SCA NEWS

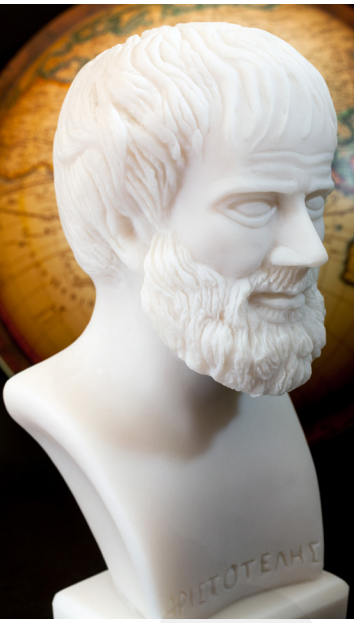
SOCIETY OF CARDIOVASCULAR ANESTHESIOLOGISTS
Knowledge • Care • Investigation

Volume 33, Number 17
October 2022

PRESIDENT'S MESSAGE

Special Thank You to Dr. Abernathy – Contributor to the President's Message

"The whole is greater than the sum of its parts." – Aristotle



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

Cardiac anesthesiologists are amazing collaborators. Every day we coordinate care, lead operative teams, discuss complex hemodynamic management with surgical colleagues and guide interventionalists providing catheter-based therapies.

The SCA is a strong society with nearly 4,000 members. We host an annual meeting with 1,200 participants from 23 nations. We lead the world in the education of intraoperative and intraprocedural echocardiography. We cultivate the creation of new knowledge through research grants totaling almost $500,000 annually. We groom the next generation of healthcare leaders through transformative grants like the Kaplan Award and by offering leadership opportunities within our society.

The Society believes that we alone cannot advance how we care for patients, improve outcomes, transform education or reach new research heights. **We are made better when work together with our surgical colleagues to transform medicine.** Thankfully, the Society of Thoracic Surgeons and the American Association of Thoracic Surgery are in alignment. Our partnerships extend far beyond the operating room.

The leadership of the SCA and the AATS are excited to announce that in 2024, for the first time ever, we will hold our annual meetings in the same city at the same time! No more closed ORs with too many anesthesiologists or too many surgeons with too few anesthesiologists! A special thanks to Dr. Mary Beth Brady and the entire Scientific Program Committee (SPC) for their creativity and collaboration as the SCA and the AATS build a groundbreaking educational experience for our members. Each annual meeting will maintain its own identity and will offer many opportunities for collaborative education. Thank you to Drs. Yolanda Colson and Lars Svensson for their transformative leadership of the AATS.

Our transformative partnership with the STS and the STS / SCA database is steadily increasing member participants and cases. The recently announced and implemented Participant User File (PUF) process provides SCA members funding and access to these data in order to ask and answer important questions. Thank you to Drs. Bruce Bollen, Miklos Kertai and Danny Muehlschlegel for their vision and leadership.

Other important collaboratives include the annual STS Perioperative and Critical Care Conference which is co-sponsored by the SCA. Both the AATS and the STS are committed to collaboration through shared governance. Anesthesiologists serve on STS and AATS committees and surgeons serve in the SCA.

The SCA's voice is amplified through our strategic collaborations. Our patients, anesthesiologists, and surgeons are the beneficiaries. Together, we are better.

Together we are Better

Jake Abernathy, III

PoCUS Hands-on Workshop

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POCUS 2023

February 20, 2023
Atlanta, Georgia

Join Us for the 2023 PoCUS Hands-On Workshop

We hope to see you on **February 20, 2023, in Atlanta, Georgia** for the upcoming Perioperative Ultrasound Course: Hands-On Workshop!

The SCA Perioperative Ultrasound Course offers training in utilizing basic clinical ultrasound to assist in clinical assessment and decision making and to guide percutaneous procedures. This reverse classroom–style program gives participants the opportunity to learn ultrasound skills through an hands-on workshop.

Attendees will gain practical knowledge from subject-matter experts on how to perform safe ultrasound procedures.

Registration NOW Open!

Check out the PoCUS website page for more information on the course.

CLICK HERE TO REGISTER

FEBRUARY 17-19, 2023 · ATLANTA, GEORGIA

It's time to register for the 2023 Echo Week!

CLICK HERE TO REGISTER

Here's What is Planned for the 3 Days of Echo Week:

FRIDAY, FEBRUARY 17, 2023

All Times in Eastern Standard Time

6:45 AM – 7:20 AM	Breakfast
7:20 AM – 8:50 AM	**Echo Anatomy for Surgical Decision Making - Learning From the Experts**
9:00 AM – 10:45 AM	**3D SYMPOSIUM**
9:00 AM – 9:20 AM	3D Imaging Basics
9:20 AM – 9:40 AM	Echo Dissection – How I Do Multiplanar Reconstruction
9:40 AM – 10:00 AM	When is 3D Better than 2D?
10:00 AM – 10:30 AM	Case Based – 3D to the Rescue
10:30 AM – 10:45 AM	Q&A
10:45 AM – 11:00 AM	BREAK
11:00 AM – 12:30 PM	**DECISION MAKING IN AORTIC VALVE SURGERY**
11:00 AM – 11:20 AM	Data Discordance in Patients with Aortic Stenosis
11:20 AM – 11:40 AM	Is this Valve Repairable? The When/Who/What/Where/How Answer
11:40 AM – 12:00 PM	How to Evaluate the Eponymous Procedures on Echo? The Ross, Davis, Ozaki, and Konno
12:00 PM – 12:30 PM	Q&A
12:30 PM – 1:30 PM	Lunch or Industry Sponsored Symposium
1:30 PM – 3:30 PM	**MCS AND TRANSPLANT**
1:30 PM – 1:50 PM	Echo Guided Decision Making for LVAD Implantation
1:50 PM – 2:10 PM	Echo Guidance for Temporary MCS
2:10 PM – 2:30 PM	VA, VV, VAV, VVA: Who, What, When, and Why?
2:30 PM – 2:45 PM	Imaging for Lung Transplantation
2:45 PM – 3:00 PM	Imaging for Heart Transplantation
3:00 PM – 3:30 PM	Q&A
3:30 PM – 3:45 PM	BREAK

continued

FRIDAY, FEBRUARY 17, 2023 (continued)

3:45 PM – 5:45 PM	**Decision Making Tricuspid Valve Surgery**
3:45 PM – 4:05 PM	Advanced Imaging of the Tricuspid Valve Apparatus
4:05 PM – 4:25 PM	Clinical Decision Making in Functional TR
4:25 PM – 4:45 PM	Classification of TR - Traditional and Expanded
4:45 PM – 5:15 PM	Case Based (Unanticipated Moderate TR, Post OP TR)
5:15 PM – 5:45 PM	Q&A
5:45 PM – 6:00 PM	BREAK
6:00 PM – 7:30 PM	**3D Image Acquisition and Optimization- Learning from the Experts**

SATURDAY, FEBRUARY 18, 2023

6:45 AM – 7:20 AM	Breakfast
7:20 AM – 8:50 AM	**3D Post Processing - Learning from the Experts**
8:50 AM – 9:00 AM	BREAK
9:00 AM – 11:30 AM	**IT IS ALL ABOUT THE MITRAL VALVE**
9:00 AM – 9:25 AM	Mitral Echocardiography – How to Add Value
9:25 AM – 9:40 AM	Proportionate vs Disproportionate MR
9:40 AM – 9:55 AM	Atrio-Functional MR
9:55 AM – 10:10 AM	Mitral Stenosis
10:10 AM – 10:30 AM	Echo and Anatomic Consideration for Percutaneous Mitral Valve Edge-to-Edge Interventions
10:30 AM – 11:00 AM	Mitral Valve: Memorable Cases
11:00 AM – 11:30 AM	Q&A
11:30 AM – 12:00 PM	Lunch
12:00 PM – 12:40 PM	**WEYMAN LECTURE**
12:40 PM – 1:00 PM	Q&A
1:00 PM – 1:15 PM	BREAK
1:15 PM – 3:45 PM	**CLINICAL DILEMMAS – NOW WHAT?**
1:15 PM – 1:45 PM	Clinical Dilemmas - Repair or Replace Functional MR
1:45 PM – 2:15 PM	Clinical Dilemmas - The Challenging Mitral Valve Repair
2:15 PM – 2:45 PM	Clinical Dilemmas - Unanticipated Moderate MR?
2:45 PM – 3:15 PM	Clinical Dilemmas - HOCM will Septal Myectomy be Enough?
3:15 PM – 3:45 PM	Q&A
3:45 PM – 4:00 PM	BREAK
4:00 PM - 6:20 PM	**CLINICAL DILEMMAS: SHOULD WE RE-INTERVENE?**
4:00 PM – 4:30 PM	New Findings After Mitral Valve Replacement
4:30 PM – 5:00 PM	Mitral Regurgitation After Mitral Valve Repair
5:00 PM – 5:30 PM	Dagger to the Heart - Post-CPB LVOT Gradients
5:30 PM – 6:00 PM	There is Something Wrong with my New Valve
6:00 PM – 6:20 PM	Q&A
6:30 PM – 7:30 PM	**ASE COCKTAIL HOUR**

continued

SUNDAY, FEBRUARY 19, 2023

6:45 AM – 7:20 AM	Breakfast
7:20 AM – 8:50 AM	**Echo Anatomy for Structural Heart Decision Making Learning From the Experts**
8:50 AM – 9:00 AM	BREAK
9:00 AM – 11:15 AM	**CASE-BASED STRUCTURAL HEART TEAM SYMPOSIUM ASE@SCA**
9:00 AM – 9:20 AM	Challenges during Left Atrial Appendage Occlusion
9:20 AM – 9:50 AM	Percutaneous Tricuspid Edge-to-Edge Repair
9:50 AM – 10:10 AM	Transcatheter Electrosurgery
10:10 AM – 10:35 AM	Percutaneous Mitral Repair
10:35 AM – 11:00 AM	Percutaneous Mitral Replacement
11:00 AM – 11:15 AM	Q&A
11:15 AM – 11:30 AM	BREAK
11:30 AM – 12:50 PM	**CONGENITAL HEART SYMPOSIUM**
11:30 AM – 11:50 AM	Plumbing Basics: Imaging of the Common Defects
11:50 AM – 12:10 PM	Plumbing Basics: Imaging of the Common Repairs
12:10 PM – 12:20 PM	Help Me Understand the Plumbing! A Case of Congenital Patient for Adult Heart Transplant
12:20 PM – 12:30 PM	Help Me Understand the Plumbing! A Case of Congenital Patient for Adult LVAD
12:30 PM – 12:50 PM	Q&A
12:50 PM – 1:30 PM	Lunch
1:30 PM – 3:00 PM	**FUTURE DIRECTIONS**
1:30 PM – 1:45 PM	A Decade Later–Board Review for the Seasoned Echocardiographer Sitting for Recertification
1:45 PM – 2:05 PM	Artificial Intelligence in Echo
2:05 PM – 2:25 PM	Right Ventricle Assessment: New Frontiers
2:25 PM – 2:45 PM	Multimodal Imaging in Structural Heart Procedures – Is it a Unique Skill Set?
2:45 PM – 3:00 PM	Q&A

For any exhibitor or sponsor questions please contact:

Matt Van Wie
Manager, Corporate & Educational Support
(804) 240-3839
(804) 550-0695 fax
matt@esvw.com

Registration is NOW Open!

