind: to bring us together for community, to update us with the latest cardiothoracic anesthesia information, and to encourage us to engage with one another in multiple live question and answer sessions, workshops, mentoring sessions, and problem-based learning sessions.

From cutting edge sessions on Artificial Intelligence in Cardiac Anesthesiology to our new Professional Development Workshop, each session is designed to bring you clear and timely information pertinent to our specialty. We are pleased to announce an extra perk this year: sessions will be available to you on-demand for the next 60 days to accommodate your work-life balance. You can network with one another, or the faculty, by reaching out through the options on the platform, or ask questions through the group chat option during the sessions. Be sure and stop by all the amazing abstract presentations, including the popular Super Echo Panel!

Welcome to the meeting, we are honored you have joined us!

Best,

Sasha K. Schillcutt, MD MS FASE
Chair, Scientific Program 2021

Stanton K. Shernan, MD FAHA FASE
SCA President 2019-2021

SCA2021 ANNUAL MEETING & WORKSHOPS
APRIL 24-27, 2021

Register NOW for the Largest Cardiovascular Anesthesiology Event of the Year!

SCA Annual Meeting and Workshops are only a few days away! The Scientific Planning Committee has been working hard and diligently to bring you one of the best virtual meetings for the SCA membership and cardiovascular field.

From cutting-edge artificial intelligence lectures to our new Professional Development Workshop, this year's program is without a doubt our most ambitious yet. We have over 300 presenters and 81 sessions over four days.

We have developed a custom-designed virtual meeting platform. Our virtual meeting platform has been optimized for medical meetings, designed to create an immersive experience that enhances the great content assembled for SCA's Annual Meeting and Workshops.

To view the meeting agenda and register, visit www.scahq.org/2021 Annual Meeting Workshops.

Thank you Sponsors and Virtual Exhibitors:

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SCA ECHO WEEK

2021 RECAP

Congratulations to the 2021 Echo Week Award Winners!

2021 Virtual Echo Week Recap

Echo Week was SCA's very first virtual conference, and what a great success! In the virtual world, Echo Week proved to be another year of great educational content, speakers, presenters, and exhibits.

There were 755 attendees from 36 different countries and 46 faculty members that attended and participated in Echo Week 2021!

ECHO WEEK

WEYMAN LECTURE AWARD

Dr. Judith Hung, MD FASE

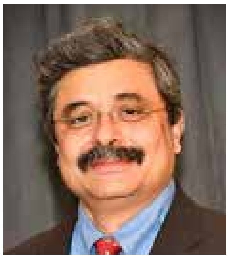
ECHO WEEK CO-DIRECTOR'S AWARD

Dr. Nelson Burbano, MD

Thank you to the Echo Week Program Planning Committee for all their hard work in putting together this year's successful virtual meeting!

PROGRAM DIRECTORS:

Mark A. Taylor MD FASE



Feroze Mahmood MD FASE

Alina Nicoara MD FASE

Charles Nyman MBBCh

Program Planning Committee

Nelson Burbano, MD
Sheela Pai Cole, MD FASE
Megan Krajewski, MD
Massimiliano Meineri, MD FASE
Sharon McCartney, MD FASE
Kimberly Howard-Quijano, MD MS FASE
Aidan Sharkey, MD
Andrew Shaw, MB FCCM FFICM FRCA
Douglas Shook, MD FASE
Nikolaos Skubas, MD DSc FACC FASE
Madhav Swaminathan, MD MBBS MMCI

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VIRTUAL EXHIBITORS

ASE American Society of Echocardiography Sound Saves Lives

Elsevier

National Board of Echocardiography, Inc.

Siemens Healthineers

TomTec

Claim your CME by April 30, 2021!

Echo attendees – have you claimed your CME Credits yet? To do so, please follow the Instructions provided below to claim your credits:

How to Get Your CME Certificate

1. Go to https://www.surveymonkey.com/r/M99W7HF.
2. Evaluate the meeting.
3. You should be automatically redirected to claim credits to this site: https://cme-tracker.net/certificate?certID=601977bb75d2f8343afd8ac1
4. You will need to login to claim credits. This login is different from your SCA account! If you have not previously claimed credits through SCA, you will need to create an account, then return to this link to claim credits.
5. Enter your name, credentials, and the credits you wish to claim to print your certificate.

Comprehensive Review & Advanced Applications of Perioperative Echo

28+ Hours of Echo Week Content on Your Time

The 2021 Echo Week meeting content gives you access to more than 28 hours of educational meeting content. Revisit the meeting whenever and wherever you choose – and earn CME credits.

Top Reasons to purchase the 2021 Echo Week Content:

- **Core Series—** prerecorded lectures
- **Interactive Series**— prerecorded lectures with live panel discussion
- **28.75 Hours of continuing education**
- Echo attendees **receive a discount** on the Echo Board Review Course which takes place on June 12 - 13, 2021.

If you were unable to attend Echo Week, the meeting content is available for purchase online through June 30, 2021.

To purchase the content, visit the SCA website at: EchoWeekContent.

Echo Board Exam Review Course

Join This Virtual Exam Review Course Offered by SCA on June 12 - 13th

A panel of experts will lead sessions designed to help prepare Echo Board candidates for the exam. The Echo Board Exam Review Course is designed for Fellows who will be sitting for the exam for the first time and to those who will be taking the exam to recertify their credentials.

The Echo Board Exam Review Course is scheduled for the following days:

SATURDAY, JUNE 12	SUNDAY, JUNE 13
10:00am - 6:00pm CST *7 CME hours*	10:00am - 5:00pm CST *6 CME hours*

For information on registration fees and to register, please visit EchoBoardExamReview.

SCA NEWS

2021 SCA Elections Results

SCA is pleased to announce the following individuals who have been elected to Society leadership positions.

PRESIDENT-ELECT

Kathryn E. Glas
MD MBA FASE
University of Arizona College of Medicine, Tucson

SECRETARY/ TREASURER

Amanda A. Fox
MD MPH
University of Texas Southwestern Medical Center

DIRECTOR-AT-LARGE

James (Jake) H. Abernathy III
MD MPH
Johns Hopkins University

DIRECTOR-AT-LARGE

Tara R. Brakke
MD FASE
University of Nebraska Medical Center

NOMINATING COMMITTEE MEMBER

Rebecca A. Aron
MD
University of Nebraska Medical Center

NOMINATING COMMITTEE MEMBER

Abimbola (Bola) Faloye
MD FASA FASE
Emory University School of Medicine

CONTINUING MEDICAL EDUCATION (CME) COMMITTEE MEMBER

Dalia A. Banks
MD FASE
University of California San Diego

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SCA's Outgoing Leaders — Thank You for Your Service

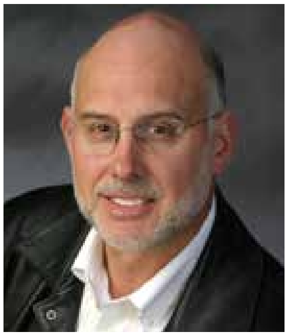
SCA would like to recognize the leaders whose terms of office have concluded. We greatly appreciate all their hard work towards improving our society, and we thank them for their involvement.

Mark A. Taylor
MD FASE
Cleveland Clinic
Secretary/Treasurer, 2019-2021

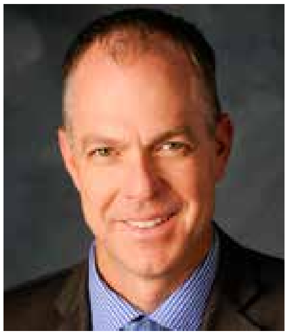
Christopher A. Troianos
MD FASE
Cleveland Clinic
Immediate Past-President, 2019-2021

Nikolaos J. Skubas
MD DSc, FACC FASE
Cleveland Clinic
Board Director, 2018-2021

Fabio G. Guarracino
MD
Board Director, 2018-2020
EACTA Liaison



Bruce A. Bollen
MD
Missoula Anesthesiology and The International Heart Institute of Montana
CME Committee, 2017-2021



Jacob Gutsche
MD
University of Pennsylvania
Nominating Committee, 2019-2021

Adriaan Van Rensburg
MD MBChB MMED FCASA FRCPC
University of Toronto
Nominating Committee, 2019-2021

SCA NEWS

SF Match Fellowship Agreements Close June 1, 2021

In-order to provide more consistency and predictability to the ACTA fellowship application process, the ACTA programs participate in a common application and match process provided by SF Match for recruitment.

The schedule for the 2022 training year is as follows:	
• Applicant Registration Began	November 9, 2020
• Central Application Service Target/Deadline Date	March 3, 2021
• Rank List Submission & SCA Exception Agreement Deadline	June 1, 2021
• Results Sent to Programs /Applicants and Medical Schools	June 14, 2021
• Post-match Vacancies Posted	June 15, 2021
• Training Position Starts	July, 2022

Applicants and programs participate by registering with SF Match and applicants applying to the programs of their choice. Both programs and applicants submit a rank list based on their preferences. Notably, only programs where an applicant has interviewed can be ranked in the match.

Critical to the match process, programs and applicants can make an Exception Agreement prior to submitting their rank list to SF Match. Exception Agreements allow an applicant and program to agree to match each other prior to submitting their respective rank lists. Importantly, all ACTA positions must be included in the match, including all Exception Agreement positions.

DON'T DELAY!

Exceptions to the standard match process have been agreed upon by the ACTA Fellowship Program Directors Council in the following situations:

1. Applicants who are in active military service at the time of application.
2. Internal candidates, i.e. applicants who are currently in the anesthesiology residencyprogram at the same institution as the ACTA fellowship.
3. Applicants who are making a commitment to come to the institution of the ACTA fellowship for more than one year.
4. Applicants who are enrolled in an anesthesiology residency outside of the USA at the time of application.
5. Applicants who reside outside the USA at the time of application or who are not eligible for ABA certification due to non-US training.
6. Applicants whose spouse or partner is applying for a GME-approved post graduate training program in a medical specialty in the same region as the ACTA fellowship.

Please Note: Eligible applicants and programs who wish to take advantage of an exception rule are still required to participate in the match ranking process and must complete an exception agreement found on the SCA website via the link below. Any match irregularities will be referred to the ACTA Fellowship Program Directors Council of the SCA.

(continued)

Program directors complete the first part of the match exception process. Program directors – click here to begin. You will need to log in with your SCA username and password.

Once the program director completes this portion of the process, the applicant will receive an email with a link to the form they must complete.

