SCA NEWS

PRESIDENT'S MESSAGE

Volume 22, Number 6 | December 2020

Season's Greetings and Wishes for a Happy New Year!!!!

Stanton K. Sherman, MD, FAHA, FASE

President, Society of Cardiovascular Anesthesiologists

Dear Friends and Colleagues,

As we close out this extraordinary year, we should all take advantage of the unique opportunity to reflect not only on the past, but even more importantly to contemplate on how we can make next year more joyous, rewarding and fulfilling. I will intentionally keep this edition of the SCA President's Message very brief and hope that you will all take a moment to count your blessings, be grateful for your health and savor moments to be thankful for your friends. colleagues and family. I miss you all and I am looking forward to seeing you again in the very near future.

Please be safe and stay well,

Stan

SOCIETY OF CARDIOVASCULAR ANESTHESIOLOGISTS
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HAPPY NEW YEAR

FEB 26-28
Echo Week

APRIL 23
Thoracic Anesthesia Symposium

APRIL 24-27
Annual Meeting & Workshops

SCA ECHO WEEK

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Have You Registered for the 2021 Virtual Echo Week? Registration is NOW Open!

The Echo Week Planning Committee invites you to join us virtually for Echo Week February 26-28, 2021. Comprehensive Review & Advanced Applications of Perioperative Echo.

Top reasons to register for Echo Week 2021:

- **Core Series** — prerecorded lectures.
- **Interactive Series** — prerecorded lectures with live panel discussion.
- **Earn more than 40 hours** of continuing medical education.
- **Receive Discount on Test Yourself Modules** that will be available in April/May 2021.

If you have not registered, now is the time. You do not want to miss out on the first virtual Echo Week. Lots of exciting stuff in the planning.

Visit www.scahq.org/EchoWeek/Register for more details on registering and to view the agenda.

DON'T MISS THE FIRST VIRTUAL ECHO WEEK!

SCA ECHO WEEK

SOCIETY OF CARDIOVASCULAR ANESTHESIOLOGISTS
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Introducing the 14th Annual Arthur E. Weyman, MD, Lecturer

Dr. Judy Hung, MD

Director of Echocardiography at Massachusetts General Hospital and professor of Medicine at Harvard Medical School.

Dr. Judy Hung is Director of Echocardiography at Massachusetts General Hospital, Boston, MA, and Professor of Medicine at Harvard Medical School. She is the Director of the Trial Innovation Unit within the Division of Clinical Research at MGH, whose mission is to promote innovation in clinical trial research. She directs the Echocardiography Core Laboratory for the NIH-NHLBI sponsored Cardiothoracic Surgical Network Clinical Trials. She is President of the American Society of Echocardiography.

Dr. Hung's educational and research focus is on understanding mechanisms of underlying common cardiac function and valvular heart disease using noninvasive imaging tools such as 3D echocardiography, strain imaging and flow convergence quantitative methods. She has written extensively on cardiovascular mechanisms of disease and has received research funding from NIH, ASE, and Foundations.

The 2021 Weyman Lecture takes place Sunday, February 28. Be sure to register for Echo Week to hear Dr. Hung speak.

Visit www.scahq.org/EchoWeek/Register for more details on registering and to view the agenda.

SCA THORACIC ANESTHESIA SYMPOSIUM

Your Registration is Waiting — 2021 TAS Registration is NOW Open!

The 2021 SCA Thoracic Anesthesia Symposium will be a virtual platform held April 23, 2021.

TAS offers you:

- A focus on dramas, traumas, experts, and controversies, along with everyday challenges in the chest.
- Thought leaders provide a deep-dive exploration of new topics in thoracic surgery and anesthetic challenges.
- Virtual workshop format! Focus on your clinical interests and explore what is new with interactive experience with the authorities in the field.

At the SCA Thoracic Anesthesia virtual Symposium you can:

- **Earn more than 8 hours** of continuing medical education.
- **Choose 3 virtual workshops** and register for an optional live PBLD for a conference experience tailored to YOUR educational needs.
- **Network with 200 other professionals in anesthesiology** to help you gain insight into your practice and career.
- **Connect with our exhibitors** to learn about new products and programs.

The Thoracic Anesthesia Symposium Planning Committee is inviting non-cardiac and cardiac anesthesiologists to join us for an excellent opportunity to learn what is new in the profession!

Register and view the program at https://www.scahq.org/TAS.

REGISTER TODAY!

SCA ANNUAL MEETING

SOCIETY OF CARDIOVASCULAR ANESTHESIOLOGISTS
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2021 Annual Meeting Registration is NOW Open!

The 2021 SCA Annual Meeting and Workshops Planning Committee invites you to join them virtually April 24-27, 2021.

Look forward to:

- Amazing content delivered by experts in cardiothoracic anesthesiology, interventional cardiology and cardiothoracic surgery.
- Experts will provide didactics, small group breakout teaching, and high-yield discussions.
- Hybrid approach to virtual learning, with both on-demand education and live panel discussions.
- Problem based learning discussions, scientific abstracts, and workshops are planned to optimize attendee learning and connection on critical cardiothoracic anesthesiology topics.
- The virtual platform to allow for attendee networking, idea-sharing, and exhibits.