Cardiovascular Outcomes Research in Perioperative Medicine

MAY 5, 2023 | PORTLAND, OREGON

COR-PM

Registration opening in November

Join Us for the Second Annual COR-PM Meeting

SCA is excited to announce it's second annual Cardiovascular Outcomes Research in Perioperative Medicine (COR-PM) meeting to be held during the SCA Annual Meeting & Workshops in Portland, Orgeon.

More Information Coming Soon!

Registation opens in early November 2022.

Cardiovasular Outcomes Research in Perioperative Medicine

THORACIC ANESTHESIA SYMPOSIUM & WORKSHOPS

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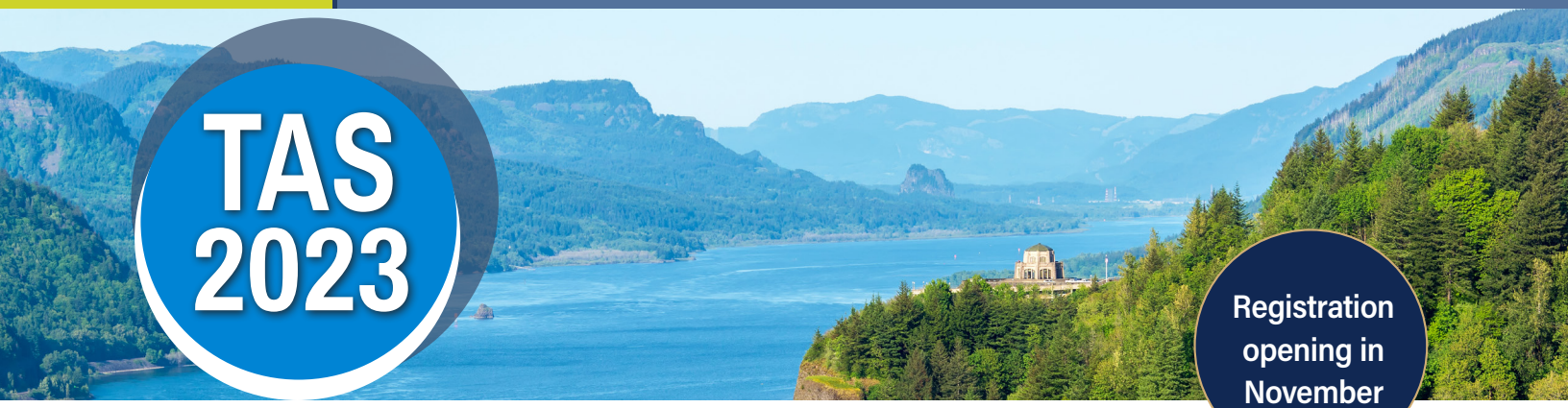

Join Us in Portland, Oregon on May 5, 2023

The Thoracic Anesthesia Symposium & Workshops will be a day of lectures, workshops, and mentoring through both PBLDs and resident/fellow sessions.

The TAS Planning Committee is looking forward to seeing you in Portland, Oregon on May 5, 2023. Registration opens in early November.

TAS PBLDs and Abstract Submission

Call for Submissions Closes on December 1, 2022!

The Society of Cardiovascular Anesthesiologists invites the submission of abstracts and difficult cases to be presented at the upcoming 11th Thoracic Anesthesia Symposium and Workshops in Portland, Oregon on May 5, 2023.

Important Dates

- Submission system closes at 5:00 pm (Central) on December 1, 2022.
- Additional submissions will not be accepted after the submission system closes
- If you do not receive email confirmation of your abstract submission within 30 minutes of finalizing your abstract submission, please contact SCA Member Services for assistance: selery@veritasamc.com
- Co-Authors must complete their disclosure forms by December 1, 2022.
- Notifications regarding abstract selection will be sent in January 2023.

CLICK HERE TO SUBMIT ABSTRACT

Visit **TAS Abstracts & PBLD** to view the call for submission guidelines and start your online submission.

Questions? Contact selery@veritasamc.com

SCA 2023

Annual Meeting & Workshops – May 6-9

Portland, Oregon

Now is the time to start planning to join us in Portland, Oregon for the latest cardiothoracic anesthesia information through fantastic plenary sessions, controversial panel discussions, pro-con debates, hands-on workshops, mentoring sessions, and problem-based learning sessions.

Registration opens in November

Learn from abstract presentations, the popular Super Echo Panel, a special session from the History Task Force, and the Gala Event to help fund the SCA Endowment.

Don't miss out on this fantastic meeting in Portland, Oregon!

Registration opens in early November 2022. **Click Here to view the 2023 schedule at a glance.**

Early Career Investigator Award

The Research Committee will select the top five eligible abstracts to receive an SCA Early Career Investigator Award. Each recipient will be recognized during the SCA Annual Meeting and in the SCA Newsletter. The single best abstract will be identified by announcement of the prizewinner during the Annual Meeting.

Priority will be given to studies that elucidate the pathophysiology of cardiac, thoracic, or vascular disease or explore novel therapeutic possibilities based on mechanisms of disease.

SCA will notify you of the status of your application in January 2023.

For general rules and eligibility requirements, please contact Kerim Oz at kerim@veritasamc.com

Annual Meeting PBLDs and Abstracts

Submit Your SCA Abstract Before It's Too Late!

Deadline: December 1, 2022, 11:59 PM EST

The Society of Cardiovascular Anesthesiologists invites the submission of abstracts for presentation at the SCA 2023 Annual Meeting & Workshops on May 6-9, 2023.

Scientific Abstracts

- Instructions for Online Abstract Submission can be found **here.**
- Co-Authors must complete their bio and disclosure forms by December 1, 2022. The submission will not be reviewed unless all listed authors complete a bio and disclosure form by the deadline.
- Notifications will be sent in January 2023.

SCA Fellow and Resident Complex Cases

- If you are a fellow or resident, please consider submitting to the SCA Fellow and Resident Complex Case.
- Instructions for the Fellow and Resident Complex Case can be found **here.**
- Co-Authors must complete their bio and disclosure forms by December 1, 2022. The submission will not be reviewed unless all listed authors complete a bio and disclosure form by the deadline.
- Notifications will be sent in January 2023.

Super Echo Call

- If you are a fellow or resident and prefer the Super Echo Call, the attending must be named on the submission and if accepted, participate in the session with you.
- Instructions for the Super Echo Call can be found **here.**
- Co-Authors must complete their bio and disclosure forms by December 1, 2022. The submission will not be reviewed unless all listed authors complete a bio and disclosure form by the deadline.
- If this case report is submitted to the Super Echo Panel and the Fellow and Resident Panel and accepted to both; authors will need to decline one of the invitations to present.
- Notifications will be sent in January 2023.

CLICK HERE TO SUBMIT ABSTRACT

Questions? Contact kerim@veritasamc.com

SCA 2023 Problem Based Learning Discussion and Abstract Submission Site

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Annual Meeting & Workshops – May 6-9

Don't Miss Out on Our New Member Benefit!

SCA UNIVERSITY
An Online Learning Management System

SCA University is a powerful new learning management system available exclusively to SCA members

This robust platform allows you to access hours of learning tailored to your needs, accessible whenever are wherever is most convenient for you.

We developed this content library to offer more educational opportunities on the topics that are most important to our members. SCA University allows us to tap into the wealth of knowledge and expertise in our organization, providing the latest clinical updates, innovative presentations, and relevant publications from around our community. New content on the hottest topics will continually be released throughout the year.

We have developed this powerful resource to be the go-to knowledge base for the international community of cardiac, thoracic, and vascular anesthesiologists.

Check your e-mail from Friday, September 9th for a message from noreply@vamedu.efrontlearning.com.

Access instructions and a prompt to create your new password will be provided in that message.

If you did not receive the message, please check your Junk/Spam folder.

If you are having difficulty accessing SCA University please reach out to info@scahq.org or call 855-658-2828.

The Kaplan Leadership Development Award

The 2023 Kaplan Leadership Development Award application submission opens December 1, 2022. The award is designed to assist cardiothoracic and vascular anesthesiologists in their career by granting funding to further their leadership development through coursework and leadership-specific studies.

The Kaplan Leadership Award will be adjusted accordingly to offer an aggregate of $5,000 to either one recipient or divided among two; $5,000/$2,500 from the SCA Endowment, with a $5,000/$2,500 match from the applicant's institution to fund a leadership education strategy.

Watch your in-box for more information on this award and how to apply.

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2023 SCA Research Grants

Deadline: January 27, 2023

SCA supports cardiothoracic and vascular research projects. This is the basis for the creation of the **SCA/IARS Starter Grants, SCA/IARS Mid-Career Grants, SCA Diversity and Inclusion Grants and the In-Training Grant.**

The SCA is committed to promoting the representation of women and underrepresented minority investigators. Diversity is vitally important to advance scientific discovery. The SCA is especially encouraging individuals from all racial, ethnic or gender groups to apply.

Apply for your Research Grant

Grants Information

- Four types of grants will be awarded in 2023:
  - *SCA/IARS Starter Grant* – up to $25,000 per year for two years.
  - *SCA/IARS Mid-Career Grant* – up to $50,000 per year for two years.
  - *SCA Diversity and Inclusion Grant* – up to $25,000 per year for two years.
  - *SCA In-Training Grant* - $15,000 for one year.
- Applications will close on January 27, 2023.
- The awards will be announced during the 2023 SCA Annual Meeting & Workshops in Portland, Oregon. The grant period of 24 months can begin any time from July 1 to December 31 of the year granted. Grant recipients are required to present their work at a subsequent SCA Annual Meeting.

Please Note: The Starter Grant and the Diversity and Inclusion Grant request the same information. Upon review, the Research Committee Chair will place your application into the appropriate category for which it should be considered.

Applications will close on January 27, 2023. More information about these funding opportunities will be posted on the SCA website.