Any match irregularities will be referred to the ACTA Fellowship Program Directors Council of SCA.

COMING SOON

Online Community Platform is On the Way

The SCA has partnered with DocMatter to create an online Community for high-quality clinical discussion and collaboration as an added benefit of SCA membership. The DocMatter Team is adding members to the SCA Community in waves, so please be on the lookout for an account activation email. If you would like to get started earlier, please email support@docmatter.com to let them know you'd like to join the SCA Community.

We are excited about this partnership because we know that a wonderful group of experts in cardiovascular and thoracic (CVT) anesthesiology and perioperative care comprises the SCA, and the SCA DocMatter Community gives you the chance to share relevant information, knowledge, and expertise with your fellow SCA members.

How Does the SCA DocMatter Community Work?

Integrates seamlessly into your current workflow.

- Participate in the SCA DocMatter Community by logging in to the website (docmatter.com/scahq) or mobile app (search "DocMatter" on iTunes or Google Play), or by replying to a discussion notification email you receive from DocMatter.

Trusted sources of information.

- Every SCA member has a profile within this private Community, so you can easily network and see other members' credentials. Log in to the SCA Community to review your profile and update your clinical/research interests so the DocMatter system can target relevant information to you.

No distractions. No wasted time.

- The DocMatter team moderates and organizes discussions, which will be sorted based on relevance to you based on your interests and expertise.

Your support is here.

- You will have access to the DocMatter Clinician Advocate team, who can help with everything from logging into the Community, to taking dictation of a case or question you'd like to share with the group.

With so much going on in the world, and the current impracticability of in-person meetings, the SCA Community is the safe, trusted resource to which you can turn to stay up to date on literature, advances in technology, and best practices in contemporary times.

Thank You to the Newsletter Sub-Committee

We want to take a moment to thank all the members of the SCA Newsletter Sub-Committee. These members volunteer their time to create the Newsletter, mainly the Literature Reviews, Thoracic Review, the new Pro/Con Section, Echo Corner Cases, and additional content.

A special thank you to the SCA Newsletter Sub-Committee Chair, Dr. Dalia Banks, MD, FASE who has been nominated to the CME Committee and will end her term as the Newsletter Committee Chair.

Congratulations to Dr. Jessica Spellman, MD, FASE who will take the baton from Dr. Banks as the new Newsletter Sub-Committee Chair.

The SCA Newsletter would not be what it is today without the commitment from our outstanding committee members!

- Sohail Mahboobi, MD
- Saroj Pani, MBBS
- Richa Dhawan, MD
- Nikolaos J. Skubas, MD FASE
- Mark T. Nelson, MD MEd
- Ludmil (Lou) Mitrev, MD
- Liliya Pospishil, MD
- Kathirvel Subramaniam, MD, MPH
- Jessica Zvara, MD
- Jessica L. Spellman, MD, FASE
- Jared W. Feinman, MD
- Igor Zhukov, MD
- Himani Bhatt, DO MPA FASE
- Frederick Conlin, MD
- Deborah L. Dubensky, MD
- Dalia A. Banks, MD FASE
- Christine Choi, MD
- Ashley Fritz, DO
- Archer K. Martin, MD
- Antonio T. Conte, MD
- Andrew Maslow, MD
- Ahmed S. Awad, MD, MBA, FASE

SCA MEMBER CORNER

AWEsome Woman Interview

Mary Beth Brady, MD FASE

Johns Hopkins University School of Medicine

Brief introduction about yourself:

Dr. Mary Beth Brady, MD FASE, is an associate professor of anesthesiology and critical care at the Johns Hopkins University School of Medicine. She is nationally known as an expert in Transesophageal Echocardiography (TEE) and serves as the director of the Intraoperative TEE Program. For years she has been on the forefront of educational initiatives on TEE education.

Dr. Brady serves as the Vice Chair for Education for the department of Anesthesiology and Critical Care Medicine. In this role, she coordinates educational initiatives across the multiple Johns Hopkins campuses. She is also medical director of the Adult Post Anesthesia Care Unit at Johns Hopkins.

Dr. Brady is currently the Vice-Chair for the SCA Scientific Planning Committee.

1. What led you to become a Cardiovascular Anesthesiologist?

Simple, I did not want to be afraid of cardiac, non-cardiac, any case at all. It was a long time ago (don't ask the exact year!), and I was incredibly junior. I distinctly remember the Hopkins cardiovascular faculty. Not much frightened them. I admired their humble confidence in the face of anything that came through the OR door. I wanted to be like them.

2. How did you hear about the SCA?

I easily remember this as well. As a junior faculty member at Johns Hopkins, I was trying to find my footing. Dan Nyhan and Brett Simon, friends and mentors even today, knew of the impact of the SCA and pointed me in that direction. They did not have to point far. Throughout residency, I had worked closely with Lee Fleisher, who even then was an expert and a leader in the field. Lee was kind enough to mentor me through possible ways of getting involved. In this way, all three mentors changed the trajectory of my involvement in the SCA and of my career as a whole. I have been lucky enough to have many tremendous mentors. To this day, I still work with many of them. And to this day, I never forget their support. As such, I try to do the same for others. One of my biggest pleasures is guiding junior colleagues as they launch their own career path.

3. What roles have you held for the society?

Early on in my SCA career, I was lucky enough to be on the Scientific Program Committee under the tutelage of both Scott Reeves and Linda Shore-Lesserson. If Lee threw me into the "SCA pool," Scott and Linda taught me how to swim! Honestly, I had absolutely no idea what I was doing, but both

Linda and Scott essentially held my hand, walked me through the process and never made me feel as naïve as I actually was. Even now, I consider both to be great mentors and, more importantly, great friends. I still ask for their advice and they still generously give it. Interestingly in this role, which remember was so many years ago, I also met Colleen Koch, who has also been incredibly influential in my career. Looking back, the simple decision to get involved in the SCA has had a huge impact on my career and on my relationships with immensely talented mentors. Throughout the years, I must have done something right because now I am Vice-Chair of the very same committee where I started.

4. What is one of your greatest achievements as a cardiovascular anesthesiologist?

As a person, I am proud that my daughters are nice, curious and call me just to say hello. As a professional, I am most proud when someone stops me at a meeting and says, "Dr Brady. I remember when you told me…" Usually that means they remembered one of three topics not in that particular order: career advice, personal advice, or clinical/patient care advice. I know these are not the typical "achievements" but you asked and I have had lots of years to realize that achievements come in many different forms.

5. Do you have any advice for Fellows and Residents?

Advice? I was afraid you would not ask! Here goes – 1) Work hard 2) Never burn a bridge 3) Say yes, even if you doubt yourself 4) Say yes more than no but don't be afraid to say no if you do not have the bandwidth 5) Reach out. People love to help. When speakers include their emails on slides, it is for a reason. If someone reaches out after a talk, I know at least someone was paying attention to the talk at least for one slide! Joking aside, people love to help. If they don't, you don't want their help anyway.

6. Have you experienced any difficulties as a woman in the field?

Locally, my institution, its leadership, my division and most definitely my mentors have been nothing but supportive. Additionally, I have been an SCA member since 1997: a great society which because it is great continues to change as years pass. There are many to thank for this progressive change, but specifically and very recently, Stan Shernan and Sasha Shillcutt have played an important role in broadening the opportunities for all members of the SCA. Luckily, I have had a seat at the table to watch their constant efforts and their success in this regard.

7. Do you have any advice for other women in the field?

You can do it – don't doubt yourself! An eye-opening study noted that men and women often respond differently to career opportunities or projects. With equal qualifications, studies show that often men do not doubt their qualifications, but women do. This impacts career trajectory. If you find yourself doubting, email me! First, I will shake you out of it. Next, I will encourage you to say yes. Lastly, we will figure it out together.

MEMBER CORNER

8. How do you balance work and personal life?

Balance is always a tough question. I think women can be too hard on themselves when it comes to that question, but it really is an important one. Frankly, in the past, I would finish a day and ask 1) "Today, was I a good mother? or 2) "Today, was I a good doctor?" or 3) "Today, was I a good spouse?" I rarely finished a day thinking that I was good at all three roles. Honestly, I was pretty happy if I was good in at least one role. Believe me, there were many days where I thought, "Today, was I good at anything?" Things changed when I focused on being "present." If I am present at home, it makes being at work more satisfying. If I am present at work, I enjoy my time at home more. Additionally, I offer two concrete tips:1) Ignore emails if family are nearby: the email won't be life-changing, and children grow up way too fast. My daughters are now in college. I miss them every day and yet, the work emails keep coming! 2) It takes some help, if not a lot of help, to balance life. I couldn't do anything without my husband's constant support (and his great sense of humor). You need home support from somewhere and/or someone – don't be afraid to ask for it and to accept it.

9. What is something you enjoy doing outside of work?

Travel, travel and more travel. Photography, which works well with travel. Dogs, literature, movies, great television and running – who knew the Pandemic could be my friend in that way? Most importantly, I enjoy entertaining at home with family and friends - nothing beats a good belly laugh and a large bottle of wine.

10. Would you change anything about the path you took to get to where you are now?

Less email, more laughter – less time doubting.

11. What was the best piece of advice you received?

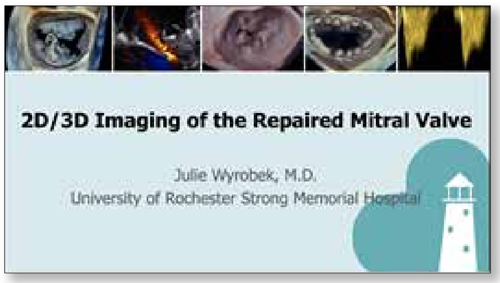
State your goals – if you can't articulate them, you will never even get close to achieving them.

MEMBER CORNER

Online Educational Videos Continue to be Added on the SCA Website and Mobile App!

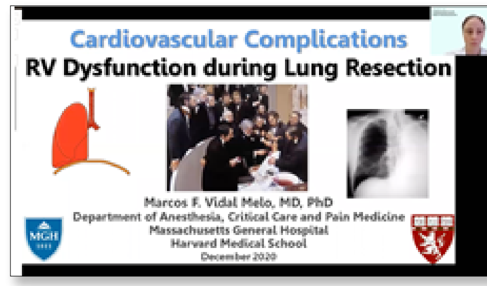
SCA's Online Education Subcommittee is proud to announce that TWO additional online educational videos are now available for CME credits to SCA members only.

The videos are available through the SCA website and Mobile App.