This year, in our virtual platform you can:

- **Earn over 30 hours** of continuing medical education education that will be on-demand post meeting for up to 60 days.
- **Attend live discussion sessions** sessions to help you discover up to date practice pathways and innovations in the field.
- **Network with 1,200 other professionals in anesthesiology** to help you gain insight into your practice and career.
- **Connect with industry and exhibiting companies** to learn about new roducts and programs.

Register and view the program at
https://www.scahq.org/AnnualMeeting.

WE HOPE TO SEE YOU ONLINE!

Introducing the Earl Wynands Lecturer

Dr. Hilary Grocott

Editor-in-Chief
Canadian Journal of Anesthesia
Professor Department of Anesthesia & Perioperative Medicine
University of Manitoba

Dr. Grocott completed medical school at the University of Saskatchewan in 1990, and after finishing an anesthesia residency at the University of Manitoba in 1995, he went on to complete a cardiothoracic anesthesiology fellowship at Duke University, where he later joined the faculty, advancing to tenured professor in 2006. In 2007, he relocated to the University of Manitoba, where he currently serves as professor (with tenure) in the Departments of Anesthesia & Perioperative Medicine and Surgery. He is also editor-in-chief of the Canadian Journal of Anesthesia.

He has published more than 300 peer-reviewed articles, abstracts, and book chapters largely relating to the cerebral consequences of cardiac surgery. An SCA member since 1994, he has served on both its International and Research Committees, the latter of which he chaired for six years. Dr. Grocott served as a Director-at-Large from 2016-2019 on the SCA Board of Directors and was re-elected in 2020 for a Director-at-Large on the Board of Directors.

The 2021 Earl Wynands Lecture takes place Sunday, April 25. Be sure to register for the Annual Meeting to hear Dr. Grocott speak.

Register and view the program at https://www.scahq.org/AnnualMeeting.

SCA Earned Reaccreditation from the Accreditation Council for Continuing Medical Education!

SCA leadership is pleased to share with you that SCA recently learned that the Accreditation Council for Continuing Medical Education (ACCME) has reaccredited SCA as a provider of Continuing Medical Education (CME) through 2024!

Accredited organizations are responsible for demonstrating that they meet requirements for delivering independent CME that accelerates learning, change, and improvement in healthcare. The ACCME accredits (and reaccredits) organizations that provide continuing medical education for physicians.

Thank you to all who played a part in this significant accomplishment!

You make a difference by supporting the SCA Endowment

December 31st is approaching — donate to SCA to take advantage of tax deductions!

By donating to the SCA Endowment, you help SCA achieve its mission and assist cardiovascular anesthesiologists in furthering their education, research, and professional development.

Making an online donation is quick, easy, and secure. Access the SCA Endowment Fund donation page by visiting **https://www.scahq.org/about/SCA-Endowment**.

For more details on the Endowment, please email **donation@scahq.org**.

Research Grant Applications Closing January 11, 2021

SCA encourages all eligible members to apply for a 2021 Research Grant. The following SCA/IARS Research Grants are available through the 2021 Grant Application.

SCA Members are eligible to apply for 1 of 3 types of grants offered in 2021:

- **SCA/IARS Starter Grant** — up to $25,000 a year for 2 years
- **SCA/IARS Mid-Career Grant** — up to $50,000 a year for 2 years
- **Diversity and Inclusion Grant** — up to $25,000 a year for 2 years

Award recipients will be announced during the SCA 2021 Virtual Annual Meeting & Workshops. The grant period of 24 months can begin any time from July 1 to December 31 of the year granted.

Applications will close on **January 11, 2021.** Visit **www.scahq.org/researchgrants** for more information about these funding opportunities.

Visit **www.scahq.org/researchgrants** to review the eligibility, application requirements, and to learn more about past winners. Make sure to submit your application by 11:59 pm CST on Monday, January 11, 2021.

SUBMIT YOUR APPLICATION TODAY

Kaplan Leadership Development Award is NOW Accepting Applications!

The Kaplan Leadership Development Award is designed to assist cardiothoracic and vascular anesthesiologists in their careers by granting funding to further their leadership development through coursework and leadership-specific studies.

The award granted is for $10,000: $5,000 from the SCA Endowment with a $5,000 match from the applicant's institution to fund a leadership education strategy.

The deadline to submit your application is January 15, 2021.

Check out **https://www.scahq.org/kaplanaward** for more information on this award and how to apply.

Questions about the grant and grant application should be emailed to **operations@scahq.org**, or via telephone at 855.658.2828.

SCA 2021 Nominating Slate

The SCA Nominating Committee, chaired by Immediate Past President Dr. Christopher A. Troianos, is pleased to endorse the following candidates for the 2021 election cycle. Information about each candidate will be available in the February newsletter and through the online election system.