Eligibility

1. Member, Society of Cardiovascular Anesthesiologists at the time of application.
2. MD or PhD or equivalent degree.
3. Primary Investigators (PI) on active NIH grants or other (inter)national peer-reviewed grants with > $50,000 per year are not eligible.
4. Previous Starter or Roizen Grant recipients are only eligible for Mid-Career Grants.
5. Grants will be judged relative to peers in the grant category submitted.
6. Eligible research projects should be completed within three years after the award of the grant.
7. *Starter Grant:* At the time of grant activation, PI must be within five years of finishing training and have an academic appointment at the rank of Instructor or Assistant Professor. PI must not be enrolled in a training program (residency, fellowship, PhD, postdoc) at the time of grant activation.
8. *Diversity and Inclusion Grant:* The grant is open to all women and underrepresented minority candidates in the early to mid-career stage.
9. *Mid-Career Grant:* PI must be at the level of Assistant or Associate Professor. Previous Mid- Career Grant recipients are not eligible for additional awards.
10. *In-Training Grant:* In-Training grant is targeted for residents with a strong intertest in cardiac anesthesia and cardiac anesthesia fellows in eligible training programs.

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Formatting Requirements

Except for the Curriculum Vitae of the PI, Chair letter, Mentor letter, and the letters of support from co- investigators all other submitted documents must strictly adhere to the

- Must be at least 12-point font.
  - Up to 10 points texts in figures, graphs, diagrams, and charts is acceptable (as long as it is legible when the page is viewed at 100%)
- Type density: Must be no more than 15 characters per linear inch (including characters and spaces).
- Application must be double spaced – must be no more than three lines per two vertical inches.
- Recommended font choices:
  - Arial
  - Georgia
  - Helvetica
  - Palatino Linotype
- Page size should be US letter 8.5″ x 11″.
- Page margins must be at least 0.5″ throughout the application
- Any figures or tables should be embedded within the PDF document, not included as separate pages.

Application Requirements

1. **Online Application (fill in information on submission website)**
   - Type of grant applying for.
   - Title of research grant.
   - Proposed starting date.
   - Applicant name, email address, postal address, telephone number, SCA member ID number, academic degrees, and faculty rank.
   - Sponsoring institution in which research will be performed.
   - Responsible department chief name, email address, postal address, and telephone number.
   - Responsible financial officer of the sponsoring institution name, email address, postal address, and telephone name.
   - Starter/D&I/In-Training Grants: Primary mentor name, email address, postal address, and telephone number.
2. **Acknowledgement of Other Requirements**
   - It is understood that if awarded the grant, a satisfactory progress report will be due to the SCA (addressed to the SCA Research Committee Chair) by June 10 of the following year to obtain the second funding installment.
   - The award recipient agrees to provide a report letting SCA know how they have capitalized on the research done because of the SCA grant.
   - The award recipient agrees to write a paper and article for the SCA newsletter regarding the research done because of the SCA grant.
   - It is understood that a final report will be due to the SCA (addressed to the SCA Research Committee Chair) by September 30 of the year of completion of the research.
3. **Letters included in the submission should be addressed to:**

   J. Danny Muehlschlegel, MD, MMSc
   SCA Research Grant Committee Chair
   SCA Headquarters 1061 E. Main Street, Suite 300
   East Dundee, IL 60118
   grants@scahq.org

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Research Grant Information

Application Materials to be Uploaded**

**You must have Adobe Flash Player installed to upload the file.

The main body of the application should be uploaded to the grant submission website as ***PDF documents*** with the following components:

1. **Title Page** (using the template provided on the SCA website):
   - Type of grant applying for.
   - Research grant title.
   - Name of applicant.
   - Applicant's institution, academic degrees, and faculty rank.
   - Mentor's name for Starter Grants.
   - Names, academic degrees, and faculty ranks of any co-investigators.
2. **Response to Reviewers** For previously submitted grants, a response to previous critiques must be provided (maximum 2 pages):
3. **Research Plan** (see pg. 4; maximum of 9 total pages).
4. **Budget** The budget should outline all proposed expenditures for the project and indicate the amount and breakdown for specific items requested from the SCA, and, if applicable, the amount and breakdown for specific items provided by the institution as matching funds:
   a) The budget may include salary support for technicians, research nurses, and other research personnel, equipment, and/or supplies. Other costs must be itemized and justified.
   b) Starter Grants: no part of the grant may be used for salary support of the PI, the PI's mentor, fellows, or residents. Travel or tuition expenses are not allowed.
   c) Mid-Career Grants: up to 50% of the budget can be used for salary support of the principal investigator and co-investigators. Funds cannot be used for travel or tuition expenses.
   d) Institutions should not request overhead costs as part of the budget.
   e) No part of the grant may be used for patient care costs (except to pay for pertinent laboratory costs), consultant costs, alterations, and renovations.
5. **Budget Justification** (1 page). Include a brief description of projected costs for different components of the budget, i.e., supplies, animal costs, equipment, salary support.
6. **Study Approval** (1 page). Include a statement of approval for studies involving human or animal subjects by the appropriate institutional committee. (The application may be submitted before approval is obtained, with a letter of explanation. However, no award will be made until notification of institutional approval is received).
7. **Related Studies** (1 page). Include a listing of all other studies being performed on the study population, if applicable.
8. **Other Grants** (1 page). All active and pending (applied for or received as an investigator or co- investigator) research support for all projects must be detailed. Include a statement of the relationship to the present grant.
9. **Curriculum Vitae of the PI** (5 page maximum; NIH Biosketch format required).
10. **Letter from the Department Chair indicating the following:**
    a) Assessment of the applicant's research and other professional accomplishments.
    b) Institutional/departmental matching funds, which may be salary support of personnel (excluding the principal investigator), supplies, animals, equipment, etc.

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The amount of all pledged funds should be specified in US $.

c) The availability of suitable facilities and/or patients.

d) A guarantee that the PI will have at least 40% non-clinical (research) time, should the grant be awarded.

e) The agreement to return all unused funds if the project is not completed in three years.

11. **Starter Grant *(including the SCA starter, SCA Diversity and Inclusion grant, and In-Training Grant)*:** A scientific mentor is required. A letter describing the track record of the mentor in-regards to success of previous mentees, mentor's sources of research support, commitment of mentor's resources to the applicants' projects, and a mentoring plan must be submitted.

    a) **Curriculum Vitae of the scientific mentor** (5 page maximum; NIH Biosketch format required).

12. **Starter Grants (*including the SCA starter, SCA Diversity and Inclusion grant, and In-Training Grant)*:** A career development plan describing the Career Goals and Objectives and the Candidate's Plan for Career Development/Training Activities during Award Period (maximum 2 pages).

13. **Letters of support from all co-investigators.**

Research Plan

The Research Plan must not exceed 9 total pages; lengths listed below do not include references. Failure to strictly follow formatting instructions for the Research Plan will result in administrative withdrawal of the application. Any figures or tables should be embedded within the PDF document, not included as separate pages.

1. Specific Aims and Research Hypothesis (1 page).
2. Research Strategy structured as follows (total 8 pages maximum, with a maximum of 1 page each for the significance and innovation sections):
    a) Significance
    b) Innovation
    c) Approach
        i. Introduction and Feasibility
        ii. Preliminary Studies
        iii. Research Design, which should included
            1. Definition of primary outcomes.
            2. A reproducible sample size calculation (power analysis).
            3. Specific techniques, animal species, data sources etc. that will be used.
            4. Types of studies to be done, including any considerations to ensure experimental rigor.
            5. Planned methods for statistical analysis.
            6. Potential problems and limitations, and how they will be addressed.
3. References: Up to 50 references may be included starting on a new page. References will not be counted towards the maximum of 9 pages for the Research Plan (1-page Specific Aims and Research Hypothesis + 8 pages Research Strategy).

Help Build the SCA Future Together Through the SCA Endowment

CARE
INVESTIGATION
KNOWLEDGE

SOCIETY OF CARDIOVASCULAR ANESTHESIOLOGISTS
ENDOWMENT

As the population ages and cardiac surgery becomes more complex and challenging, the role of the cardiovascular anesthesiologist has evolved to enhance mankind's ability to treat life-threatening and debilitating heart conditions.

The Society of Cardiovascular Anesthesiologists (SCA) is the preeminent international educational organization for this sub-specialty, leading the way in treatment innovations through care, investigation, and knowledge. The SCA funds research and educational activities to enhance the care of patients with cardiovascular disease.

The SCA Endowment (formerly the SCA Foundation) continues to support SCA members in the achievement of these goals.

Vision of the SCA Endowment

We will be world leaders in enhancing patient care and safety and in developing excellence in the next generation of clinicians and physician-scholars through research and education in the field of cardiothoracic and vascular anesthesia.

Making an online donation is quick, easy, and secure

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to donate online

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DEI COMMITTEE

Trevor S. Sutton, MD
Hartford Hospital and UConn Medical Center
West Hartford, CT

Lead author of this featured article.
Member of SCA's DEI committee and leads the research subcommittee of DEI.

Editorial by:

Promise Ariyo, MD, MPH
Johns Hopkins Medicine
Baltimore, MD

Member of the SCA's DEI committee.

Bridging the Gap in Cardiac Surgical Outcome Among the Races; Is ERAS a Path Forward?

Disparities, specifically racial disparities, in surgical outcomes are an irrefutable problem in the perioperative arena. Unfortunately, cardiac surgery is not immune to this problem and racial differences in mortality and morbidity outcomes have been reported after Coronary Artery Bypass Surgery (CABG)[1,2]. This unsettling problem is persistent after adjusting for multiple variables including socio-economic status, comorbid conditions, surgeon, hospital, and care factors[3]. Thankfully, this issue is gaining widespread recognition and there is agreement on the need to rectify this problem and mitigate these disparities.