2D/3D Imaging of the Repaired Mitral Valve

Presenter: Julie Wyrobek, MD



Cardiovascular Complications: RV Dysfunction During Lung Resection

Presenter: Marcos F. Vidal Melo, MD, PhD

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THORACIC CORNER

Operating Room Extubation: A Predictive Factor for 1-year Survival After Double-lung Transplantation

Fessler J, Fischler M, Sage E, et al. *J Heart Lung Transplant*. 2021 Feb; 5S1053-2498(21):01999-9.

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Background

Recent literature has described the influence of perioperative anesthetic management on outcomes in lung transplantation.[1] While consensus guidelines regarding enhanced recovery after surgery (ERAS) in lung transplantation are still lacking, many of the concepts found in thoracic surgical ERAS guidelines are applicable in this patient population. Upon recent examination of ERAS guidelines in thoracic surgery, Teeter et al recently noted that while the benefit of individual guideline components is uncertain, that multidisciplinary compliance with a perioperative ERAS plan may lead to benefit.[2] Operating room (OR) extubation, which is not a common practice in lung transplantation, may be considered a component of early recovery and fast track protocols. The aim of the current manuscript is to evaluate the prognosis of patients who were extubated in the operating room, as well as to elucidate recipient factors which are predictive of operating room extubation.[3]

Methods

This is a single-center, retrospective study evaluating patients undergoing double-lung transplantation (DLT) at Foch Hospital in Paris, France. Patients who underwent DLT from January 2012 to June 2019 were included, and a total of 450 patients were included in the study.

Exclusion criteria included the following: recipients undergoing multi-organ transplantation, re-transplantation, or recipients who were supported intraoperatively with the use of cardiopulmonary bypass as the form of extracorporeal life support (ECLS).[3] The two groups of comparison were patients extubated in the OR immediately following completion of the DLT versus patients who were extubated in the intensive care unit (ICU) postoperatively.

The primary outcome evaluated was one-year mortality, and the secondary outcomes were the following: rate of early reintubation postoperatively, and incidence of grade 3 primary graft dysfunction (PGD3) at 24, 48, and 72 hours postoperatively. Additionally, ICU complications and overall length of stay were evaluated. Beyond examining these prognostic factors for OR-extubated patients, predictive factors of successful intraoperative extubation were evaluated as well.

(continued)

Extubation criteria was established with a transplant protocol, which incorporated PaO2/FiO2 ratios, inhaled nitric oxide (iNO) requirements, and hemodynamic parameters to establish appropriateness for intraoperative extubation. OR extubation was performed in the setting of stable hemodynamics, normothermia, PaO2/FiO2 ratio > 300, and ability to wean iNO.

Results

A total of 450 patients out of the 475 patients who received a DLT at Foch Hospital during the study timeframe met inclusion criteria. A total of 35.8% of patients were extubated in the operating room, with 2.5% reintubated within the first 24 hours. Subsequently, another 5% of patients were reintubated between postoperative day (POD) 1 and 7. The transplant protocol was followed in most instances, and while the authors report associated morbidity and mortality with protocol deviation, no statistical analysis was reported.

The primary outcome of one-year mortality showed a significantly greater survival rate in the OR extubation group as compared to the ICU extubation group ($p = .005$). After the authors adjusted for predictive factors of intraoperative extubation, intraoperative extubation remained associated with superior one-year outcomes as compared to ICU extubation ($p = .028$).

Secondary outcomes showed that etiology of end-stage lung disease (ESLD), recipient body mass index, and PaO2/FiO2 ratio 10 minutes after second graft implantation were predictive for successful intraoperative extubation. Patients successfully extubated in the operative room had fewer intraoperative blood products ($p < 0.001$), decreased need for ECMO support ($p < .001$) and lower lactate levels ($p < .001$) as compared to ICU extubated patients. Finally, patients extubated in the operating room had a lower prevalence of PGD3 at every time interval as compared with ICU extubation patients ($p < .001$).

Discussion

The impact of perioperative anesthetic management on outcomes in lung transplantation has been discussed extensively within the literature.[3] While previous data have focused primarily on intraoperative fluid resuscitation, blood product transfusions, and levels of delivered oxygen during reperfusion, this is the first manuscript to examine the impact of airway management on outcomes in lung transplantation. A common thread amongst this paper and previous literature is the impact of the studied intervention on development of PGD. PGD, while a perioperative syndrome, has both short and long-term effects on lung transplantation morbidity and mortality.

In addition to this manuscript describing the first outcomes-related data in lung transplantation as they relate to airway management, this paper also provides further insight as to the impact of presenting etiology of ESLD on management in lung transplantation. Whereas the concept of recipient ESLD impacting intraoperative anesthetic management has been described in the literature by the Foch group as well as others[4-6], this manuscript provides data which show that end-stage obstructive disease as well as cystic fibrosis are predictors of successful operating room extubation ($p = .002$ and $p =$

.005, respectively).[3]

The authors note that intraoperative extubation is merely one component of a comprehensive, team-based fast track protocol. Any fast-track protocol should have the goal of reducing PGD in recipients, be maintained throughout the entire perioperative phase of care, and be tailored to recipient etiology of ESLD. Although this study is limited by the high proportion of end-stage obstructive and cystic fibrosis recipients, the lung transplant protocol described by the Foch group provides valuable insight into a cutting-edge lung transplantation anesthetic approach that deserves evaluation by academic groups seeking to improve their patient outcomes.

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LITERATURE REVIEWS

Invasive Management of Acute Myocardial Infarction Complicated by Cardiogenic Shock

A Scientific Statement from the American Heart Association

Henry TD, Tomey MI, Tamis-Holland JE, et al. Circulation. Circulation. 2021;143:00–00

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Acute myocardial infarction (AMI) is the most common cause of circulatory shock (CS).[1] The incidence of shock after AMI (AMICS) is 7%–10% and the 30-day mortality is 40% to 45%.[2] Patients after discharge has a higher rate of mortality. Mechanical circulatory support (MCS) devices are being increasingly used.[3] This article appraise current evidence, identify areas of consensus and controversy, propose best practices, and highlight areas for future research in the acute invasive management of AMICS.

DEFINING SHOCK

The Society for Cardiovascular Angiography and Intervention (SCAI) has introduced a classification scheme (Stages A–E) for a patient's hemodynamic state.[4] This classification is useful to risk stratify hospitalized patients. At every stage, the presence of cardiac arrest significantly increases mortality.

TRIAGE TO INVASIVE MANAGEMENT

Patients with spontaneous circulation should receive cardiac catheterization as soon as possible. Stable patients with risk factors for shock (stage A) or early shock (stage B) can generally proceed directly to coronary angiography. Patients presenting in shock (stages C–E) may require acute stabilization with attention to blood pressure, end organ perfusion status, oxygenation, and acid-base status. Patients with late or extreme forms of shock (stage E) where invasive management is unlikely to provide benefit should be evaluated for palliative care.

INITIAL STABILIZATION

Blood Pressure

The goal is to maintain mean arterial blood pressure >65 mm Hg with minimum dose of vasopressors. Norepinephrine is a suitable choice as first-line therapy.[5] Other agents can be used in addition to or replacing norepinephrine in conditions like unstable bradycardia, where a chronotropic effect of dopamine or epinephrine may be beneficial; dynamic left ventricular (LV) outflow tract obstruction, for which a pure vasopressor such as phenylephrine or vasopressin may be preferred; or refractory hypoxemia or acidosis, in which case efficacy of catecholamine vasopressors may be attenuated, favoring the use of vasopressin. Higher requirements of vasoactive agents are associated with higher mortality.

Respiratory Function

Hypoxemia results from cardiogenic pulmonary edema and metabolic acidosis. Early endotracheal intubation and mechanical ventilation should be considered. The initiation of positive pressure ventilation can abruptly lower systemic arterial pressure in patients with right ventricular failure and right ventricular myocardial infarction.

DIAGNOSTIC EVALUATION

Physical Examination

Rales and inability to lie supine indicate pulmonary venous congestion. Jugular venous distension suggests systemic venous congestion. Cool and clammy extremities, rapid thready pulses, and altered level of consciousness represent hypoperfusion. A systolic murmur should raise suspicion for mechanical complications.

Echocardiography

The echocardiography is used to assess left and right ventricular systolic function, valvular pathologies, pericardial effusion/tamponade, and mechanical complications, including septal, papillary muscle, or free wall rupture. Early surgical consultation should be considered for mechanical complications.

Left-sided Heart Catheterization

Elevated LV end-diastolic pressure has been associated with increased mortality and the development of heart failure.[6] Coronary angiography should identify the culprit lesion and the extent of the disease. In patients with elevation in LV end-diastolic pressure or renal insufficiency contrast ventriculography should be avoided particularly when a diagnostic echocardiogram is available.

Right Sided Heart Catheterization

Right-sided heart catheterization provides useful information about central venous pressure, pulmonary capillary wedge pressure, cardiac output, cardiac power output, pulmonary artery pulsatility index, and mixed venous oxygen saturation. This information can help to identify those patients who are hypotensive but normally perfused and those who are normotensive but hypoperfused. This should be performed ideally after completion of PCI.

CONTEMPORARY MCS TRIALS

The benefit for early MCS is reduction of ventricular workload, increase systemic and myocardial perfusion, and provide hemodynamic stability during PCI. For patients with predominant LV failure, MCS options include intra-aortic balloon counterpulsation (IABP), a transvalvular axial flow pump (Impella), and the TandemHeart percutaneous LV assist device. For patients with predominant right ventricular failure, options include the transvalvular axial flow Impella RP pump and TandemHeart Protek Duo percutaneous right ventricular assist device. Patients with biventricular failure may be supported with bilateral Impella pumps or VA-ECMO with a concomitant LV venting mechanism. Patients with concurrent refractory respiratory failure should be considered for VA-ECMO. The notable risks are bleeding, hemolysis, vascular complications, limb ischemia.

CORONARY REVASCULARIZATION

ThePCI is the recommended method of reperfusion for patients with AMICS regardless of time delay. Early revascularization has become the most important strategy in the treatment of AMICS, with increased risks with revascularization delays.[7]

Modality of Revascularization

PCI is the most often performed revascularization therapy in AMICS, whereas coronary artery bypass graft surgery (CABG) is rarely performed. CABG should be considered depending on suitability of coronary anatomy; importance of the infarct-related artery; and surgical availability and experience. Emergency CABG should be considered in patients where PCI is unsuccessful, and in cases where AMI is complicated by myocardial rupture. A hybrid approach of PCI (with or without stent placement) and staged CABG has also been considered. Fibrinolytic therapy is reserved for patients with ST-segment–elevation AMI when timely PCI is unavailable.