President-Elect — one position is available, among the following nominees**:**

- Kathryn E. Glas, MD MBA FASE, Emory University
- Mark A. Taylor, MD FASE, Cleveland Clinic

Secretary/Treasurer — one position is available, among the following nominees**:**

- Amanda A. Fox, MD MPH, University of Texas Southwestern Medical Center
- Douglas C. Shook, MD FASE, Brigham and Women's Hospital
- Nikolaos J. (Nick) Skubas, MD DSc FACC FASE, Cleveland Clinic

Director-at-Large — two positions are available, among the following nominees**:**

- James H. (Jake) Abernathy, MD MPH FASE FAHA, John Hopkins University
- Tara Brakke, MD FASE, University of Nebraska Medical Center
- Michael P. Eaton, MD, University of Rochester Medical School
- Jacob T. Gutsche, MD, University of Pennsylvania
- Nanette M. Schwann, MD, Lehigh Valley Health Network

CME Committee Member — one position is available, among the following nominees**:**

- Dalia A. Banks, MD FASE, University of San Diego
- Muhammad F. Sarwar, MD FASE, SUNY Upstate Medical University

Nominating Committee Member — two positions are available, among the following nominees**:**

- Rebecca Ann Aron, MD, University of Nebraska Medical Center
- Abimbola O. (Bola) Faloye, MD, Emory University

The 2021 online elections for SCA leadership will open on January 28, 2021.

Call for Volunteers Opening Soon!

Are you looking to get even more out of your SCA membership? Consider applying for an SCA volunteer position on a committee, sub-committee, working group, or task force!

More than 500 SCA members are engaged in the Society's work by serving on nearly 45 different groups (i.e., Committee, Sub-Committee, Working Group, Task Force, Council). These groups are formed to achieve a specific goal designed to enhance the membership experience for Society members. Each group takes a different structure, form, and function:

Committees
Long-standing groups within the Society that focus on more extensive strategic measures.

Sub-Committees
Support the work of Committees and have a specific focus with specific goals.

APPLY TO VOLUNTEER TODAY

Working Groups
Groups brought together by common knowledge to complete detailed work, as outlined by their parent Committee or Sub-Committee.

Task Forces
Small groups are assigned to complete a particular task within a limited period. Once the task is complete, the task force disbands.

Committee Member Expectations:

- SCA membership must be in good standing.
- Attend at least 50% of meetings (including conference calls and in person).
- Review meeting materials in advance and respond promptly to communications.
- Demonstrate enthusiasm: act ethically, conscientiously, and with respect for other group members, SCA members, and the SCA management team.
- Be able to work effectively both independently and with a team.

Applications for the 2021 Call for Volunteers opens in January 2021.

2020 UPDATE

Regional Anesthesia for Cardiothoracic Enhanced Recovery Special Interest Group (RACER)

This has been a year like no other. The COVID-19 pandemic disrupted every aspect of life. We are humbled and saddened by the sacrifices given by so many, especially as we watch the current surge, but have hope and optimism with the arrival of the vaccines.

Thank you for your continued support and participation in the RACER Special Interest Group. As we lost the opportunity to present and discuss at the 2020 SCA Annual Meeting, and COVID has disrupted research activities in many centers, we have curated some of this year's RACER studies.

The literature contains an emphasis on fascial plane blocks, trends away from opioid based pain management, and increasingly innovative approaches in applying regional anesthesia techniques to a wider variety of cardiothoracic surgeries beyond sternotomy. It's great to see so many active SCA members investigating and publishing on these topics. We hope you will enjoy these, whether by a roaring fire, or under the bright lights of an ICU or the OR.

Wishing you all a safe and happy holiday season, and a hopeful bright new year.

From your SCA RACER SIG Leadership Team,
Ban Tsui, Rebecca Klinger, Peter Neuburger, Himani Bhatt and Jessica Brodt

Fascial Plane Blocks – Reviews, Techniques

- Regional Anesthesia in Cardiac Surgery: An Overview of Fascial Plane Chest Wall Blocks. Kelava M, Alfirevic A, Bustamante S, Hargrave J, Marciniak D. Anesth Analg. 2020 07;131(1):127-135.
- Serratus Anterior Plane Block – A Promising Technique for Regional Anesthesia in Minimally Invasive Cardiac Surgery. Patel SJ, Augoustides JGT. J Cardiothorac Vasc Anesth. 2020 Nov;34(11):2983-2985.
- The Role of Serratus Anterior Plane and Pectoral Nerves Blocks in Cardiac Surgery, Thoracic Surgery and Trauma: A Qualitative Systematic Review. Jack JM, McLellan E, Versyck B, Englesakis MF, Chin KJ. Anaesthesia. 2020 10;75(10):1372-1385.
- Utility of Erector Spinae Plane Block in Thoracic Surgery. Pirsaharkhiz N, Comolli K, Fujiwara W, Stasiewicz S, Boyer JM, Begin EV, Rubinstein AJ, Henderson HR, Lazar JF, Watson TJ, Eger CM, Trankiem CT, Phillips DG, Khaitan PG. J Cardiothorac Surg. 2020 May 12;15(1):91.

RACER in Sternotomy Patients

- Erector Spinae Regional Anesthesia for Robotic Coronary Artery Bypass Surgery is Not Associated with Reduced Postoperative Opioid Use: A Retrospective Observational Study. Moll V, Ward CT, Jabaley CS, O'Reilly-Shah VN, Boorman DW, McKenzie-Brown AM, Halkos ME, Prabhakar A, Pyronneau LR, Schmidt PC. J Cardiothorac Vasc Anesth. 2020 Sep 20.