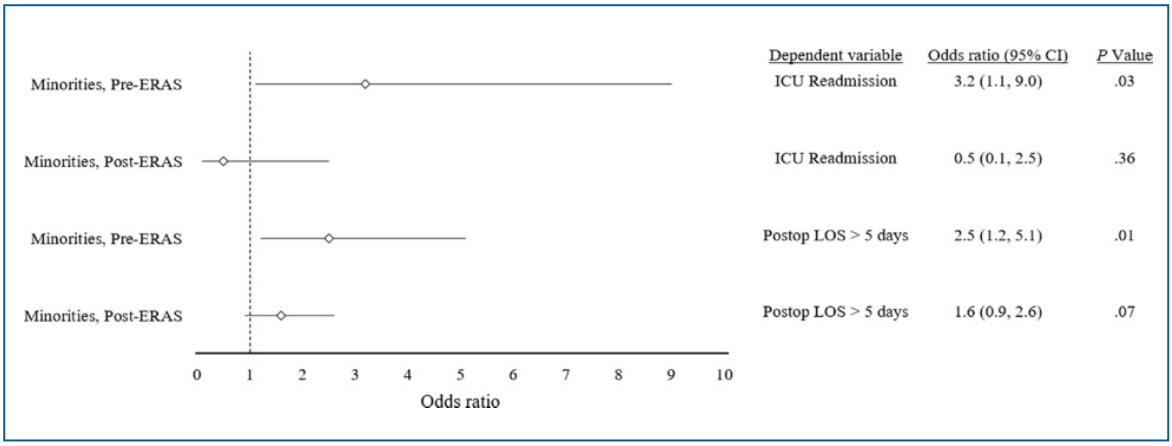
One of the recent remarkable strides in perioperative care is the advent of Enhanced Recovery after Surgery, (ERAS). The concept of well-thought-out, multi-discipline derived, protocolized ways of caring for surgical patients has been reported to improve outcomes, including mortality, recovery and costs of surgical care[4]. Of particular interest is the signal that it might be successful in reducing racial outcomes disparities in non-cardiac surgery. ERAS is increasingly being utilized for cardiac surgery in many institutions but whether this translates to reduction in racial disparities and outcomes, has not been established[5].

It is therefore with great interest we present a recent study published by Sutton et al in the Journal for Cardiothoracic and Vascular Anesthesia (JCTVA)[6]. This retrospective study was performed at a single tertiary center with the primary objective of identifying associations between ERAS implementation and outcomes for all patients undergoing isolated CABG surgery. The secondary objective was to elucidate any associations between ERAS and outcome disparities after CABG surgery between a White population and a propensity matched pre-specified Minorities subpopulation.

In their analysis, Sutton et al included all adult patients undergoing isolated CABG surgeries, including elective, urgent and emergent CABG surgeries between January 2016 and December 2020. They compared patients who underwent CABG procedures prior to the ERAS implementation to those whose surgeries occurred after ERAS implementation. These pre and post ERAS groups were subdivided by race and ethnicity into a White

subgroup and a Minorities subgroup. The Minorities subgroup was composed of African American, Hispanic Non-White, Asian, Native Hawaiian and/or Pacific Islander and American Indian and/or Native Alaskan patients.

A large population of 1735 patients undergoing elective or urgent CABG surgery were analyzed, of which 584 post-ERAs patients were propensity matched with 584 pre-ERAS patients such that there were non-significant differences between the two cohorts. Consistent with prior studies, there were statistically significant improvement for all patients in ERAS specific outcomes, including shorter length of stay (LOS), total ventilation time, increased likelihood of early extubation and reduced postoperative opiate consumption. There were no differences between the two groups with respect to 30-day mortality. Additionally, logistic regression models demonstrated that disparities in ICU readmission and postoperative LOS between White and Minorities patients were eliminated post-ERAS implementation, a novel discovery in the world of CABG surgery. The authors concluded that ERAS in not only a promising quality initiative for all patients but also potentially serves as tool for health equity initiative.



The odds ratios of ICU readmission and postoperative LOS >5 days for Minorities patients pre-ERAS and post-ERAS. Bars correspond to 95% confidence intervals; p value < 0.05 considered statistically significant. ERAS, Enhanced Recovery After Surgery protocol; ICU, intensive care unit; LOS, length of stay.
From Sutton et al - Enhanced Recovery After Surgery Is Associated With Improved Outcomes and Reduced Racial and Ethnic Disparities After Isolated Coronary Artery Bypass Surgery: A Retrospective Analysis With Propensity-Score Matching. J Cardiothorac Vasc Anesth. 2022;36(8 Pt A):2418-31.

In recent years, several publications have reported on racial disparities in surgical outcomes. However, investigative work dedicated to studying these differences and workable solutions in a systematic way is lacking. This study by Sutton et al is therefore timely and brings optimism to finding solutions to this important issue. It adds to the growing evidence that ERAS improves outcomes for patients and narrows the racial gaps in outcomes. This effect of ERAS on outcomes for racial minorities has been reported for other types of surgical procedures including colorectal surgery[7,8]. Since the use of ERAS is becoming more widespread in cardiac surgery, it makes sense to capitalize on all the ways it can improve outcomes in the minority patient population. As the authors point out, there is a lot more work to be done in understanding the exact mechanisms by which ERAS improves outcomes among racial minority groups. It makes intuitive sense that providing care, using robust and vetted standardized pathways throughout the peri-operative period will even the playing field for all patients, regardless of racial or ethnic background. Some scholars have suggested that the standardized pathways

are successful by modifying decisional behavior and reducing the impact of provider's conscious and unconscious biases.

This study also raises important questions in our minds, however. Are there specific elements of ERAS that are more impactful in equalizing quality of care for racial minorities? And how well are providers adhering to these protocols for all comers? Large prospective and multicenter studies looking at physician preferences and practices may elucidate more important elements of this program and its impact on disparity work. Nevertheless, the authors have given an encouraging food for thought and we look forward to future work as we seek to make advances in making cardiac surgical care equitable for people of all races.

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Special Interest Group (SIG) News

SCA is excited to announce the new Adult Congenital Heart Disease (ACHD) special interest group. The ACHD SIG will continue to enhance the mission and vision of the SCA by allowing SCA community to improve the perioperative care of this unique group of cardiovascular patients through education centering around perioperative, intraoperative, and postoperative management of these patients including proficiency in echocardiography. It will also allow for a platform for multi-institutional research and database development and ultimately help improve outcome for the ACHD patients.

More information about joining this SIG will be forthcoming in the next few weeks.

For questions regarding this SIG, please email operations@scahq.org.

An Update on Novel Regional Anesthesia Techniques for Cardiac Surgery via Median Sternotomy

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Acute pain after cardiac surgery via median sternotomy is a direct result of surgical manipulation and tissue trauma and may be related to many causes including surgical incision, pericardiotomy, retraction, artery dissection, or chest tubes. A subset of patients experiences severe, debilitating postoperative pain which may increase length of stay, morbidity, mortality, and healthcare costs.[1] In addition, as Cintron and Lin described in the last ***SCA RACER SIG*** newsletter[2], persistent postoperative pain continues to be a challenging problem, as up to 43% of patients experience persistent pain three months after cardiac surgery, and even 10% of patients continue to experience sternotomy-related pain seven years after surgery. Since the greatest predictor of chronic post-surgical pain is poorly controlled acute postoperative pain[3], cardiac anesthesiologists are in an excellent position to make significant improvements in this regard.

Historically, anesthetic techniques for cardiac surgery via median sternotomy relied heavily on high-dose intravenous opioids with delayed extubation. Over the past decade, with the emergence of enhanced recovery after cardiac surgery (ERACS) programs, cardiac anesthesiologists have been exploring unique options for the management of postoperative pain in lieu of high-dose opioids. Neuraxial anesthetic techniques have been used and studied extensively in this context, and while they appear safe and may even improve outcomes[4-6], persistent concern over the rare, yet devastating risk of spinal or epidural hematoma during full heparinization has limited their use in cardiac surgery. In addition, paravertebral blocks have shown comparable analgesic effects after cardiac surgery compared to thoracic epidural blockade[7], however similar concerns over epidural hematoma exist.

Alternatively, due to their relative simplicity and perceived low risk of complications, several chest wall fascial plane blocks are gaining popularity for use in cardiac surgery. Thoracic intercostal nerves (T2-T6) are primarily responsible for the sensory innervation of the chest wall. Each spinal nerve exits an intervertebral foramen and divides into a dorsal and ventral ramus. The ventral ramus traverses initially between the pleura and endothoracic fascia and then between the internal and innermost intercostal muscles. As it courses anteriorly towards the sternum, it pierces the internal intercostal muscle, external intercostal muscle, and pectoralis major muscle terminating as anterior intercostal cutaneous nerves providing sensory innervation to the anterior chest wall.

For patients undergoing median sternotomy, targeting the anterior intercostal cutaneous

SIG

An Update on Novel Regional Anesthesia Techniques for Cardiac Surgery via Median Sternotomy

nerves appears logical anatomically. Infiltration of local anesthetic close to the intercostal nerves at the sternal border performed by surgeons right before sternal wire placement, a so-called "parasternal block," was described as early as 20058. However, these nerves can be targeted more directly in one of two different fascial planes: either a deeper plane between the internal intercostal and transverse thoracic muscles [deep parasternal block, previously known as transverse thoracic plane block (TTPB)] or a more superficial plane between the internal intercostal and pectoralis major muscles [superficial parasternal block, previously known as pectointercostal fascial block (PIFB)]. The utilization of ultrasound by anesthesiologists has allowed the generic "parasternal block" to be more appropriately named depending on which fascial plane is targeted. Of note, a recent international consensus paper has recommended simplification and standardization of fascial plane block nomenclature and readers are encouraged to cross-reference this if not already familiar with it.[9]

The deep parasternal block was first described in 2015 by Ueshima et al. in patients undergoing breast cancer surgery[10], and the technique was later successfully utilized in two patients undergoing cardiac surgery via median sternotomy[11]. A recent prospective, randomized controlled trial in 48 adult cardiac surgery patients comparing preoperative ultrasound-guided deep parasternal blocks (called TTPB in the study) with bupivacaine vs saline demonstrated significantly reduced postoperative opioid consumption, pain scores up to 12 hours after surgery, and opioid-related side effects in the bupivacaine group.[12] There were no block related complications in either group.

Although this technique has been shown to be safe from complications such as pneumothorax, hematoma, and infection[13], the internal mammary artery runs within the same plane approximately 1.5cm lateral to the sternal border. If the block is performed before cardiac surgery, both the right and left internal mammary arteries could be damaged rendering them unusable for bypass grafting. If the block is performed after cardiac surgery involving harvesting of the internal mammary artery, surgical disruption of tissues could lead to difficulty identifying the correct fascial plane and potentially affect the spread of the local anesthetic.

Additionally, the transversus thoracic muscle is often very thin, difficult to visualize under ultrasound, and located close to the pleura leading to a theoretically higher risk of pneumothorax. The superficial parasternal block is a more superficial block, located further from the pleura, and separated from the internal mammary artery by the internal intercostal muscle, and so it is the authors' opinion that this is a safer regional anesthesia technique for patients undergoing cardiac surgery via median sternotomy. Figure 1 illustrates the sonographic landmarks and needle approach to perform a superficial parasternal block.