Management of Multivessel Disease

Multivessel disease have a higher mortality compared with patients with single-vessel disease. Patients with AMICS, PCI should be limited to the culprit lesion with possible staged revascularization of other lesions.

Antiplatelet Therapy

CS is a potent predictor of stent thrombosis due to AMICS-associated abnormalities in coronary perfusion, thrombus burden, microvascular occlusion and dysfunction, platelet activation, PCI quality, and limited bioavailability related to absorption and pharmacodynamics of antithrombotic therapies.[8] AMICS patients may benefit from the preferential use of third-generation oral P2Y12 inhibitors instead of clopidogrel. Platelet reactivity may be further reduced with adjunctive use of glycoprotein IIb/IIIa inhibitors.

CARDIAC INTENSIVE CARE

Comprehensive critical care comprises prevention, diagnosis, and management of multi organ system failure complicating AMICS; reassessment of hemodynamics and perfusion; anticipation and management of complications; decision making by a multidisciplinary team; and close communication with family.

SPECIAL CONSIDERATIONS

Cardiac Arrest

Patients successfully resuscitated from cardiac arrest with neurological function (Glasgow Coma Scale score ≥8) and a diagnosis of AMICS should be send to the cardiac catheterization laboratory as soon as possible. Patients who remain comatose (Glasgow Coma Scale score <8) or unable to follow simple commands should be treated with targeted temperature management.

Conclusion

AMICS is a complex clinical entity that is a major cause of death after AMI. Care of these patients requires a multidisciplinary team effort to coordinate early assessment and triage, noninvasive and invasive diagnostics, coronary revascularization, and intensive care management.

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LITERATURE REVIEWS

Benefits of Routine Prophylactic Femoral Access During Transvenous Lead Extraction

Chung DU, Müller L, Ubben T, Yildirim Y, Petersen J, Sinning C, Castro L, Demal TJ, Kaiser L, Gosau N, Reichenspurner H, Willems S, Pecha S, Hakmi S.
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Background

The insertion of cardiac implantable electrical device (CIED), a potentially life-saving therapy, has increased in recent years due to dramatic expansion in the indications for increased aging patient population with substantial cardiac disease. The wires and leads are commonly inserted under a local anesthetic with or without MAC. With time, many of these leads become faulty, cracked, or infected. If fibrosis has not developed, they can be removed easily. However, the development of adhesions will cause lead entrapment and removing of these entrapped leads will require using complex tools and techniques that release the lead from its fibrotic attached sites. Accordingly, Transvenous Lead Extractions (TLE) has increased considerably. Therefore, potential life-threatening complications with high mortality also have increased especially, traumatic injuries with bleeding. Examples of injuries sustained during lead extraction involve tear of the subclavian vein, superior vena cava, right atrial appendage, or free wall right atrium that will lead to bleeding into the chest causing hypovolemic shock or cardiac tamponade with circulatory collapse. Although procedure-related major complication rates around 0%– 2.5% and despite immediate endovascular or surgical intervention, mortality rates of patients experiencing cardiac or vascular tears during TLE range between 36% and 50%. To minimize the time elapsed between injury and intervention, prophylactic placement of venous and arterial femoral sheaths establish access for immediate deployment of rescue devices such as SVC occlusion balloons, temporary pacing wires, or femoral cannulation for CPB. Thus, increasing patient survival.

Study Design

The authors designed the study as a retrospective analysis of patients who underwent TLE from January 2012 to February 2019 with the purpose to assess the benefits of routine prophylactic femoral access in patients undergoing TLE and to evaluate the methods, frequency, and efficacy of the emergency measures used in those patients.

Participants

All patients undergoing TLE for any reason between January 2012 and February 2019. Two hundred eighty-five patients treated during this time period were included in the study. All patients were treated by 3 different operators.

Methods

All cases were performed in a hybrid OR under fluoroscopy and GA by lead extraction team. All patients had arterial line and transesophageal echocardiography with a perfusionist on standby. Arterial femoral sheath 4F and two venous femoral sheaths 6F were placed in the right groin. One of the venous femoral sheaths was engaged with insertion of a 5F pigtail catheter to enables selective venography to visualize adhesions or vascular lacerations and the other with insertion of a temporary pacing wire. In case of hemodynamic compromise both arterial and venous femoral sheaths are used for femoral insertion of the CPB cannulas. Hemostasis achieved at the arterial access sites using Angio-Seal VIP vascular closure devices and at the venous access sites with manual compression.

Results

Two hundred eighty-five patients (mean age of 65.3 years) were included in the study. Median lead dwell time was 84 months. Overall complication occurred in 12 patients with a rate of 4.2%. Major complications occurred in 5 patients with a rate of 1.8%. Clinical success rate was 97.2%. A total of 3 patients died as a procedure-related mortality with a rate of 1.1%. Femoral sheaths were actively engaged in 26 patients with a rate of 9.1%. The major complications included two patients with SVC perforation where they underwent surgical repair using CPB. Both patients required extensive blood transfusion however they died of multiorgan failure 5 and 8 days after the procedure. One patient had pericardial effusion after extraction of the ventricular lead required surgical repair of a small ventricular perforation without CPB. This patient died of pneumonia and sepsis-related multiorgan failure. One patient had right atrial perforation and one patient had bleeding from coronary sinus that required immediate intervention.

Authors performed intervention in the 26 patients where the femoral sheaths were actively engaged included deployment of snares in 10 patients for retrieval or mobilization of lead fragments, followed by prophylactic or emergency placement of occlusion balloons in total of 7 patients, insertion of a temporary pacing in 3 patients for sudden asystole, venous angioplasty in 3 patients, diagnostic venography in 3 patients to identify the location of vascular tear, and extracorporeal membrane oxygenation in one patient where femoral sheaths were used to cannulate the patient. The authors did not observe any femoral vascular complications due to prophylactic sheath placement.

Study Limitations

The study has several limitations, as the authors accurately identified at the end of the discussion section. The main limitations include being a single-center retrospective analysis, small sample size, lack of a control group.

Conclusions

The authors' suggestion of routine prophylactic placement and utilization of femoral sheaths could improve visualization and extraction in difficult cases and helps shortens response time to diagnose and quickly establishes control in the occurrence of rare complications but potentially fatal vascular injuries with hemodynamic compromise that may occur during TLE procedures. Although routine prophylactic femoral access is associated with rare vascular access site complications, the authors after weighing against fatal complications, which can occur during lead extraction recommended this approach.

Reviewers' Comments

This study, which was conducted in Germany is relatively well written paper describing the benefits of prophylactic femoral access in patients undergoing lead extraction. The study has several limitations, including being a single-center retrospective analysis, and a relatively small sample size. Nevertheless, it emphasizes the importance of pre-procedural venous and arterial femoral access regarding management of this specific patient population undergoing TLE procedures. However, the 2017 Heart Rhythm Society (HRS) Expert Consensus Statement on Cardiovascular Implantable Electronic Device Lead Management and Extraction recommended this as the standard of care. Also, the HRS Expert Consensus Statement recommends large bore access (preferably 12 French sheath insertion) not only for the prophylactic insertion of a rescue wire and/or rescue balloon but also to rapidly infuse large quantities of blood product or volume in the event of a major adverse event. This should be delivered through a rapid infuser with large bore tubing for a quick resuscitation. This was not acknowledged by the authors in the study and should not be overlooked as one of the more important aspects of peripheral line insertion in extraction cases.

The HRS Expert Consensus Statement comments on dual venous sheaths are also important if indeed a rescue wire and/or balloon is prophylactically deployed and alternative femoral snare and/or temporary venous pacing is required. This was clearly stated by the authors. The authors were also very clear on the benefit of both arterial and venous access if cardiopulmonary fem-fem bypass is necessary in the event of a hemodynamic compromise.

The authors recommended the technique of pigtail insertion with a venous contrast injection for better delineation of the location or mechanism of a hemodynamically consequential event during TLE however, this is not part of the HRS Expert Consensus Statement and potentially lends to potential delay in the ultimate treatment for SVC tear and or myocardial injury to which the treatment is immediate thoracotomy. We disagree with authors as any delay exceeding five to ten minutes increases mortality (guideline-based data). According to the recent data on rescue balloon use, mortality for an SVT injury has been reduced from greater than 50% to 10% or less. Based on this recent data, it is recommended that at least a prophylactic rescue wire (with or without the balloon) be deployed prior to TLE. Insertion of the wire and balloon after injury already has occurred, may be difficult and unsuccessful in obtaining adequate positioning and balloon deployment for abrupt hemostasis. The venography can be easily obtained if necessary, with prior sheaths placed from the upper extremity prior to TLE if there is no clear evidence for occlusion. With appropriate hemodynamic monitoring, the use of transesophageal echocardiography and visualizing the site to which hemodynamic compromise occurred during the extraction procedure, an operator should easily be able to determine the injury location. This should prompt either immediate balloon deployment prior to sternotomy or immediate sternotomy if the injury is below the SVC deflection presenting as cardiac tamponade. It is also not mentioned in the study (which becomes extremely important if the immediate deployment of the rescue balloon is required) to assure adequate sizing and position of a fully inflated balloon. This is to ensure there is no "watermelon seeding" back into the right atrium leaving portions of the SVC uncovered. Given all of what is stated, the actual percentage of femoral sheaths that are actively engaged would be significantly higher than the 9.1% described by the authors.

The study mentioned the most common intervention performed through the femoral sheath was the use of snares but the number was extremely low and this is certainly dependent on the experience and comfort level of the extractor with the use of these tools. In certain institutions femoral extraction with snare tools is the preferred method of TLE and thus the use of femoral engagement would be 100%.

In our conclusion, the study has benefits in confirming the necessity and uses of femoral access prior to and during TLE but has limited statistical significance as presented where the true emergency use was a small number. Also, comparing to similar procedures in literature on complications from femoral sheaths insertion, it is not always zero as the authors described. As acknowledged by the authors, they had no control group which makes it difficult to establish an effect of their approach on patient outcomes. For the authors 'suggestion of an RCT, perhaps database research similar to STS without identifiers linking outcomes to a particular institution would be helpful in further clarifying the value of their technique.

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LITERATURE REVIEWS

Does Ablation of Atrial Fibrillation at the Time of Septal Myectomy Improve Survival of Patients with Obstructive Hypertrophic Cardiomyopathy?