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- Effect of Regional Analgesia Techniques on Opioid Consumption and Length of Stay After Thoracic Surgery. Dunham WC, Lombard FW, Edwards DA, Shi Y, Shotwell MS, Siegrist K, Eagle SS, Pretorius M, McEvoy MD, Gillaspie EA, Nesbitt JC, Wanderer JP, Kertai MD. Semin Cardiothorac Vasc Anesth. 2020 Aug 17:1089253220949434.
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- Efficacy of Bilateral Erector Spinae Plane Block in Management of Acute Postoperative Surgical Pain After Pediatric Cardiac Surgeries Through a Midline Sternotomy. Kaushal B, Chauhan S, Magoon R, Krishna NS, Saini K, Bhoi D, Bisoi AK. J Cardiothorac Vasc Anesth. 2020 Apr;34(4):981-986.

RACER Beyond the Sternum

- Choosing the Best Method for Postoperative Regional Analgesia After Video-Assisted Thoracoscopic Surgery. Campos JH, Peacher D. J Cardiothorac Vasc Anesth. 2020 Jul;34(7):1877-1880.
- Parasternal Pectoral Block for Right Anterior Minimally Invasive Thoracotomy in Cardiac Surgery. Ellouze O, Missaoui A, Berthoud V, Bouhemad B, Guinot PG. J Cardiothorac Vasc Anesth. 2020 Feb;34(2):450-453.
- Ultrasound-Guided Continuous Deep Serratus Anterior Plane Block Versus Continuous Thoracic Paravertebral Block for Perioperative Analgesia in Videoscopic-Assisted Thoracic Surgery. Hanley C, Wall T, Bukowska I, Redmond K, Eaton D, Ní Mhuircheartaigh R, Hearty C. Eur J Pain. 2020 04;24(4):828-838.
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- Bilateral Continuous Erector Spinae Plane Block in Open Abdominal Aortic Aneurysm Repair. Zullino V, Bonvicini D, Alfonsi L, Ferrarese B, Rinta-Nikkola M, Gambardella M. J Cardiothorac Vasc Anesth. 2020 Jun;34(6):1588-1590.

SCA MEMBER CORNER

SOCIETY OF CARDIOVASCULAR ANESTHESIOLOGISTS
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Fellow Membership Update!

Congratulations to all who have recently completed their fellowship! When renewing your SCA membership, please be sure to renew at the active or associate rate. Should you need assistance when doing so, please contact Mary Lunn at **mary@veritasamc.com**.

Annual Dues and Meeting Registration Update!

This past summer the SCA transitioned to a new association management company, Veritas Association Management. As a result, there is new banking information that your institution should be made aware of if they cover your annual dues or meeting registrations via a wire transfer. Requests for this information to be forwarded to your institution's accounting department may be sent to **info@scahq.org.**

Member Benefit: JCVA Subscription at Discounted Rates

All SCA members are eligible to subscribe to the *Journal of Cardiothoracic and Vascular Anesthesia* (Red Journal) at discounted rates!

JCVA is primarily aimed at anesthesiologists who deal with patients undergoing cardiac, thoracic, or vascular surgical procedures. The Red Journal features a multidisciplinary approach, publishes clinically relevant material, and encourages innovative submissions from all continents.

Journal Benefits:

- Access to all multimedia content (e.g., podcasts, videos, slides).
- Fully optimized mobile browsing experience on your smartphone or tablet

Visit https://www.scahq.org/JCVA for more details and to take advantage of special SCA member rates!

AWEsome Woman Questions

Jessica Brodt, MBBS FASA
Stanford University

Brief introduction about yourself:

Dr. Jessica Brodt is a cardiothoracic anesthesiologist and Clinical Associate Professor at Stanford University. She is a native Australian, originally from the Blue Mountains outside of Sydney. Dr. Brodt supervises and teaches fellows, residents, and medical students at Stanford Hospital and Clinics, providing anesthesia for the whole spectrum of cardiac surgical procedures. She also provides consultation on the application of regional anesthesia in cardiac surgery and management of high-risk cardiac patients undergoing non-cardiac surgery and obstetric procedures. Her non-clinical work passions include sparking curiosity in trainees and clinical research focused on the impact of regional anesthesia and opioid-sparing techniques in the cardiothoracic surgery population.

1. What led you to become a Cardiovascular/Thoracic Anesthesiologist?

Looking back, I had many small exposures to incredible cardiothoracic specialists, culminating in awe of managing patients in the heart room. My medical school (University of Sydney) has clinical exposure starting in the first year. I was paired with a cardiology registrar and a vascular surgeon from week 1, who provided great inspiration for pursuing a focused cardiovascular career. After a very hands-on elective in anesthesia and critical care, with a dream that I could try to understand physiology and pharmacology on the same level as my teacher, I knew I wanted to pursue anesthesia (thanks, Dr. Jennifer Prowse!). Fast forward to an internship, and I still vividly remember the cardiac anesthesia team arriving at the bedside to manage a patient with tamponade and meeting someone I always much admire, Dr. Yiliam Rodriguez. I wanted to grow up to be like her! The hardest decision was between critical care and ACTA (Dr. Ricardo Martinez-Ruiz nearly convinced me to pursue a different path). Still, after watching a heart transplant reperfuse and come back to life, I knew the heart room was the place I could happily be in any time of day or night, and that would keep working with that kind of magic.