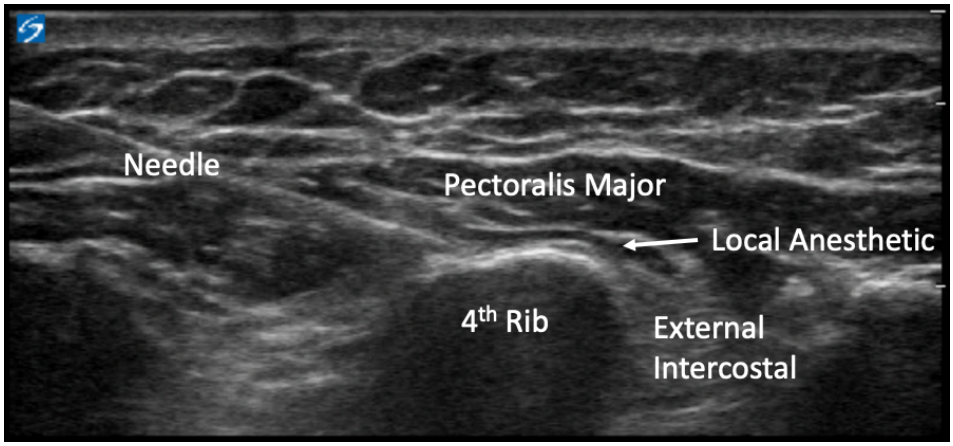

Figure 1. Superficial parasternal block by ultrasound at level of 4th rib.

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Although the studies are small, recent published literature has supported the use of superficial parasternal blocks for cardiac surgery. Two single-center, prospective, randomized controlled trials utilizing postoperative bilateral ultrasound-guided superficial parasternal blocks have demonstrated decreased pain scores and opioid consumption after cardiac surgery.[14,15] In another randomized trial, Zhang et al performed bilateral blocks preoperatively and not only demonstrated similar decreases in postoperative pain scores and opioid consumption, but also decreased time to extubation, intensive care unit (ICU) length of stay, and hospital length of stay.[16]

Interestingly, they were also able to show reduced postoperative insulin resistance and inflammatory response in the group that received this technique. In a follow-up study, the same group showed that continuous bilateral superficial parasternal blocks initiated before surgery reduced ICU and hospital length of stay and provided effective postoperative pain relief for up to three days.[17]

Another prospective, randomized, controlled trial recently demonstrated preoperative blocks reduced the maximum concentrations of remifentanil and propofol required to maintain hemodynamic stability and depth of anesthesia during sternotomy while also reducing the postoperative inflammatory response.[18] There was no intervention related adverse events such as pneumothorax, hematoma, or infection in any of these studies.

While both deep and superficial parasternal blocks appear effective and safe, there has only been one study that has compared the two regional anesthetic techniques directly. A small prospective, randomized trial comparing bilateral superficial blocks directly with bilateral deep blocks showed similar postoperative pain scores and opioid requirements between the two groups, with no block related complications in either group.[19] However, larger studies are needed to definitively conclude similar efficacy between the two blocks.

It is clear that regional anesthesia utilizing fascial plane blocks has a role in cardiac surgery, however the optimal technique, timing of the block, and local anesthetic utilized still need clarification. Parasternal techniques appear to provide effective analgesia for median sternotomy with a great safety profile, however, will not provide effective coverage for painful chest tube insertion sites. Future studies could investigate combinations of chest wall blocks to adequately cover both sternotomy and chest tube pain.

While preoperative blocks may provide additional intraoperative benefits, the postoperative benefits would be limited by the relatively short duration of action of standard local anesthetics. Given the benefits described with continuous block techniques, additional research should clarify the optimal timing for catheter placement and investigate the role of preoperative liposomal bupivacaine in regional anesthesia for cardiac surgery.

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Commentary by ASRA RACER Member

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Enhanced recovery after surgery (ERAS) for patient undergoing cardiac operation has required us to change thinking, practices, and protocols that we have clung to for decades. ERAS Expert Recommendations for Cardiac Surgery include a multimodal, opioid-sparing, postoperative pain management plan (class I recommendation, level of evidence B – randomized).[1] While high dose opioids have classically been the mainstay for the perioperative cardiac surgery patient, they are associated with sedation, respiratory depression, nausea, vomiting, ileus,[2] and may exacerbate or increase rates of delirium.[3]

These undesirable side effects contradict the goals of postoperative analgesia including improvement in quality of life and acceleration of functional recovery. Inadequately treated acute pain may contribute to chronic pain in one out of five patients, and the reported incidence of chronic postoperative pain is even higher (30-50%) following coronary artery bypass surgery.[3] Thus, multimodal analgesia – the concurrent use of primarily non-opioid analgesics – is an essential component of for ERAS after cardiac surgery. This has stimulated an interest in the routine use of regional anesthesia as to improve postoperative analgesia.

The simplistic nature and low risk of both superficial parasternal intercostal facial blocks (formerly called pecto-intercostal facial plane blocks) and deep parasternal intercostal facial plane blocks (formerly call transversus thoracic facial plane blocks)[4] have made them an attractive option for ERAS after cardiac surgery. Although less evidence was published several years ago, several randomized controlled trials recently demonstrated decreased intraoperative opioid use[5] or improved postoperative outcomes[6-8] for patients receiving parasternal intercostal facial plane blocks. As outcomes differences have not been noted between the superficial and deep approaches,[9] the superficial approach may be preferable to avoid injury to the mamillary vessels.

Unfortunately, as Simon and Meyer astutely remind us in their summary, parasternal blocks will not cover the chest tube site, the saphenous vessel harvest area, or the patient's chronic arthritis. Additionally, the majority of publications have focused on single injection blocks with limited durations rather than catheter-based techniques, and liposomal bupivacaine has not demonstrated superior analgesia when compared to ropivacaine or bupivacaine[10] consistent with other publications.[11, 12] Thus, future investigations are still needed.

Although parasternal blocks offer a relatively low risk and possibly high reward component for cardiac ERAS, it is also important that we remember that regional anesthesia is just one aspect of multimodal analgesia. As one with a love and strong belief in the benefits of regional anesthesia, it would be glorious to demonstrate that a simple nerve block solved everything. However, it is important to recognize that regional anesthesia is only one component of multimodal analgesia. Similarly, multimodal analgesia is only one component of ERAS. ERAS requires incorporating smoking cessation, improved nutrition, pre- and postoperative physical therapy, respiratory therapy, and sleep hygiene, to name a few. Thus, it requires engagement and education of the numerous providers, patients, and their families to redesign perioperative care and expectations.

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Outcomes of Lung Transplantation from Hepatitis C Viremic Donors

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Background

The advent of direct acting antiviral (DAA) therapy in the last decade has radically altered the efficacy and feasibility of the treatment of acute and chronic hepatitis C infection.[1] With the ability to elicit sustained viral response (tantamount to cure), the pool of potential donors for lung transplantation has now expanded to include hepatitis C virus positive (HCV+) donors. Early reports of HCV+ lung transplantation into HCV- recipients showed promising results[2] and opened the field for more transplant centers to begin accepting HCV+ lungs.

Methods

This is a retrospective study that used data gathered from the United Network for Organ Sharing (UNOS). They included adult lung transplant recipients from July 1, 2016 to December 31, 2019. Exclusion criteria were multivisceral transplants, incomplete data sets, loss to follow-up, and heart-lung en blanc resection. HCV+ status was confirmed with nucleic acid testing (NAT). They identified 189 HCV+ donors and were able to 3:1 propensity match 160 recipients of HCV+ lungs with HCV- control recipients. Mean follow-up duration was 19.8 months.

Results

The number of patients who received HCV NAT+ lungs increased from 2 in 2016 to 118 in 2019. The number of lung transplants per year also increased throughout the study period. Obstructive lung disease was more common in HCV+ recipients ($p = .002$); FEV1 was lower ($p = .001$); and mean lung allocation score was also lower ($p = .009$). HCV+ donors were more likely to be younger ($p = .017$), white ($p < .001$), and were twice as likely to use drugs or alcohol. HCV+ donors were more likely to have PaO2/FiO2 ratios > 300 ($p = .029$). Lungs from HCV+ donors travelled longer distances and had longer ischemic times than HCV- lungs ($p < .001$). There was significant regional variability regarding where HCV+ lungs were transplanted. For example, 33% of HCV+ lungs were transplanted in region 1 (New England), but this region only performed 3% of HCV- transplants. Regions 4 and 8 have only transplanted one set of HCV+ lungs and region 6 has not transplanted any. High, medium, and low volume transplant centers contributed equally to HCV+ lung transplants.

30-day death and 1 year mortality rates were not statistically different between recipients of HCV+ and HCV- lungs. Donor HCV+ status was not linked to increased mortality by multivariate Cox regression analysis, but older age of recipient, MELD score, higher lung allocation score, retransplantation, and longer ischemic times were.

Of the 189 patients who received HCV+ lungs, seroconversion occurred in 63 (33%).

HCV viremia was identified in 14 of those patients with 6 clearing the viremia by the next follow-up visit. There were no statistical differences between seroconverted patients and non-seroconverted patients in rates of hospitalization for infection or rejection.

Discussion

Approximately 3000 patients are added to the waitlist for lung transplantation yearly according to UNOS data and approximately 2500 lung transplants occur annually.[3] Mooney et al. used a model to predict the number of additional donor lungs available annually if HCV+ donors were considered.[4] They determined that approximately 55 additional lungs could be transplanted per year if HCV+ donor lungs were utilized. While this does not account for all patients not transplanted from the waitlist, expanding the donor pool could decrease time on the waitlist and waitlist mortality. This study by Li et al does demonstrate promising results from national data for HCV+ transplants into HCV- recipients. A significant limitation of this study is that the mean follow-up is less than 2 years and thus does not provide long-term survival data. As more HCV+ transplants occur, the discussion arises about preemptive treatment versus early intervention if seroconversion occurs. No data yet exists which determines superiority of treatment strategy. Cautious use of HCV+ donor lungs should be considered until long-term data is available on survival, graft rejection, and HCV-related complications following seroconversion.

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Three-Dimensional Transthoracic Static and Dynamic Normative Values of the Mitral Valve Apparatus: Results from the Multicenter World Alliance Societies of Echocardiography Study

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Background

The mitral valve (MV) is a complex three-dimensional apparatus. Accurate identification of normal reference values for the size, geometry, and functionality of the MV, helps diagnose and understand pathology and more effectively apply corrective treatment. Transthoracic echocardiography (TTE) has been used most for the description of the geometry and function of the MV because it is widely available, easy, and reproducible.

Some data exist[1,2] with the use of cardiac MRI and CT scan, but the studies were done on small cohorts which makes it hard to apply to all. Likewise, most existing data on 2D TTE are based on small cohorts or study a particular ethnic group or age groups and use different analysis and image interpretation each.[1-7] In addition, 2D echocardiography of a complex 3D structure such as the MV, is subject to geometric assumptions. In the current study, 3D TTE was used to define static and dynamic normative values of the MV apparatus on 748 echo studies, including different gender, age groups.