Cui H, Schaff HV, Dearani JA, Lahr BD, Viehman JK, Geske JB, Nishimura RA, Ommen SR. *J Thorac Cardiovasc Surg.* 2021 Mar;161(3):997-1006.e3. doi: 10.1016/j.jtcvs.2020.08.066.

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Background

Atrial fibrillation (AF) is a common arrhythmia associated with hypertrophic cardiomyopathy (HCM) which affects quality of life and is associated with increased risk of thromboembolic events.[1,2,3] Yet, the impact of AF on survival in patients with HCM remains questionable. Although some observational data suggests that AF in patients with HCM is a strong predictor of mortality, other data supports transient clinical course of AF with low disease related morality and minor contribution to heart failure related morbidity.[2,3] Up to date there is limited literature assessing the impact of AF in patients with obstructive hypertrophic cardiomyopathy (HOCM) undergoing septal myectomy. Even more sparse data exists on the need of surgical AF ablation at the time of septal myectomy, optimal surgical ablation approach, and success in long-term rhythm control. This study aimed to evaluate the impact of perioperative AF and concomitant surgical ablation in patients undergoing septal myectomy.[4]

Study Design

This study was a single center retrospective observational study of patients with HOCM who underwent transaortic septal myectomy between 2001 and 2016. The authors aimed to assess the impact of preoperative AF and surgical AF ablation on septal myectomy outcomes. All-cause mortality was the primary outcome. The primary comparison was the survival difference between patients with and without preoperative AF. Subgroup analysis was performed to determine the effect of ablation procedure on survival, difference between ablation approaches (COX-maze operation vs pulmonary vein (PVI) isolation), and impact of postoperative AF on long-term survival. History of preoperative AF, surgical ablative procedures performed, TTE morphologic parameters (septal thickness, left atrial (LA) appendage volume index) were obtained from chart review. Mortality was obtained from Social Security Death Master File and state death records. Persistent AF was defined as continuous AF sustained for more than 7 days. Paroxysmal AF was defined as AF terminating spontaneously or with intervention within 7 days of onset. Early postoperative AF was defined as newly developed or recurrent AF episodes lasting more than 1 hour within 30 days after myectomy.

Results

A total of 2023 patients were included in the study. At the time of surgery, the median age of patients was 56, and 56% were male. History of preoperative AF was recorded in 19.5% of patients (10.2% with persistent AF, and 89.8% with paroxysmal AF). Notably, 19.3% of patients with paroxysmal AF had only one episode prior to surgery and 7.6% underwent prior transcatheter or surgical ablation. Compared with patients without preoperative AF, patients with history of AF were older (55.3 vs 58.5 years), more likely to be male (55% vs 61.4%), and had higher values of LA volume index. Furthermore, the odds of higher LA volume index were increased for patients with history of persistent AF compared to patients with history of paroxysmal AF.

A total of 48.2% patients with history of preoperative AF underwent surgical AF ablation at the time of septal myectomy. Patients who underwent surgical ablation were more likely to have persistent AF (rather than paroxysmal) and increased LA volume index. Compared to bilateral PVI, Cox-maze operation was more often performed in patients with persistent AF with a trend towards lower rates of early AF recurrence. Subgroup analysis of surgical ablation procedures showed equivocal effects of procedure type on unadjusted survival.

All-cause mortality was evaluated over a median follow-up of 5.6 years. Survival was adjusted for age, sex, body mass index, septal thickness, left ventricular mass index, posterior wall thickness, New York Heart Association class, surgery year, and concomitant procedures. Although not statistically significant, patients with preoperative AF had moderately worse survival (HR 1.36) with little separation of survival curves in the first 5 years post operatively. Long-term survival in patients who underwent surgical AF ablation did not differ significantly from that of patients without preexisting AF, but unablated AF trended towards worse survival. There was no survival difference between patients with paroxysmal and persistent AF. Early postoperative AF occurred in 26.8% of study population. Patients without preexisting AF had higher incidence of new-onset AF compared to early recurrence in patients with preexisting AF with older age, thinner septa, and greater posterior wall thickness exhibiting association with early new-onset AF in this group. Furthermore, patients with early new-onset AF had higher degree of LA enlargement and mitral valve procedures. Early recurrence of AF was similar in ablation and non-ablation groups and no significant association was observed between new-onset AF and long-term survival.

Discussion

This study confirmed approximately 20% prevalence of AF in HOCM population and the association of LA size, male gender, and older age with preoperative AF. Moreover, the incidence of new-onset postoperative AF was similar with other cardiac procedures. The authors found that patients with history of preexisting AF had reduced long-term survival compared to those without preexisting AF after septal myectomy. In addition, there was no difference in survival between patients without preoperative AF and those with concomitant surgical ablation. Improved survival following concomitant surgical ablation at the time of septal myectomy is consistent with improved outcomes when ablation is performed with other cardiac procedures.5 Interestingly, survival difference was not apparent until after 5th postoperative year. Although prior studies of cardiac surgical procedures, including coronary bypass grafting, suggest that new-onset postoperative AF increases short- and long-term mortality, the present study did not find an association with early new-onset or recurrent AF and survival. It is possible, that early post myectomy AF is a temporary complication with minimal effect on long-term outcomes.[5]

At the authors' institution, PVI with LA exclusion is the procedure of choice in patients with preoperative paroxysmal AF, while Cox-maze procedure is reserved for patients with high AF burden. None of the patients undergoing either type of surgical AF ablation had early postoperative mortality supporting the safety of concomitant AF ablation. Although the authors believe that PVI is less injurious to the atrium, Cox –maze approach seems to produce better rhythm control. The number of patients and follow-up time available for analysis of the effect of surgical ablation approach on long-term survival and long-term rhythm control was limited, underpowering the ability to detect significant differences in outcome.

In addition to being performed at a single center, the study's limitations include retrospective design and small number of patients with preexisting and postoperative AF. As a result, the study was underpowered to detect differences in subgroup analysis. The lack of rhythm maintenance follow up further limited the evaluation of surgical ablation. Moreover, the effect of postoperative transcatheter ablation could not be evaluated with potential to alter patient survival compared to patients who did not undergo postoperative ablation.

Despite these limitations, this study is a valuable contribution to the literature evaluating the prevalence and incidence of preoperative AF in patients with HOCM undergoing septal myectomy. Potential impact on late survival, long-term arrhythmia control, and safety of concomitant surgical AF ablation remain major considerations at the time of septal myectomy. Additional research is needed to elucidate the effect of surgical ablation and optimal ablation techniques on post myectomy survival.

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LITERATURE REVIEWS

Dysphagia Following Cardiac Surgery: Prevalence, Risk Factors and Associated Outcomes

Authors:
Plowman EK, Anderson A, York JD, DiBiase L, Vasilopoulos T, Arnaoutakis G, Beaver T, Martin T, Jeng EI, Dysphagia Following Cardiac Surgery: Prevalence, Risk Factors and Associated Outcomes, The Journal of Thoracic and Cardiovascular Surgery (2021), doi: https:// doi.org/10.1016/j.jtcvs.2021.02.087.

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Background

Dysphagia is a potential complication of cardiac surgery especially with the use of transesophageal echocardiography (TEE). The incidence of dysphagia is wide ranging from 3-70% and is associated with increased morbidity and mortality related to aspiration pneumonia and prolonged hospitalization. While the exact mechanism in which dysphagia develops after cardiac surgery is complex, the use of intraoperative TEE, advanced age, and prolonged post-operative intubation are well known to be independent risk factors for post-operative dysphagia.[1]

Previous studies on dysphagia in cardiac surgery patients have mostly been retrospective chart reviews and the few prospective studies have mainly studied dysphagia related to TEE use.[2, 3] The authors of this study sought to perform a prospective study utilizing direct imaging of deglutition to determine the prevalence of dysphagia in cardiac surgery patients, identify risk factors for dysphagia, and evaluate the impact of dysphagia and aspiration on health care related outcomes.

Methods

The study was a single center prospective study conducted between February of 2019 to January of 2020. Patients undergoing cardiac surgery or extended thoracic surgery who were successfully extubated without positive pressure support post operatively were selected while those with pre-existing history of dysphagia based on chart review or symptom report were excluded. A total of 182 patients were included for the statistical analysis.

Selected patients underwent fiberoptic endoscopic evaluation of swallowing within 72 hours of extubation at the bedside. Patients were given various consistency liquid and solid foods per the institution's standardized protocol and video imaging was recorded. Two blinded reviewers provided ratings using a validated Penetration Aspiration Scale (PAS) and the Yale Pharyngeal Residue Severity Rating Scale (YRS) to quantify the degree of airway invasion and amount of residue during swallowing. Potential risk factors were identified, and health-care outcomes data was collected using a secure web platform.

Results

Based on PAS score, 6% of patients were deemed safe to swallow while 65% of patients were penetrators and 29% were confirmed aspirators. YRS data showed 52% of patients having clinically significant residue whereas 48% of patients demonstrated efficient swallowing. Univariant analysis showed NYHA score>3, re-operative procedure, higher number of TEE images obtained and longer intubation period to be more prevalent amongst aspirators. Multivariable analysis showed NYHA III and IV, reoperation, TEE images > 110, intubation > 27 hours to be independent risk factors for aspiration. Aspirating patients had higher odds of pneumonia, reintubation, and 90-day mortality rate.

Discussion

Dysphagia is a potential complication with significant consequences including aspiration pneumonia, prolonged hospital stay increased hospital cost, and high 90 day mortality. Previous retrospective chart review studies have demonstrated this finding whereas the authors of this paper conducted a prospective study to evaluate swallowing function using a fiberoptic video recording tool. While the exact etiology of dysphagia is complex, it is likely contributed by increased age and underlying morbidity of the patient, the use of extensive TEE and prolonged intubation. The video recordings of swallow studies demonstrated that the prevalence of dysphagia may be higher than previously thought and highlights the need for a systematic evaluation of swallowing functions post operatively. Identification of high-risk patients, use of fiberoptic scope for swallow evaluation, and intense pre and post-surgical speech rehabilitation programs are recommended to reduce the prevalence of dysphagia.

While this study is novel in that it is a prospective study with the use of a fiberoptic recordings to quantify the degree of dysphagia, it is limited in that the pre-operative dysphagia evaluation was limited to chart review rather than through the fiberoptic swallow evaluation. Therefore, it is difficult to rule out pre-existing subclinical or undiagnosed dysphagia. Second, long term follow-up was not performed therefore making it difficult to conclude whether dysphagia in the immediate post-operative period has long term sequelae. Both points are acknowledged by the authors and highlights the need for continued research in this field.