2. How did you hear about the SCA?

I was encouraged to join the SCA by attending my residency when I approached them about pursuing an ACTA fellowship. When I attended the 2013 thoracic symposium and annual meeting in Miami, I felt like a kid in a candy store, totally hooked.

3. What roles have you held for the society?

I feel incredibly fortunate to have been elected this year to serve on the SCA Board of Directors. I first became a member in 2012, relatively passively enjoying the annual meetings and society's general camaraderie. After encouragement from a great friend and sponsor (Dr. Bel Russel) to pursue more active SCA engagement, I joined the International Committee in 2017.

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Since being invited to serve on the Opioid Working Group, founded the Regional Anesthesia for Cardiothoracic Enhanced Recovery Special Interest Group (RACER SIG), and serving on the Board of Directors, Online CME Subcommittee, and the Leadership, Organization, and Succession Task Force, things a have accelerated for me.

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

Being asked to be a mentor still surprises me, though admittedly less so as I progress in career milestones. When a junior colleague, resident, or medical student comes to discuss careers, fellowship, jobs, or other aspects of life, I feel honored and humbled by the responsibility. Although we won't ever know the depth or breadth of the impact we have in these roles, this is a unique and memorable way to leave a mark.

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

- Use every clinical experience to build on your skills and knowledge. If you did a case and didn't learn anything, you weren't looking for things to know. Often it's not something you can find in a textbook, journal, or lecture.
- Be curious. I don't mean continually asking questions about every step of an anesthetic, but take time to ruminate on the things we assume we know and those we don't know.
- Don't wait for the perfect time for your family – this doesn't exist. You will never have enough time or feel ready. There are more support and flexibility than ever before thanks to changes from the ACGME and ABA, so you won't even have to say "back in my day..."
- Look out for each other and yourselves.

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

Although I've faced challenges arriving as a foreign medical graduate, as a woman in a large academic center, and raising kids throughout training and initial years as faculty - there are individuals with far more significant obstacles to overcome based on nothing they can change. The discussions on equality and diversity that are happening on the individual, department, institutional and societal levels are great to see, but we still have a long way to go.

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

- We are stronger together.
- Don't internalize negative feedback. Listen to it, consider the feedback provider's perspective, and use it to inform your future actions (e.g., never give feedback like that) or develop your skills in a new way.
- There are still individuals who label strong women clinicians as difficult or confrontational – don't make this your problem.
- Stay alert for when you find someone who is a good fit as a mentor or sponsor. These relationships can't be forced or arbitrarily assigned and require willingness and active participation on both sides.

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8. How do you balance work and personal life?

It's a daily challenge. It's simply not possible to be present in both simultaneously, no matter how hard you try. I'm finding more peace by compartmentalizing and finding uninterrupted time with kids as close to every day as possible (even if just at bedtime). I've missed a lot of bedtimes, spent a lot of time working by the light of a laptop late into the evening, and am grateful for a very forgiving husband and family. My one line-in-the-sand is my kid's birthdays, which I take as a vacation day every year.

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

Almost anything near an ocean or surrounded by trees or other nature. I enjoy gardening but probably need to get more drought-tolerant plants, given my erratic watering habits. Not much time for reading casual literature, but I love getting stuck into a great book (check out "The Overstory" if you need something mind-bending). If I need to disconnect completely, I'll find one of my old piano books and dabble in classical pieces. I am excited for when we can get back to travel, skiing and snowboarding too.

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

Be better at waking up early. Other than that, I can't ask for anything to change as it might disrupt where I would be currently. If I could do maternity leave over again, I would do more take out/delivery and set aside work completely – running a household with a newborn and trying not to feel out of touch with work is way overrated.

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

When you get to a new place, learn how they practice and use that way (unless patient safety is an issue) at first ("keep your mouth shut"). Once you establish yourself as a great clinician, you can start to do things 'your' way.

Does the Risk Outweigh the Benefit: The Impact of Change in Definition of Increased-Risk Donors on Survival after Lung Transplant

Lehr C, Lopez R, Arrigain S, et al. *J Thorac Cardiovasc Surg*. 2020 Aug;160(2):572-581.