Study Design

This Normal Values Study of the World Alliance Societies of Echocardiography (WASE) was a multicenter international, observational, prospective, cross-sectional study of healthy adult individuals. There were 19 participating sites worldwide. The American Society of Echocardiography, through representatives of the American Society of Echocardiography International Alliance Partners asked each site to enroll 100 "normal" local volunteers. The study complied with each local institutional review board and ethics committees and informed consent was obtained. Enrollment consisted of a single visit during which basic demographic information was collected and a study-specific standardized transthoracic echocardiography exam (TTE) was acquired, which included 2D, Doppler and 3D images.

The acquisition protocol was in accordance with the American Society of Echocardiography (ASE) recommendations and was developed by the WASE core laboratories (MedStar Health Research Institute and the University of Chicago). The "normal" volunteers were individuals without heart, lung or kidney disease and were evenly distributed among both sexes and all age groups (young: 18-40 years, middle aged: 41-65 years and elderly:>65 years). The elderly individuals were permitted to have well controlled hyperlipidemia or hypertension (on no more than 2 antihypertensives and without left ventricular hypertrophy).

Study images were analyzed by two observers (M.P.H. and J.C.) at the University of Chicago core laboratory using commercial mitral valve (MV) quantification analysis software TomTec Imaging Systems (4D-MV Assessment version 2.3). 900 study exams were reviewed but 152 were excluded due to inadequate image quality so 748 were included in the final analysis.

More specifically, after identification of early systole (the frame after MV closure), end systole (the frame just before MV opening) and mid systole (the frame halfway between MV closure and opening), several static measures were obtained and dynamic analysis was performed as follows:

All static measures were performed in early systole for better frame identification and reproducibility. After manual identification of key anatomic points, the software created the static 3D mitral valve model in early systole and annular size, shape and leaflet geometry were assessed.

Assessment of annular size included measurements of anteroposterior (AP) diameter, anterolateral (AL)- posteromedial (PM) diameter and software generated mitral annular (MA) circumference, 2D and 3D areas.

Assessment of annular shape included measurements of nonplanar angle (NPA), annular height, tenting height with the corresponding tenting area and volume, and sphericity index (ratio between AP and AL-PM diameters.

Assessment of leaflets included measurements of anterior and posterior leaflet length (in the AP plane including coaptation length) and area (defined by the annulus and coaptation line)

Static measures (except sphericity index and NPA) were indexed to BSA and height.

The dynamic analysis included automatic annular tracking in each systolic frame. Changes of AP and AL-PM diameters, 2D annular area, annular circumference, and sphericity index over time through systole were expressed as function of the percentage of total systolic time.

To ensure adequate tracking manual adjustments were applied as necessary.

Reproducibility analysis was performed by randomly selecting 30 studies, evenly distributed among both sexes and age groups. Intraobserver and interobserver absolute differences were assessed on repeated measurements of the same observer and measurements by a blinded independent observer respectively.

Measurements were expressed as mean ± SD and normal values were between the 2.5th and 97.5th percentile.

Results

STATIC MEASURES

Normal ranges of nonindexed early systolic MV parameters for men and women

	Men	Women
Mitral annular size		
AP diameter, cm	2.7-4.2	2.4-3.9
AL-PM diameter, cm	3.0-4.7	2.8-4.5
Circumference, cm	9.8-14.9	9.1-14.1
2D area, cm2	6.5-15.7	5.7-14.2
3D area, cm3	6.9-16.4	6.1-14.5
MA shape NPA	116-173	113-174
Annular height, cm	0.42-1.37	0.39-1.45
Tenting volume, cm3	1.1-6.9	0.9-6.2
Tenting area, cm2	1.0-3.6	0.9-3.5
Tenting height, mm	4.9-15.9	4.6-15.8
Sphericity index (AP/AL-PM)	0.74-1.04	0.76-1.05
Mitral leaflets Anterior leaflet area, cm2	4.2-11.3	3.8-9.8
Posterior leaflet area, cm2	3.2-10.4	2.6-9.4
Anterior leaflet length, cm	2.1-3.4	1.9-3.3
Posterior leaflet length, cm	0.9-2.4	0.8-2.420

Comparison between sex groups

NPA, sphericity index and annular height were not found to be significantly different between sexes. MA size, shape and leaflet measurements were significantly larger in men but when indexed by BSA or height the differences were lost.

Early systolic MV measurements obtained in the three age groups

	All subjects P			
	18-40 y (n = 266)	41-65 y (n = 249)	>65 y (n = 233)	P
BSA, m2	1.79 ± 0.24	1.81 ± 0.22	1.72 ± 0.19	* ,†,‡
Height, cm	170 ± 11	168 ± 10	164 ± 9	* ,†,‡
MA size				
AP diameter, cm	3.3 ± 0.4	3.3 ± 0.4	3.2 ± 0.5	
AL-PM diameter, cm	3.7 ± 0.5	3.7 ± 0.5	3.6 ± 0.5	* ,‡
Circumference, cm	11.8 ± 1.4	11.9 ± 1.4	11.6 ± 1.5	* ,‡
2D area, cm^2	9.7 ± 2.3	10.0 ± 2.5	9.5 ± 2.5	* ,‡
3D area, cm^3	10.2 ± 2.4	10.4 ± 2.4	10.4 ± 8.7	
MA shape				
NPA,	139 ± 17	143 ± 15	140 ± 15	* ,‡,§
Annular height, cm	0.91± 0.24	0.85 ±0.26	0.86±0.23	* ,† ,§
Tenting volume, cm^3	3.0 ± 1.5	3.9 ± 1.5	2.9 ± 1.3	* ,‡,§
Tenting area, cm^2	2.0 ± 0.7	2.3 ± 0.7	1.9 ± 0.6	* ,‡,§
Tenting height, mm	9.0 ± 2.8	10.7± 2.7	9.6 ± 2.6	* ,†,‡,§
Sphericity index (AP/AL-PM)	0.89 ± 0.08	0.89 ± 0.08	0.90 ± 0.07	* ,†,‡
Mitral leaflets				
Anterior leaflet area, cm^2	7.2 ± 1.8	7.1 ± 1.7	6.2 ± 1.7	* ,†,‡
Posterior leaflet area, cm^2	5.4 ± 1.7	6.3 ± 1.8	6.0 6 1.8	* ,†,‡,§
Anterior leaflet length, cm	2.7 ± 0.3	2.7 ± 0.4	2.5 ± 0.4	* ,†,‡,§
Posterior leaflet length, cm	1.4 ± 0.4	1.6 ± 0.4	1.6 ± 0.3	* ,†,§

Data are expressed as mean ± SD.
*Three-way analysis of variance.
† Student's t test for 18 to 40 versus >65 years.
‡ Student's t test for 41 to 65 versus >65 years.
§ Student's t test for 18 to 40 versus 41 to 65 years21

Comparison between sex groups

The BSA in the older group was smaller compared to the middle aged and young. Most MV measurements were larger in the middle age group, some but not all difference was lost with indexing by height or BSA. In the middle-aged group, NPA and annular height measurements were consistent with a rather flatter MV annulus compared to the younger or older groups.

The AP diameter was significantly larger and the anterior leaflet volume significantly smaller in the elderly and remained statistically significant after indexing by BSA or height.

Comparison among races

No statistically significant differences were found in the mitral valve measurements among White, Black, and Asian individuals except: Asian men and women showed significantly smaller MA measurements but larger NPA.

Dynamic Measures
MA 2D area and circumference showed changes through systole with the smaller values occurring at 20% systole and the largest at end systole. AP and AL-PM diameters showed motion in opposite directions during systole, with the AP diameter measuring the smallest at 10% of systole when AL-PM measured the largest. The % change for the AP and AL-PM diameters was 5% and 1% of the original size respectively, resulting in a more circular annulus at end systole. The same dynamic MA motion was found in all age groups and both sexes.

Discussion and Comments
Summarizing the results of this study:

1. Larger MA shape, size and leaflet dimensions were identified in men, but the difference is mitigated by BSA or height indexing. Or in other words, size differences in the mitral valve apparatus match the size of the individual and not the sex.

2. Although MA size and shape parameters were age independent, the anterior mitral leaflet area was smaller in the elderly despite height or BSA indexing. The clinical significance of this finding is not exactly clear. It is unknown whether this is part of the natural course of aging or a precursor of pathology and how useful this information will be.

3. In the Asian population, the NPA was found significantly larger and the MA significantly smaller, indicative of a smaller and less flat mitral valve. Further studies are needed to clarify whether this information can be used in in future therapeutic options.

4. Contraction end expansion of the AP in opposite fashion with the relatively not as mobile AL-PM annular diameters leads to the formation of a more circular mitral valve orifice at end systole. Observation of the mitral annular motion may help identify or treat disease.

This is the first report of normative values of the mitral valve, derived from study of large number of patients from different ethnic and age groups based on TTE. The image acquisition was standardized, and data analysis was performed by vendor independent software in the core laboratory.

Because of limitations related to the software used, no measurements were made during diastole.

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Left Ventricular Global Longitudinal Strain in Patients with Moderate Aortic Stenosis

Stassen J, Pio S, Ewe SH, Singh G, Hirasawa K, et al. J Am Soc Echocardiogr 2022; 35:791-800

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Background

Several recent studies have highlighted the increased mortality seen in patients with moderate aortic stenosis (AS), both in patients where the left ventricular ejection fraction (LVEF) is reduced (<50%), as well as in those who maintain a normal ejection fraction (≥50%). , Cardiac magnetic resonance imaging (MRI) has also revealed several structural and functional abnormalities in those patients with moderate stenosis and a preserved LVEF. This may be due to the development of myocardial fibrosis in the left ventricle as a response to the increased afterload of even moderate AS, leading to a progressive deterioration in LV diastolic, and eventually systolic, function.

While LVEF may not be sensitive enough to pick up the changes associated with the early stages of this remodeling, left ventricular global longitudinal strain (LV GLS) has shown promise in this arena. LV GLS allows for the quantification of active myocardial deformation in the longitudinal plane, and has been shown to be a more sensitive test for subclinical cardiac dysfunction. This has potentially significant implications for the timing of surgical intervention in patients with moderate AS. This study attempts to clarify the prognostic value of LV GLS in patients with moderate AS with both preserved and reduced LVEF.