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Outcomes of Treatment Pathways in 240 Patients with Congenitally Corrected Transposition of Great Arteries

Barrios PA, Zia A, Pettersson G, et al. *Journal of Thoracic and Cardiovascular Surgery*. 2021 March; 161(3):1080-1093.e4

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Background

Congenitally corrected transposition of the great arteries (ccTGA), also known as L-TGA, is characterized by a heterogeneous range of morphologies and presentations, and treatment options are equally as diverse. It accounts for less than 1% of congenital cardiac lesions, and limited literature exists in defining outcomes and guiding treatment.[1] Current management includes expectant management, physiologic repair, anatomic repair, single ventricle repair (such as Fontan palliation), and primary heart transplant.[2] Physiologic repair indicates repair of associated cardiac defects while maintaining the morphologic right ventricle (mRV) as the systemic ventricle, and anatomic repair indicates correction of atrioventricular and ventriculoarterial discordance allowing the morphologic left ventricle (mLV) to become the systemic ventricle.[3]

The authors of this study belong to an institution with a robust history of treating ccTGA at multiple stages. Their goal was to explore the outcomes of various treatment pathways by evaluating surgical repair methods, changes in cardiac function, and long-term survival.

Methods

This study is a retrospective review of 240 patients with ccTGA who were treated at Cleveland Clinic from 1995-2000. Patients were divided based on type of definitive repair (physiologic, anatomic, Fontan, and primary transplant) or non-interventional. 46 patients who received surgical management elsewhere prior to presentation were evaluated but excluded from the cohort analyses. Prospective cross-sectional follow-up was performed with patient record review and questionnaires, and median follow-up was 10 years. Statistical analyses also accounted for the temporal effects of interventions among the different treatment pathways to provide consistency in time-dependent outcomes.

Results

Of the cohort, 40 patients underwent expectant management, and the remainder underwent definitive repair: 79 anatomic, 45 physiologic, 24 Fontan, and 6 primary transplants. For all patients, the 20-year survival after presentation was 73%. There was a high survival rate of 88% at 20 years in patients who were managed expectantly, though the authors do highlight that many eventually transitioned to physiologic repair, thus entering a separate treatment pathway. In patients who underwent definitive repair, median survival was similar among all the treatment pathways; however, transplant-free survival at 15 years for anatomic repair was 80%, and for physiologic repair was 71%. In terms of ventricular function, they determined that mLV dysfunction increased then stabilized after anatomic repair (initial prevalence of 10% that increased to 28% after 10 years), and mRV dysfunction increased after physiologic repair (65% to 84% after 10 years), despite tricuspid valve intervention.

Discussion

This study demonstrates the enormous challenge of elucidating outcomes associated with ccTGA, a rare and highly complex disease. The authors make several conclusions, notably that anatomic repair may be preferable to physiologic repair due to preservation of mLV function. In terms of the other treatment pathways, the authors note that though expectant management did show excellent outcomes, failures must also be taken into account due to the transition towards definitive surgical repair. The authors also conclude that physiologic repair results in progressive and an increased degree of mRV dysfunction, despite tricuspid valve interventions, and that Fontan palliation may also be considered a meaningful treatment option.

Several limitations are prominent in this study. Certainly, the characteristics of ccTGA pose many constraints; disease rarity results in small sample size, and disease heterogeneity presents many confounding factors. The authors also admit an institutional preference for early anatomic repair, which may have skewed data towards that treatment pathway. Additionally, patients' records spanning 65 years were reviewed for this study, and disease management over such a long period of time brings into question the impact of surgical, medical, and diagnostic advances that have occurred.

Though kudos must be given to the authors for tackling such an immensely complicated dataset, it would be beneficial to further clarify the results supporting their conclusions. Their main conclusion depends on two points. Firstly, that anatomic repair shows better survival compared to physiologic repair; however, the Kaplan-Meier curve describing this contrast also presents a P-value of 0.09, questioning its statistical significance. Secondly, that there exists a relationship between ventricular dysfunction and long-term survival, as it was determined that mLV function stabilized with anatomic repair while mRV function worsened with physiologic repair. It would be helpful to understand how ventricular dysfunction was evaluated, as statistical analyses processed ventricular dysfunction as binary variables (i.e. dysfunction versus no dysfunction), and the nuances of diagnostic assessment were not described.

Finally, the authors do recognize that this study is limited by its retrospective observational nature and recommend a need for prospective studies that are protocolized and multi-institutional. This would better illuminate the causative relationships between clinical management and long-term survival, though this will indeed be a challenge for a disease like ccTGA.

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The Strongest Rick Factor for Operative Mortality in Acute Type A Aortic Dissection is Acidosis: Validation of a Risk Model

Ong CS, Na L, Yesantharao P, et al. Semin Thorac Surg. 2020; 32:674-680=

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Background

Acute Type A aortic dissection (ATAAD) carries with it a host of severe and potentially lethal complications including stroke, acute aortic regurgitation, end-organ malperfusion, aortic rupture, and coronary ischemia. As such, emergent surgical repair is generally considered to be the standard of care in these cases. In spite of this practice, ATAAD is associated with a high inpatient mortality rate, approaching 30% in some studies.[1,2] Efforts have been made to risk-stratify patients presenting with ATAAD in order to determine if certain patients would benefit from medical optimization prior to definitive repair, largely using risk factors identified from databases like the International Registry of Aortic Dissection (IRAD) and the Society of Thoracic Surgeons (STS). In 2018, Lawton and colleagues proposed an algorithm that took into account preoperative acidosis (base deficit) and organ malperfusion to risk-stratify patients with ATAAD and determine which patients would benefit from emergent aortic repair and which may be better served by fenestration or other efforts to correct the malperfusion before proceeding with surgery.[1] The current study by Ong, et al. is an attempt to validate this algorithm at a second institution.

Methods

The authors included all patients who underwent ATAAD repair at Johns Hopkins Hospital from 2/1997 through 1/2018. Preoperative lab values were obtained for up to two weeks prior to surgery, including the nadir pH, bicarbonate level, and base deficit. Patients were stratified into four groups based on the nadir base deficit (<-10, -10 to -5, -5 to 0, >0) which corresponded to severe, moderate, mild, and no acidosis, respectively. Data on end-organ malperfusion were based on physical exam or radiologic imaging collected by chart review, and patients were divided into renal, intestinal, cerebral, extremity, or coronary malperfusion.

Results

A total of 298 patients were included in the analysis. Of these, 43 patients (14%) died postoperatively and 96 patients (32%) had evidence of malperfusion. 192 patients had evidence of moderate to severe acidosis (base deficit -5 or greater), and those with severe acidosis had a higher perioperative mortality rate (36.7%, n=18) compared to those patients with moderate acidosis (14.7%, n=21, p=0.001). No statistically significant difference was found in the mortality rate of those patients with clinical evidence of malperfusion and either moderate or severe acidosis (18% vs 27%, p=0.46). However, in patients with no clinical malperfusion, severe acidosis was associated with a significantly increased mortality rate compared to those with moderate acidosis (41% vs 13%, $p<0.001$).

Univariable analysis of the data identified a host of risk factors for perioperative mortality in ATAAD, including coronary malperfusion, preoperative intubation, Caucasian race, history of myocardial infarction, congestive heart failure, preoperative New York Heart Association class, cardiogenic shock, diabetes mellitus, hemodialysis, hypertension, chronic lung disease, peripheral vascular disease, elevated BMI, advanced age, previous CABG, and preoperative base deficit. Applying multivariate logistic regression identified three variables as significant risks for mortality: preoperative base deficit, diabetes mellitus, and advanced age. Of these, severe acidosis carried the highest risk of perioperative mortality with an odds ratio of 13.9 ($p=0.001$).

Discussion

Similar to the aforementioned study by Lawton, et al., this paper found severe preoperative acidosis to be a strong predictor of perioperative mortality following ATAAD. The authors have incorporated this as well as secondary risk factors identified by their group and the Lawton group into a proposed algorithm for assessing patients with ATAAD (Figure 1). Using this pathway, those patients with severe acidosis due to abdominal malperfusion would be guided towards alternative therapies to treat their malperfusion (catheter-based or surgical fenestration) and/or normalize their acidosis while delaying definitive surgical repair, which has been suggested by other investigators as a method to improve outcomes in ATAAD patients with malperfusion.[3] The significant contribution of this study is the use of base deficit, a readily obtained quantitative measure of acidosis, as a surrogate for evidence of malperfusion, the diagnosis of which is traditionally based upon symptoms and/or physical exam, both of which can be highly subjective. It may be beneficial, going forward, to include preoperative base deficit in the data collected by major aortic dissection databases so that its predictive role can be further refined.

The current study faced several limitations, the most prominent of which is its nature as a single-institution, retrospective analysis with a relatively small number of subjects. Additionally, it was difficult from the patient charts available to the authors to determine what, if any, treatments for preoperative acidosis and malperfusion may have been instituted by the primary team in the preoperative period.