Reviewers:

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Background

Respiratory failure remains a leading cause of death globally, and although medical management predominates as first line treatment, lung transplantation is the only definitive therapy for end stage lung disease.[1] Significant advances in the field of lung transplant have been made since the first transplant by Hardy in 1963; however organ availability remains the biggest limitation to lung transplant today.[2] As such, a shortage of organs accounts for 10% of US deaths on the lung transplant waitlist yearly.[3] The US Public Health Service (PHS) identifies donors that are at a risk of being in the window period for transmitting communicable diseases such as human immunodeficiency virus (HIV), Hepatitis B (HBV) and Hepatitis C (HCV). In 2013 new guidelines were adapted from the PHS to expand the definition of donor risk from the older term "high-risk" which was used in 1994 to the new term "increased-risk" instituted in 2013. This change was made as an effort to capture the period of time where donors were in a window or time frame of risk.[3] Unfortunately, the widened definition of "increased risk" donor also led to the classification of more donors who would require warning to recipients.[4] The aim of the current manuscript is to compare the effect of the new broadened definition of donor risk against the older method and standard risk donors on patient outcomes.[3]

Methods

The authors evaluated all lung transplant recipients in the Scientific Registry of Transplant Recipients (SRTR) who received a lung transplant from January 2006 until May 2017 and excluded those recipients younger than age 18, received a prior lung transplant, traveled from outside the US for transplant, were missing donor risk information, or received only a lobar transplant. These patients were divided into two matched cohorts; 924 high-risk donors (HRD) matched with 924 standard-risk donors (SRD) and 1463 increased-risk donors (IRD) matched with 1463 SRD. The matched cohorts were used to evaluate the primary outcome, post-transplant patient survival as well as the secondary outcome which included graft survival and acute rejection at 1 year. The HRD and IRD differed from SRD by characteristics such as sex, race, history of heavy alcohol or cocaine use, cigarette use, and other drug use.

Results

Primary outcome of patient survival was similar across all cohorts and there was no statistically significant change in mortality. The authors reported survival between HRD and SRD as (hazard ratio [HR], 0.97; 95% confidence interval [CI], 0.83-1.14, P = .73) and likewise between IRD and SRD (HR, 1.07; 95% CI, 0.90-1.27,

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P = .44).[3] The change in definition from high risk to increased risk had no statistically significant difference in graft survival in either HRD (P=.93) or IRD (P=.44) or acute rejection requiring treatment at 1 year for HRD (P=.27) and IRD (P=.23).[3] Notably, as an effect of this change in risk characterization in 2013, the proportion of at risk organs transplanted improved significantly. Upon changing definition to IRD from HRD the proportion of transplanted organs increased by over 10% (22% vs 8%; P <.001).[3]

Discussion

Recent literature in kidney transplantation has proven that accepting IRD kidneys has shown at least a 33% reduction in recipient 6 month mortality.[5] Cox et al. showed that patients on lung transplant waitlist who accepted the IRD offer had significantly improved overall mortality at 1 year (14.1% vs 23.9%, p < 0.001) and 5 years (48.4% vs 53.8%, p < 0.001).[4] The number of recipients who have acquired a high risk viral infection secondary to organ transplant from 2014 to 2017 in the US were 7 HBV, 20 HCV, and no cases of HIV.[3] Attempts to mitigate recipient risk and adverse outcomes by broadening risk definition have increased the number of donors labeled at-risk. However, the literature thus far has yet to support the increased mortality or graft rejection risk from these donors and perhaps has suggested the opposite; increased mortality has resulted from recipients rejecting organs from increased risk donors. More investigation is warranted as to the utility and benefit of the continued application of increased risk donor classification.

References

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SOCIETY OF CARDIOVASCULAR ANESTHESIOLOGISTS
Knowledge • Care • Investigation

Spectrum of Cardiac Manifestations in COVID-19

A Systematic Echocardiographic Study

Szekely Y, Lichter Y, Taieb P, et al. Circulation. 2020; 142:342-353

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Background

As the coronavirus disease 2019 (COVID-19) continues to spread in populations across the world and has become a major cause of morbidity and mortality, there remains little information regarding the disease's effect on the cardiovascular system. There have been reports[1,2] regarding acute cardiac injury as it relates to COVID-19 infection, however there has not been a systematic echocardiographic evaluation of patients suffering from COVID-19.

Study Design

The authors prospectively evaluated 100 patients with COVID-19, who were admitted to the Tel Aviv Medical Center between March and April 2020. The diagnoses were confirmed with positive reverse-transcriptase polymerase chain reaction assay. Patients at least 18 years of age were risk-stratified according to their COVID-19 Modified Early Warning Score (MEWS) and Sequential Organ Failure Assessment score. All patients had a comprehensive transthoracic echocardiogram (TTE) within 24 hours of admission. Patients who later clinically deteriorated had a repeat TTE. Clinical deterioration was defined as occurrence of any of the following: acute new-onset hypoxemia requiring mechanical ventilation, veno-venous extracorporeal membrane oxygenation, hypotension requiring vasopressors with elevated lactate level > 2 mmol/L, high troponin level, arrhythmia such as rapid ventricular tachycardia, ventricular fibrillation, or any arrhythmia causing hemodynamic instability.

The echocardiography was performed at bedside by cardiologists with expertise in echocardiography, using similar equipment. The left ventricle was assessed with the following parameters: left ventricular (LV) diameter, volume, ejection fraction (LVEF), and mass. Mitral inflows were obtained, E/A ratio was calculated, e' velocities at both septal and lateral positions, and the deceleration time of early filling velocity were all measured. Left atrial volume, stroke volume, cardiac output, and cardiac index were calculated. The right ventricle (RV) end-systolic and end-diastolic areas were assessed, as was the tricuspid annular dimension.