Methods

The population of potential subjects included all patients aged ≥18 years who presented with an initial diagnosis of moderate AS between November 2001 and December 2019 at a single center. The authors defined moderate AS as an aortic valve area (AVA) 1-1.5 cm2 with a peak jet velocity <4 m/s and a mean valve gradient <40 mmHg. Any individuals with a history of prior aortic valve surgery, congenital heart disease, infective endocarditis, heart transplantation, supra- or subvalvular AS, dynamic LV outflow tract obstruction, more than moderate aortic or mitral valve regurgitation, a paced rhythm at the time of echocardiography, or inadequate speckle-tracking analysis were excluded.

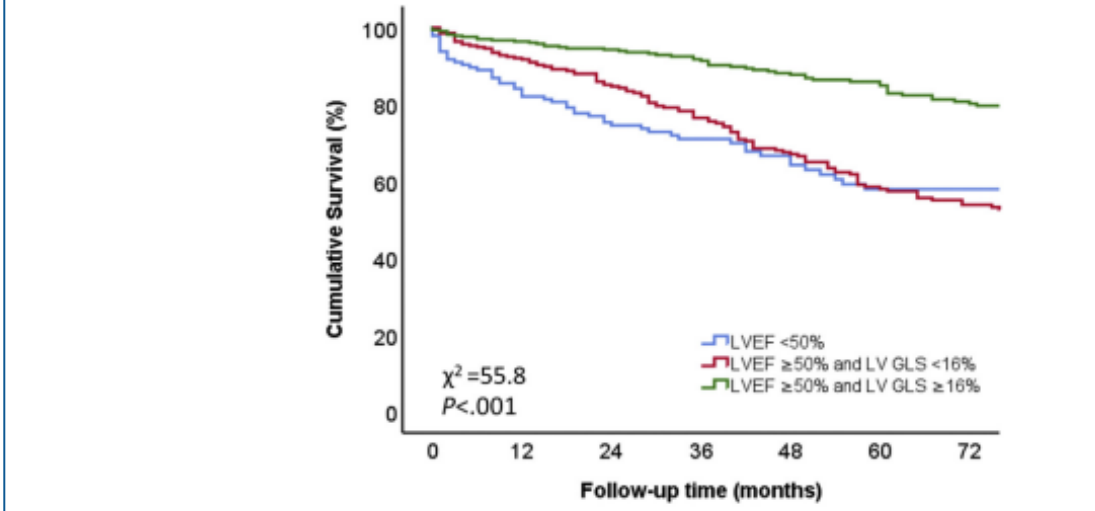
The subjects were subsequently stratified into three groups for analysis according to LVEF and LV GLS: Group 1 (LVEF < 50%); Group 2 (LVEF >= 50% and LV GLS < 16%); and Group 3 (LVEF >= 50% and LV GLS >= 16%). The primary endpoint of the study was all-cause mortality.

All echocardiographic assessments were performed using standard measurement techniques as defined by the relevant societies. GLS was calculated using speckle-tracking of the apical two-, three-, and four-chamber views with the EchoPAC software (GE Medical Systems, Little Chalfont, UK).

Results

A total of 760 patients met the authors' inclusion criteria and had adequate echocardiographic images for analysis. These patients were subsequently divided into the three aforementioned groups based upon LVEF and LV GLS. The LV GLS cutoff value of 16% was determined based on spline curve analysis. Baseline characteristics between the groups varied significantly in that the LVEF<50% group had a much higher rate of co-morbidities, including diabetes, coronary artery disease, previous myocardial infarction, atrial fibrillation, and renal disease.

During a median follow-up period of 50 months, 257 patients (34%) died with 1-, 3-, and 5-year survival rates of 92%, 82%, and 70%, respectively. 290 patients (38%) eventually underwent aortic valve replacement (AVR), of which 105 patients had a transcatheter valve placed, with the remainder receiving a surgical AVR. The survival rate based on Kaplan-Meier analysis was significantly lower in the LVEF<50% and the LVEF≥50% and GLS <16% groups compared to the LVEF ≥50% and GLS ≥16% group (see Figure 1). Indeed, long-term survival did not differ between the LVEF<50% and LVEF≥50% and GLS<16% groups.



Number at risk							
LVEF <50%	145	118	93	70	52	43	34
LVEF ≥50% and LV GLS <16%	279	254	203	167	131	102	89
LVEF ≥50% and LV GLS ≥16%	336	324	282	236	201	166	145

Figure 1: Kaplan-Meier curve for all-cause mortality. P=.592 for LVEF<50% versus LVEF≥50% and LV GLS<16%; P<.001 for LVEF<50% versus LVEF≥50% and LV GLS≥16%; P<.001 for LVEF≥50% and LV GLS<16% versus LVEF≥50% and LV GLS≥16%

The authors also performed subgroup analysis on the LVEF≥50% groups and found that the impact of GLS on survival held even with an LVEF≥60%. Given the number of co-morbidities in these patients, multivariable Cox regression was done, which showed that LV GLS as a continuous variable was independently associated with all-cause mortality (HR, 0.847; 95% CI, 0.808-0.888; P<.001). When using the predefined categorical groups, the multivariable analysis found that LVEF<50% (HR, 2.384; 95% CI, 1.614-3.522; P<.001) and LVEF≥50% and LV GLS<16% (HR, 2.467; 95% CI, 1.802-3.378; P<.001) were independently associated with a higher mortality rate.

Discussion

Chronic aortic stenosis leads to chronic pressure overload and the development of LV hypertrophy. This hypertrophy can result in a mismatch between myocardial oxygen supply and demand, resulting in subendocardial ischemia and myocardial fibrosis, affecting LV longitudinal contraction and relaxation. Thus, it is not surprising that LV GLS has been shown to predict outcomes in patients with severe AS and a preserved LVEF. It thus stands to reason that LV GLS may also help to predict outcomes in patients with moderate AS and a preserved LVEF, and indeed this was shown in a small study by Zhu, et al using a LV GLS cutoff value of 15.2%. This paper expands on those results further, demonstrating a strong, independent association between LV GLS and outcomes in a larger patient group with moderate AS, irrespective of LVEF.

This finding that LV GLS can help to predict outcomes in moderate AS with greater accuracy than LVEF has significant clinical implications. Current guidelines recommend serial echocardiograms every one to two years for asymptomatic patients with moderate AS and a preserved LVEF. However, those patients had a mortality of 14% at two years in this study when their LV GLS fell below 16%. This indicates that LV GLS may be useful in risk-stratifying patients with moderate AS and that these patients may require more frequent surveillance echocardiograms and perhaps earlier surgical intervention. The question of whether earlier AVR will improve outcomes in those patients with moderate AS and impaired LV GLS is currently under investigation in the PROGRESS (A Prospective, Randomized, Controlled Trial to Assess the Management of Moderate Aortic Stenosis by Clinical Surveillance or Transcatheter Aortic Valve Replacement) trial (NCT04889872).

The study has several limitations, which include the retrospective, observational design and the high prevalence of concomitant cardiovascular co-morbidities which may affect both GLS and outcomes. The software used to measure GLS is also vendor dependent, so the generalizability of the results, particularly the cutoff value used in the study, may be affected. Finally, the authors could not differentiate deaths from cardiovascular causes vs non-cardiovascular causes as the data was obtained from a governmental death registry database.

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Impact of Peridevice Leak on 5-Year Outcomes After Left Atrial Appendage Closure

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Introduction

Thromboembolic events emanating from the left atrial appendage (LAA) are responsible for 90% or more of embolic strokes in patients with non-valvular atrial fibrillation.[1,2] Oral anticoagulants (OAC) in patients with atrial fibrillation are effective in reducing the incidence of embolic events from > 6% to < 2%, however, more than 3% of patients are complicated by at least one significant bleeding incident.[3,4,5] The CHA2DS2-VASc score is one assessment to determine risk of thromboembolic events in patients with atrial fibrillation.[6,7] A score > 2 is considered high risk for thromboembolic events and are initially managed with OAC.[6,7]

Figure 1: CHA_2DS_2-VASc and HAS-BLED scores

	Condition	Points	CHA_2DS_2-VASc score	Stroke Risk %
C	Congestive heart failure	1	0	0
H	Hypertension	1	1	1.3
A_2	Age ≥ 75 years	2	2	2.2
D	Diabetes mellitus	1	3	3.2
S_2	Prior Stroke or TIA or Thromboembolism	2	4	4.0
V	Vascular disease	1	5	6.7
A	Age 65–74 years	1	6	9.8
Sc	Sex category	1	7	9.6
			8	12.5
			9	15.2

CHA_2DS_2-VASc score = congestive heart failure, hypertension, age, diabetes mellitus, prior stroke or TIA or thromboembolism, vascular disease, age, sex category.

	Condition	Points
H	Hypertension: (uncontrolled, >160 mmHg systolic)	1
A	Abnormal renal function: Dialysis, transplant, Cr >2.26 mg/dL or >200 μmol/L	1
	Abnormal liver function: Cirrhosis or Bilirubin >2x Normal or AST/ALT/AP >3x Normal	1
S	Stroke: Prior history of stroke	1
B	Bleeding: Prior Major Bleeding or Predisposition to Bleeding	1
L	Labile INR: (Unstable/high INR), Time in Therapeutic Range <60%	1
E	Elderly: Age > 65 years	1
D	Prior Alcohol or Drug Usage History (≥ 8 drinks/week)	1
	Medication Usage Predisposing to Bleeding: (Antiplatelet agents, NSAIDs)	1

However, if there is a history of bleeding or if patients are considered high risk for bleeding, then alternative management is considered.[8,9,10,11] For patients with atrial fibrillation, bleeding rates exceed thrombotic events when the HAS-BLED score > 3.[11] For these patient's placement of a Left Atrial Appendage Occlusion (LAAO) device is considered.[12,13,14,15]

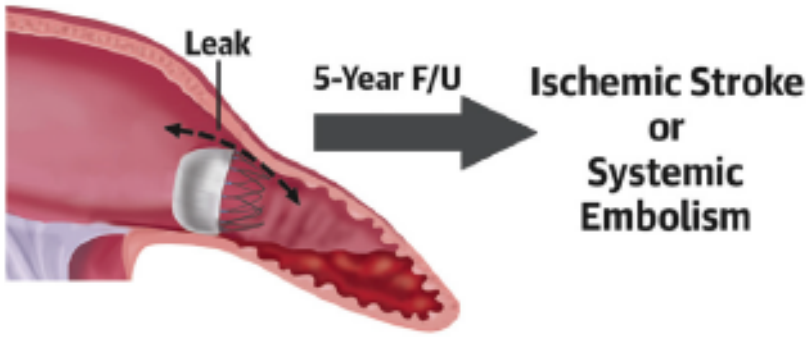
The PROTECT AF and PREVAIL studies reported that the Watchman 2.5 device is a non-inferior option when compared to OAC for patients with history of atrial arrhythmias/dysfunction at risk for thromboembolic events.[12,13,14] These data and other data for other Left Atrial Appendage Occluder (LAAO) have an equivalent efficacy in preventing thromboembolic events when compared to OAC, both being < 2%, but without the bleeding complications related to OAC.[12,13,15] In these two studies overall morbidity and mortality was lower for the Watchman group compared to OAC.[15]

Successful placement of the Watchman LAAO is defined by:

1. Positioning of the device at the LAA ostium,
2. Anchoring (stable)
3. Sizing or compression of the device by 8-20%
4. Seal so that the device covers the ostium, and all lobes are covered.