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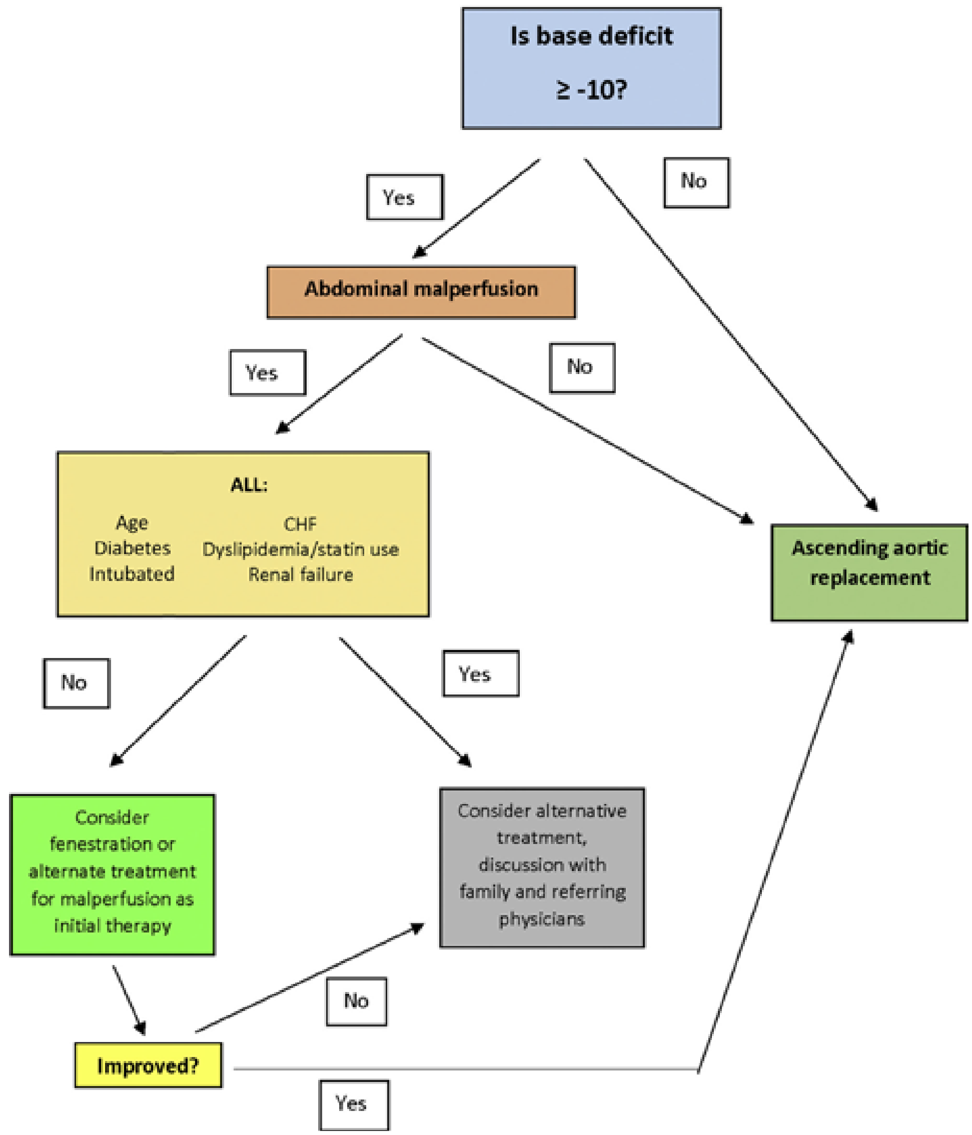
Proposed Algorithm for the Treatment of Acute Type A Aortic Dissection



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PRO / CON DEBATE

PRO CON

Tidal Volume 8 ml/kg During One-Lung Ventilation is Not Only Safe but it is Preferred

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The management, practice, and implementation of positive pressure ventilation (PPV) has been the subject of discussion and debate for decades. Adequate gas exchange, achieved by adjusting respiratory rate (RR) and tidal volume (TV), is balanced with the risk of ventilator-induced lung injury (VILI) due to barotrauma, volutrauma, and atelectrauma.

In lab models, VILI occurs after 2 days of PPV using tidal volumes between 30 to 50 ml/kg and airway pressures between 40-50 cmH2O.[1,2] Histologically, there is endothelial dysfunction, protein-rich pulmonary edema, hemorrhage, and inflammation.[1,2,3,4,5] While it is evident that extremely high TV and airway pressures cause injury, it is equally clear that too little TV causes atelectasis, lung injury, and adverse outcome.[6,7]

Although VILI was first noted in the 1950s, interest soared after the publication of two landmark studies in 1998 and 2000 that reported mortality reduction for patients with ARDS when using 'Protective Lung Ventilation' (PLV) compared to 'Conventional Lung Ventilation' (CLV).[8,9] PLV included low or 'physiologic' tidal volume (TV; < 6 ml/kg; predicted or ideal body weight; PBW) and low airway pressure (mean airway pressure < 30 cmH2O, peak inspiratory pressure [PIP] < 30-40 cmH2O; plateau pressure [Ppl] < 30-35 cm H2O;), while CLV included 12 ml/kg.[8,9] Due to the occurrence of hypercarbia and atelectasis, low TV requires a higher respiratory rate, application of positive end-expiratory pressure (PEEP), and lung recruitment maneuvers (6,10). Although Amato et al reported a large mortality benefit of PLV at 28 days (38% vs 71%), 7 patients in the CLV group died within 24-36 hours of the study's onset, and there was no difference in survival at hospital discharge.[8] In the ARDSnet study, the mortality of PLV (31%) and CLV (39%) was similar to the PLV group reported by Amato et al. Notably, in the ARDSnet study, the airway plateau pressures in the CLV group were kept between 45 and 50 cmH2O, which are known harmful airway pressures.[9,11]

Other studies have shown no benefit of PLV on the outcome of ARDS.[3,7,12] Further, these studies have shown that inflammation is less and outcomes are better with higher TV and low plateau airway pressure (< 30cmH20).[3,7,12,13] A meta-analysis showed a parabolic effect of plateau airway pressures and tidal volume with lowest and highest TV and airway pressures associated with adverse outcome, while PLV per se was not associated with improved outcome.[7] Despite the enthusiastic adoption of PLV, overall mortality for patients with ARDS has not declined over the last 20 years and remains at 30-40%.[3,12]

Since pulmonary failure accounts for <15% of deaths in patients with ARDS, scientists speculate that barotrauma, volutrauma, and atelectrauma that causes pulmonary inflammation, will also result in systemic biotrauma, systemic inflammation, non-pulmonary organ dysfunction, and mortality.[8,14]

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PRO CON

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However, cytokine studies have not been consistent with regard to levels of inflammatory mediators during PPV, with pulmonary levels of Tumor Necrosis Factor-a (TNFa) ranging from 10 to 1000 pg/ml, and interleukin 6 (IL-6) ranging from less than 100 pg/ml to greater than 1500 pg/ml from different studies using the same experimental conditions, and sometimes the same researchers.[15,16,17,18,19]

Tidal volumes affect inflammation differently. Tremblay et al reported that ventilating rats with TV during TLV of 7 and 15 ml/kg was associated with minimal increases in cytokines compared with TV of 40 ml/kg.[15] Whitehead et al varied tidal volumes from 7 to 15 to 40 ml/kg with PEEP for two hours and reported lower inflammatory mediators in the 7 and 15 ml/kg TV groups. However, after intra-tracheal injection of lipopolysaccharide, a model for ARDS, pulmonary levels of TNFa and macrophages were lower for the highest TV ventilation (40 vs 7 ml/kg), suggesting a protective effect of higher TV ventilation in an ARDS model.[19]

Adoption of ICU PPV management for the OR environment lacks evidence and sound reasoning. The lung in the patient with ARDS is smaller, less compliant, and described as a heterogenous mixture of consolidated/atelectatic lung, bullous lung, and relatively normal lung. The relatively normal lung component in the ARDS lung is at risk for over-distention during positive pressure ventilation even with low TV ventilation. By comparison, the healthier, larger homogenous, and compliant lung allows a more uniform delivery and spread of the same tidal volume with less alveolar stress.

Even advocates of PLV recognize that low TV ventilation results in hypercarbia and atelectasis, both associated with adverse outcome, often necessitating higher RR, PEEP, and recruitment maneuvers.[6,14,20] While most patients tolerate mild hypercarbia, data demonstrate an association between hypercarbia and renal dysfunction,[14] and, more recently, diaphragmatic weakness.[20] To counter this problem, the respiratory rate is increased. The phasic closing and reopening causes alveolar stress, strain, and injury resulting in reduction in surfactant, inflammation, and bacterial growth, which may lead to systemic inflammation.[3,5,10,12,21,22,23,24,25,26] During low TV ventilation, the respiratory rate is most often increased to 15 to 20 breaths-per-minute, increasing alveolar opening and closing stress.[22] When piglets were ventilated with an extremely high TV of 38 ml/kg for 54 hours, lethal pulmonary edema occurred but only when the respiratory rate was increased > 15 breaths per minute.[23] Lower respiratory rates did not result in pulmonary edema.[23]

Perioperative atelectasis occurs in up to 75% of patients, causing alveolar collapse, depletion of surfactant, inflammation, bacterial growth, pneumonia, morbidity, and mortality.[3,4,5,10,21,29,30] Atelectasis is reversible with larger tidal volumes and/or by performing "periodic deep breaths capable of providing effective expansion of the lungs or 'hyperinflation'".[6] Animal data support the safety and benefits of higher TV during TLV equivalent to OLV of > 8 ml/kg. A gradual titration of TV from 6 to 22 ml/kg in an animal model was associated with less atelectasis, less alveolar damage, less interstitial edema, and less inflammation compared to either the control group (TV 6 ml/kg) or when the TV was abruptly increased from 6 to 22 ml/kg.[31] Broccard et al, using animals, compared 6 vs 18 ml/kg TV during TLV and reported significantly less hemorrhage, lung edema, and lung weight gain with a higher TV as long as

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PRO CON

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mean airway pressure was low (13 vs 22 cmH2O).[32]

THORACIC

Patients undergoing thoracic and upper abdominal surgical procedures have a 40-50% decline in lung function. These dysfunctions are mainly due to atelectasis, alveolar collapse and subsequent reduction in alveolar gas exchange.[3,4,5,10,21,29,30] For patients requiring OLV, ARDS is reported in up to 2% of cases and usually occurs on the dependent or non-operated lung.[33] However, greater composite injury (e.g. pneumonia) occurs in the operated lung.[34] Since the enthusiastic adoption of PLV, clinicians have asked how to manage PPV during thoracic cases requiring OLV. While 'small tidal volume' has been suggested during OLV, it is clear that TV < 5 or even < 6 ml/kg (predicted body weight; PBW) isn't beneficial alone due to atelectasis/alveolar collapse, and resultant alveolar inflammation.[27,31]

'Small tidal volume' (< 5 ml/kg), or 'Protective one lung ventilation' (POLV) during OLV results in hypercarbia, atelectasis/alveolar collapse, inflammation, and morbidity.[31] Higher TV (> 8 ml/kg), or 'conventional OLV' (COLV), results in better ventilation, less dead space, and lower PaCO2.[35,36,37,38] Oxygenation, or PaO2/FiO2, is either better or similar using higher TV ventilation as compared to low TV.[35,36,37,38,39] Because there is less atelectasis with higher TV, pulmonary compliance is better.[35,39]