The following were used to evaluate RV function: fractional area change, tricuspid annular plane systolic excursion, systolic lateral tricuspid annular velocity (RV S'), index of myocardial performance (Tei index), and pulmonary flow acceleration time (AT) velocity {to assess pulmonary vascular resistance (PVR)}.

Lung ultrasound was performed using a 6-zone approach for each lung.

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Results

The patients were 63 males and 37 females with had an average age of 66.1 +/ 17.3. 72% of the patients had comorbidities (hypertension being the most common, followed by diabetes mellitus, obesity, and coronary artery disease). At the time of evaluation all patients were dyspneic. They were further classified into three groups: mild disease (no need for supplemental oxygen, 61 patients), moderate disease (supplemental oxygen, 29 patients), and severe disease (mechanical ventilation, 10 patients).

At baseline 32% had a normal exam. Reduced LVEF was found in 10 of the patients (2 of these had a known reduced LVEF). Patients with elevated troponin (20%), or those with moderate to severe clinical grades, did not demonstrate any significant difference in LV systolic function compared with patients with normal troponin or better clinical condition, but they consistently demonstrated worse RV function. Twenty (20) patients showed severely elevated filling pressures as determined by an E/e' ratio 14. RV dilatation was more common and observed in 39% of patients. While TAPSE and myocardial performance indices remained in the normal range for most patients, pulmonary AT was shorter, and RV S' and FAC were lower than expected. Patients in the moderate or severe group were noted to have shorter pulmonary AT. There was no significant difference in LV systolic or diastolic function between the groups.

A subgroup analysis was performed on patients with decreased pulmonary AT. These patients were found to be older, typically possessing more comorbidities, and more significant lung disease, as identified by chest x-ray, lung ultrasound, and oxygen saturation. These patients also had increased levels of D-dimer, BNP, troponin-I, and CRP. An additional subgroup analysis was performed on patients with elevated troponin on admission. These patients had significantly elevated E/e', shorter pulmonary AT, and reduced TAPSE, RV S', and RV FAC.

The authors found that the two principal predictors of deterioration were either low LVEF, or a shorter pulmonary AT. Echocardiographic predictors of mortality included low LVEF, elevated E/e' ratio, RV dilatation, and higher Tei index. In the 20 patients who did suffer a clinical deterioration, LV systolic and diastolic parameters did not change significantly, but a reduction in pulmonary AT was the most common finding, and RV dilatation was also frequent.

Discussion

This is the first study where comprehensive echocardiography was performed shortly after hospital admission for COVID-19 to assess the spectrum of cardiac manifestations related to the disease. Some limitations of the design include the single center nature of the study, and the exclusion of non-hospitalized patients with COVID-19, which could potentially lead to an overestimation of disease severity. At the time of the study, approximately 7% of patients with COVID-19 infection in Israel required hospitalization.

While other investigations 1,2 have demonstrated biomarker evidence of myocardial injury suggestive of potential LV dysfunction, in this series a significant reduction of LVEF appears uncommon. Although the authors state that LV diastolic dysfunction is relatively rare (16%), the threshold they are using to define significant diastolic dysfunction was an E/e' ratio of 14, which may not fully highlight those patients falling outside the 'severe' category, but also presenting with reduced diastolic function. In fact, compared to normal reference ranges in healthy adults, where E/e' is 6.5± 3.73, patients in this study who presented with COVID-19 had an average E/e' of 11.4±6, suggesting that even if severe diastolic dysfunction was not common, a reduction in overall LV diastolic function may be more frequent.

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Right ventricular dysfunction was observed in the study with an incidence of 39%, closely mirroring another larger, more recently published study4, revealing that 33% of patients with presumed or confirmed COVID-19 had right ventricular dysfunction. More than 80% of patients with moderate or severe disease had a reduced pulmonary AT (<100ms). Pulmonary AT has been demonstrated to correlate with invasively measured mean pulmonary arterial pressure5, and can be used to measure estimated peak systolic pulmonary artery pressure independent of tricuspid regurgitation6. A reduced pulmonary AT, suggestive of higher pulmonary resistance, may be reflective of conditions such as pulmonary embolism, microvascular thrombosis, worsening atelectasis, excessive positive end-expiratory pressure, pneumonia, hypercarbia, elevated left atrial pressure, -agonists, or a confluence of these factors. Indeed, in the setting of COVID-19 viral pneumonia, it is common to encounter many of these factors simultaneously. The authors did not measure tricuspid regurgitation gradient as an estimate of peak pulmonary arterial systolic pressure but given that pulmonary AT and tricuspid regurgitation gradient have been demonstrated to correlate with one another6, one might expect a similar trend.

The authors are to be applauded for being among the first to document the echocardiographic manifestations of COVID-19. While there are significant limitations to the study, and we await larger series that will explore the cardiac effects of COVID-19 in a broader set of patients, and over a longer duration, this study serves as an interesting first glimpse into the impact of COVID-19 on the heart

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Hydroxocobalamin Versus Methylene Blue for Vasoplegic Syndrome in Cardiothoracic Surgery: A Retrospective Cohort

Furnish C, Mueller S, Kiser T, et al. J Cardiothorac Vasc Anesth. 2020; 34: 1763-1770.