The seal of the device, meant to prevent PeriDevice Leaks (PDL) and related thromboembolic events (DRT). Initially, a seal was considered adequate if absent or if the PDL < 5mm, however, this was based on a relatively small number of patients.[1,16]

Figure 2: PeriDevice Leak



Intraprocedural assessment using transesophageal echocardiography, intracardiac echocardiographic imaging, and/or fluoroscopy evaluates the placement of the LAAO. The peridevice leak (PDL) is evaluated using 2D echocardiography with Doppler imaging and/or intracardiac contrast injection. After percutaneous or surgical closure of the LAA, thromboembolic events are still reported, and with a greater incidence with less complete closure.[17]

Study

Approximately 33% of percutaneous LAA closures using the Watchman device have persistent PDLs. The study presented here by Dukkipati et al is a post hoc analysis combining data from two previous randomized studies comparing OAC or LAAO the latter using the Watchman 2.5 percutaneous device.[18]

Post procedure management included:

1. Coumadin was continued until the 45-day TEE.

In the absence of a device related thrombus or a PDL >5mm, management thereafter included:

2. Clopidogrel 75 mg to replace coumadin
3. Aspirin (81-325 mg)
4. After 6 months, Clopidogrel was stopped, and Aspirin (325mg) was continued

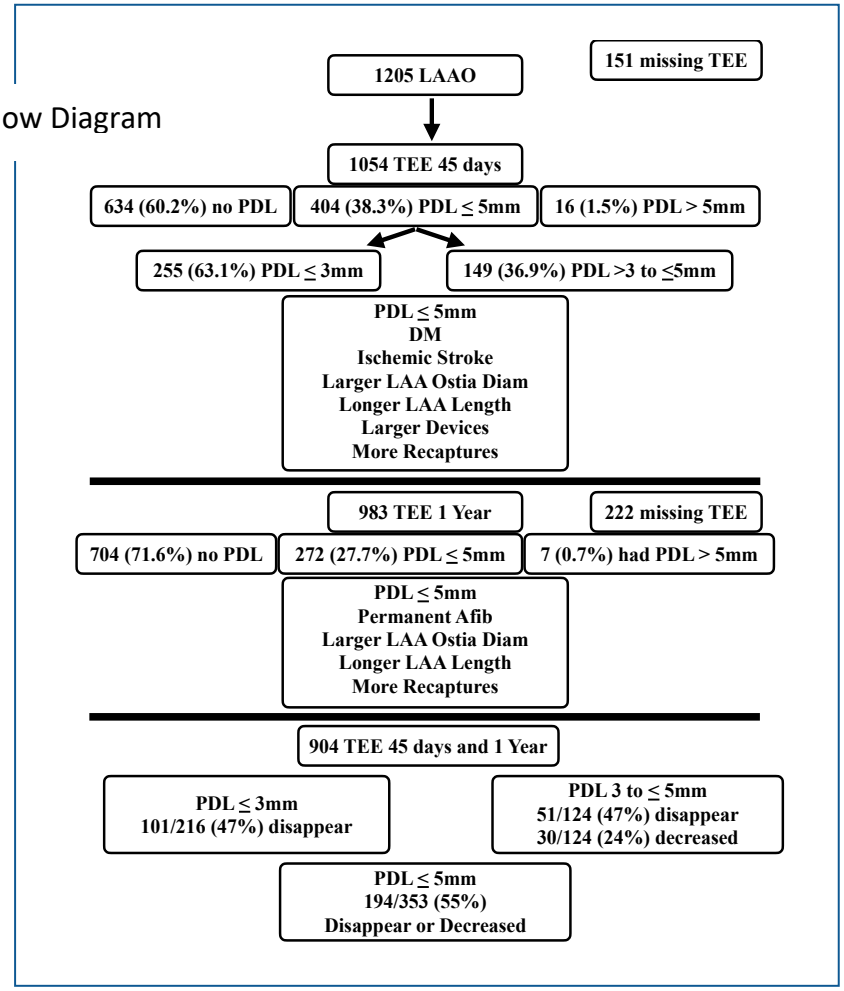
Patients underwent another TEE at 45 days and 1 year after the procedure and, were clinically followed for 5 years. All TEE exams assessed for thrombus and PDL at the standard two-dimensional mid-esophageal 0-, 45-, 90-, and 135-degree imaging windows. Leaks were assessed by a core laboratory. Study data included measures of the LAA orifice and depth, the device size, number of deployment attempts, and the presence and size of PDLs.

A PDL < 5mm assessed by TEE was considered to be acceptable at the time of implantation. PDLs were classified as none, < 3mm, and >3-5mm at its narrowest width.

Endpoints were:

1. Ischemic stroke using Modified Rankin Score (MRS) (19)
    a. Classified as non-disabling MRS < 2 or disabling MRS > 2 points
2. Systemic embolism; Device related thrombus (DRT)
3. Cardiovascular or unexplained death
4. All cause death

Figure 3: Patient Flow Diagram



Outcomes/Results

1. There was no association between PDL severity (<3ml vs >3 to 5mm) on either 45 day or 1 year TEE study and Device related thrombus (DRT) or stroke through 5 years.
2. 45 Day TEE PDL < 5mm was not associated with early or late risk for ischemic stroke or systemic embolism or death
3. 1 year TEE PDL < 5mm was associated with of ischemic stroke or systemic embolism (9.5% vs 5.1%) at 5 years, however, the significant difference was only found in the category of a Non-Disabling (MRS < 2) stroke (3.2 vs 6.4%) while disabling stroke (MRS > 2) was no different (No PDL 1.7%; PDL 1.3%).
4. Patients with PDL had greater/higher or larger
    a. Paroxysmal atrial fibrillation
    b. HAS-BLED score
    c. LAA length
    d. LAA orifice size
    e. Watchman device
    f. Number of device recaptures

Conclusion

A PDL < 5mm at 45 days and 1 year occurred in 38% and 28% of the population studied and that the majority (55%) of PDL either disappeared or decreased in severity from 45 days to 1 year. The presence of a PDL at 1 year was associated with a greater risk of non-disabling stroke (MRS < 2). Otherwise, outcomes were not different between 'no-leak' and 'leak'.

Discussion

Is this relatively larger study, the presence of a PDL < 5mm at 1 year was associated with greater occurrence of a non-disabling stroke. The strength of this study is in the numbers and the assessment of PDL by a core lab (i.e., a consistent assessment). Prior to this study, the success of the Watchman device included a small PDL, initially being < 5mm.[1,16] However, the data presented by Dukkipati et al data stress the value of preventing any leak.

These data involved placement of the Watchman 2.5, which has 10 struts and less flexibility to accommodate the LAA space especially an irregular one. The currently used Watchman FLX (18 struts) can adapt better to individual geometries and ostial anatomies. PDL have occurred after the Watchman FLX in 17.2 and 10.5% at 45 days and 1 year. This doesn't necessarily minimize the conclusion of the study presented by Dukkipati et al.

Several things need to be considered. A non-disabling stroke occurred in 6.4% at 5-year follow-up and was associated with the presence of a PDL discovered 1 year after device placement. This is a small percentage when compared to the occurrence of bleeding complications related to OAC. To what extent should all PDL be addressed at the time of device placement?

If the difference between predictiveness of TEEs performed at 45 days and 1 year was related to changing OAC regimen, then anticoagulant medications may need to be continued for those who are considered high risk for stroke. In addition to a PDL at 1-year, other variables, listed above, were shown to be predictors of outcome. Perhaps measures of atrial function, size, and flow velocities might predict the incidence DRT prompting continued OAC regimens.

In this study, leaks are defined by 2D imaging based on four standard echocardiographic

windows. In our practice, color Doppler imaging using a very low Nyquist limit (< 20cm/s) and contrast injection are employed to assess for flow around the LAAO. Could 3D imaging or cardiac MR to better define leaks either during the initial procedure and/or on follow-up?

The study does not clearly define how a leak defined? Does a PDL refer to a space that allows flow to communicate proximal to distal to the LAAO as suggested in the included figure (Figure 2)? Is a space or 'gutter' that does not communicate distally also considered a PDL? ideally, the LAAO will completely cover the LAA orifice and all spaces/pectinate, and not be associated with communications or 'gutters'. But, if not perfectly placed, what are the options?

Percutaneous LAA occlusion is not without risks.[20] Intraprocedural risks vary in significance and occurrence. Serious complications including air embolism, tamponade, stroke, device embolization, and death occur in up to 8-10%. An iatrogenic atrial septal defect is expected in all patients, but infrequently will require closure. Access related complications including bleeding, hematoma and pseudoaneurysm occur in up 10-15%.

As described in this study, PDL occur in 1/3 and associated with a 6-7% incidence of a non-disabling stroke.[18] When compared to bleeding complications associated with OAC, this number seems small and clinically less significant. To what extent should a intraprocedural or postprocedural PDL be addressed? The present study did not find that a smaller leak (< 3mm) had fewer adverse outcomes than a larger leak (>3 to < 5mm), therefore the message is to prevent all 'leaks. It is the opinion of this author that a procedure should not be aborted if a less than perfect result is obtained, but instead to continue follow-up and adjust in OAC therapy based on the presence of a PDL and additional risk factors such as LA/LAA flows and functions.[21,22] Alternatively leaks at 1 year could be closed with either vascular plugs, ductal occluders, coiling, or radiofrequency ablation.[23] With continued data collection and improved imaging and procedural technology patient management will improve.

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Echo Corner Update

SCA has contracted with TalentLMS for the acquisition of their eFront Learning Management System (LMS). The LMS went live in September 2022. SCA members NOW have greater access to online educational content, a repository of their learning history, and quick and easy access to earn CME credits and produce their certificates.

The LMS will be accessible through the SCA website and SCA Mobile App. It is important to note that the link associated with ECHO Corner Cases in the December Newsletter will connect users to the new LMS.

We look forward to providing this new functionality to serve SCA members' educational needs!