Slinger et al reported increases in auto-PEEP (and therefore total PEEP) when changing from TLV to OLV, in part related to reduced expiratory time i.e. increased respiratory rate which may not be interpreted accurately by anesthesia ventilators.[40,41] In addition, increased respiratory rate and lower tidal volume impaired exchange of respiratory gases.[41] While maintaining the same minute ventilation and varying the respiratory rate from 5 to 15/min, the higher tidal volume (1234 ml vs. 433 ml) resulted in more efficient CO2 excretion, while lower TV and higher respiratory rate resulted in auto PEEP, ventilatory dead space, and higher PaCO2.[53] Superior oxygenation and CO2 excretion were reported during Video Assisted Thoracic Surgery (VATS) with COLV (TV 10ml/kg; PEEP 0 cmH2O, RR 9/min) compared to POLV (TV 6 ml/kg; PEEP 5 cmH2O; respiratory rate 14/min).[36] Katz et al compared low (7 ml/kg) and high (14 ml/kg) tidal volumes with varying PEEP (0 vs. 10 cmH2O) during OLV.[39] Systemic oxygen levels and right-to-left pulmonary shunt was less during large TV and no PEEP ventilation.[39] Although peak airway pressures were higher, pulmonary compliance was better with the higher TV due to reduced atelectasis.[39]

Intraoperative alveolar/lung inflammation increases for both POLV and COLV, however, a connection between degrees of alveolar inflammation, mode of ventilation, and outcome has not been conclusively demonstrated.[36,37,42,43,44] Inflammatory markers, postoperative function and outcomes are similar in both groups.[36,37] Data shows same or less inflammation for COLV (10ml/kg x 9 breaths/min) compared to POLV (5 ml/kg TV x 15 breaths/minute) during surgery and also two hours after surgery.[37,44]

The impact of tidal volume ventilation during thoracic surgery and OLV was retrospectively analyzed in 1019 patients.[45] Patients were ventilated, during OLV, with TV ranging from 5 to > 8 ml/kg. Multivariate analysis reported the incidence of respiratory complications and non-respiratory morbidity and mortality was decreased 16% per 1 ml/kg increase in TV during OLV.[45] There was also a 3.4% increase risk of adverse outcome with each 1cm H2O increase in driving pressure (Ppl - PEEP). Overall, there was a biphasic effect

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PRO CON DEBATE

regarding driving pressure i.e. low and high driving pressure was associated with adverse pulmonary outcomes.[45] Rauseo et al titrated PEEP upward and reported best oxygenation at 6 cmH2O PEEP with TV between 6-8 ml/kg to yield a driving pressure of 20cmH2O during OLV.[46] The 'open-lung' approach including individualized PEEP and assessment of driving pressures yielded better oxygenation and higher pulmonary compliance.[47] In a double-blinded randomized study comparing 'traditional POLV' (TV 6 ml/kg, PEEP 5 cmH2O, and recruitment) was compared to management based on driving pressure (DPOLV), pulmonary complications were significantly less in the DPOLV group (5.5% vs 12.2%).[48] Current POLV strategies fail to protect the lung.

Consistent with prior data, a high TV with low Ppl, or driving pressure, yields the best outcome.[32,45,48] Preventing atelectasis and VILI requires a balance between adequate TV, respiratory rate, and airway pressure. When assessed by Electrical Impedance Tomography (EIT), Liu et al reported that optimal PEEP ranged from 9-13 cmH2O during OLV which resulted in maximum lung inflation.[49] Elsewhere, using EIT to assess TV and RR changes during OLV, dropping TV stepwise from 8 to 5 and increasing RR stepwise from 12 to 20 respectively caused significant reductions in aeration, oxygenation, and global compliance.[61] Based on blood gas analysis, EIT data, and outcome, TV < 5 ml/kg during OLV does not compare favorably to TV > 8 ml/kg.[50]

DATA AGAINST

While there is data reporting better results with low TV (5-6ml/kg) during OLV, these data were either not conclusive regarding outcome and/or did not control for other important variables.[51,52,53,54] The use of POLV during minimally invasive esophagectomies was associated with lower inflammatory mediators and extravascular lung water, though the authors did not conclude morbidity or mortality benefits.[51,53] In these studies, low TV patients are managed with PEEP and recruitment maneuvers while neither are employed during higher TV (> 8-10 ml/kg) patients.[51,52,54] Perhaps these data only show benefits of PEEP and recruitment maneuvers during OLV and not low TV. Furthermore, there was no data on perioperative pain and sedation scores after surgery.[51,52,54] Clinical investigations that did not keep variables, such as recruitment and PEEP, constant, and/or did not report on postoperative pulmonary complications, pain, and sedation management cannot conclude that low TV reduces postoperative morbidity.[35,55,56]

CLINICAL CONSIDERATION

Those who argue whether barotrauma or volutrauma is more important ignore the relationship between lung and total respiratory system elastance (EL/ETOT), airway pressures (PIP, Ppl), and transpulmonary pressure.[57] For the person with a normal elastance, a Ppl of 30 cmH20 might yield a transpulmonary pressure of 24 cmH20 and a maximally inflated lung.[57] However, for an obese patient the elastance may be lower such that a Ppl of 30 cmH20 would yield a transpulmonary pressure of < 10 cmH20 and be associated with lung collapse and hypoxemia.[57] Before adjusting ventilator settings, it is best to first consider the individual total elastance (compliance) and that individual decisions regarding TV, RR, Ppl are necessary to prevent atelectasis and alveolar stress. Additional settings including PEEP, perhaps guided by driving pressures, and the application of recruitment maneuvers become critical components of respiratory care.[34,46,47,58]

(continued)

CONCLUSIONS

High airway pressures (> 45 cmH2O) and extremely high TV (> 30-40ml/kg) are known to cause lung inflammation and injury, especially when applied for durations longer than 48 hours. Increasing RR also causes phasic alveolar stress. The arbitrarily determined low TV (< 5 or 6 ml/kg) with an increased RR during OLV is not supported by outcome data. Higher TV (> 8 ml/kg) while maintaining acceptable airway pressures provide the best protection from VILI while optimizing gas exchange and minimizing atelectasis. Ventilator settings should consider the total pulmonary elastance to help predict transpulmonary gradients to allow full lung inflation. Tidal volumes > 8 ml/kg during OLV while maintaining Ppl < 30 cmH2O, and/or driving pressures < 20-25 cmH2O, with PEEP and recruitment maneuvers should be considered protective. Regarding outcome, the intraoperative period is a part of the perioperative period and pulmonary therapies must continue during the postoperative period to prevent atelectasis.

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Echo Corner

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Case History

72-year-old male with past medical history significant for aortic stenosis, known heart murmur, coronary artery disease status post percutaneous intervention to the left circumflex and posterior descending artery, and known anomalous right coronary artery with high anterior takeoff presented with worsening fatigue and lower extremity edema over the past few months. He also reported angina on exertion. The patient presented to the operating room for aortic valve replacement. Intraoperative TEE imaging was used for management and guidance. Further inspection showed an unusual finding in the deep transgastric long axis view (Figure 1 and Video 1).

>

VIEW ECHO CORNER WITH VIDEOS

QUESTION 1

What explains the unusual finding in this image?

A. Mitral valve prolapse
B. Papillary muscle rupture
C. Subaortic cystic mass
D. Bicuspid aortic valve

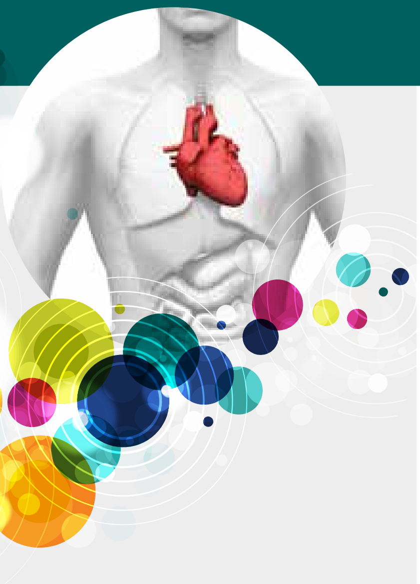
QUESTION 2

In this 3D image (Video 2 & 3), where is the point of attachment of the mass?

A. Anterior Mitral Leaflet
B. Posterior Mitral Leaflet
C. LVOT
D. Aortic Valve

(continued)

>> ***Please Note: Answers & Explanations on Second Page***



Answer/Explanations

VIEW ECHO CORNER WITH VIDEOS

QUESTION 1: ANSWER C

This mass shows a structure with a well circumscribed wall and central lucency, consistent with a cyst with tethered attachment points.

QUESTION 2: ANSWER A

In this modified LVOT 3D image, the cystic mass shows an attachment point to the base of the anterior leaflet, with displacement into the LVOT during ventricular diastole.

EXPLANATIONS

Accessory mitral valve tissue and cystic masses have been reported rarely in the literature. These types of tissues or masses have an increased risk of left ventricular outflow tract obstruction. Other complications include syncope, sudden death, embolic stroke and valvular dysfunction (1). Despite these possible complications, intracardiac cysts are often congenital asymptomatic findings that regresses spontaneously making them rare in adults (2) though they have also been confirmed in infant and fetus autopsies (3). The exact etiology of these lesions is still poorly understood (1). Congenital blood cysts are most commonly found on the mitral and tricuspid valves in fetuses and infants (4). As these lesions are rare, there are no clear guidelines for management of these incidental findings. The consensus suggests that surgery should be reserved for symptomatic lesions (3).

Our patient presented with worsening fatigue and lower extremity edema over a few months. He had known past medical history significant for aortic stenosis, coronary artery status post percutaneous intervention, and sleep apnea. He also had a known heart murmur for 20 years that was described as a mid-systolic murmur of grade 5/6 at the right upper sternal border radiating to the neck. In this patient, transthoracic echo showed severe aortic stenosis with mild-to moderate aortic insufficiency, mild mitral valve regurgitation with a mass or cystic type structure extending from the LVOT. As the patient presented to the OR for SAVR, intraoperative TEE was utilized to better define the mass, its attachment point, and more precise size. The mass was approximately 3.5cm with a cystic balloon type structure that had a cord-like attachment to the anterior mitral leaflet and to the anterolateral wall of the left ventricle. The patient was safely cannulated, and cardiopulmonary bypass was initiated. After aortotomy, both coronary ostia were noted to be widely patent. The mass was removed from the underside of anterior leaflet and a long cord was cut from the anterolateral wall of the left ventricle. The patient underwent an aortic valve replacement with a #21 Edwards Inspiris Tissue Valve. The patient was separated successfully from cardiopulmonary bypass and transferred to the ICU, on low dose vasopressor support. The patient was extubated, recovered without incident and was later discharged home.

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