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Background

Vasoplegic syndrome is a potentially life-threatening complication that can occur following cardiac surgery and cardiopulmonary bypass (CPB). The risk of vasoplegic syndrome after CPB varies widely depending on numerous factors, with reported rates ranging from 5-25%, with a mortality rate as high as 25%.[1-2] While there is no universally accepted definition of vasoplegic syndrome, commonly used criteria for establishing the diagnosis include hypotension (MAP <60 mmHg) without another identifiable cause, SVR < 800 dyn*sec/cm^5, CI > 2.2 L/min/m^2, and nonresponsiveness to adequate volume administration and vasopressor therapy.[3] Given the frequency as well as the morbidity and mortality associated with vasoplegic syndrome following CPB, a host of agents have been examined as potential rescue therapy. Two of the more commonly used rescue medications are methylene blue and hydroxocobalamin (Vitamin B12). The former is a guanylate cyclase inhibitor that reduces the vasodilatory effects of NO, while the latter acts as a binder of NO and direct inhibitor of NO synthase, and may also have inhibitory effects on H2S.[2-3] In spite of their frequent usage, the vast majority of published literature on the use of methylene blue and/or hydroxocobalamin consists of case reports or small case series, so it remains unclear which patients would benefit from their administration, what doses are most effective, and whether one agent is superior to the other.

This study attempts to answer some of these questions by retrospectively comparing the administration of methylene blue and hydroxocobalamin in patients with post-CPB vasoplegic syndrome.

Methods

The authors retrospectively screened all patients who received either methylene blue or hydroxocobalamin at a tertiary care center between June 2015 and December 2018. Patients were eligible for inclusion if they received the dose either in the operating room or cardiac intensive care unit following CPB for cardiac surgery for suspected vasoplegic syndrome, as confirmed by a note documenting this diagnosis. Any patients who received both medications or were recipients of a noncardiac solid organ transplant were excluded from the study. This left 16 patients in the methylene blue arm and 19 patients in the hydroxocobalamin arm. Baseline patient characteristics, hemodynamic data, medication dosing, and other information were then extracted from the electronic medical record. All vasopressor doses were converted into norepinephrine (NE) equivalents which were then time-averaged over the hour prior to drug administration and the hour following administration.

The primary outcome of the study was a change in the time-averaged NE equivalent, while secondary outcomes included change in point-in-time MAP, NE equivalent, change in SVR, lowest NE equivalent dose, ICU-free days two weeks post administration, vent-free days two weeks post administration, and mortality. The decision as to which agent to use, if/when to administer it, and the dosing of methylene blue were left to the clinicians caring for the patients.

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Results

Baseline characteristics were similar between the two groups, and the most common cardiac procedures among the 35 patients were aortic repair (29%), coronary artery bypass grafting (CABG) (26%), and heart transplant (20%). The patients in the methylene blue group had higher APACHE II scores, trended towards higher EuroSCORE II scores, and had a lower pre-intervention MAP, indicating that these patients may have been more critically ill at a baseline than those in the hydroxocobalamin cohort. The average dose for methylene blue was 1.6 ± 1.2 mg/kg and was administered as a bolus in 13 patients, and infusion over 25 minutes in 2 patients, and a bolus followed by an infusion in one patient (hydroxocobalamin was administered as a standard 5 gram dose over 15 minutes in all patients).

The time-averaged NE equivalents were similar between the two arms prior to drug administration, and did not change in the one hour after administration in either the methylene blue (change = 0.012 ± 0.218 µcg/kg/min, p=0.80) or hydroxocobalamin (change = -0.037 ± 0.027 µcg/kg/min, p=0.34) group. No difference in the primary outcome was seen between the two rescue therapies either (p=0.46). When individual point-in-time NE equivalent values were examined, hydroxocobalamin showed significantly lower NE equivalent levels at 1 hour (p=0.03) and 4 hours (p=0.04) post-administration, with a trend towards significance at 15 minutes, 2 hours, and 6 hours.

Both methylene blue and hydroxocobalamin were associated with a higher MAP up to 6 hours after administration, as well as an increase in SVR at 1 hour. There was no difference between the two groups in the level of change in SVR. There was also no difference found between the two arms in mortality ICU-free days two weeks post administration, or vent-free days two weeks post administration, and no adverse events related to the medications were seen.

Discussion

Despite their regular use in clinical practice, this is one of the larger cohort studies comparing the effectiveness of methylene blue and hydroxocobalamin for the treatment of vasoplegic syndrome after CPB. Both therapies resulted in an increase in MAP and SVR, but neither significantly lowered the necessary doses of vasopressor medications. The likely explanation for this is that the increase in MAP was not significant enough to offset the need for ongoing, high-dose vasopressor administration. This finding is in line with that of several other studies and reviews looking at the use of methylene blue[4-5] and hydroxocobalamin individually for post cardiac surgery refractory vasoplegia.[6-7] There is currently a prospective trial underway that will compare methylene blue, hydroxocobalamin, and placebo for vasoplegia prophylaxis in 60 patients at risk for vasoplegic syndrome undergoing cardiac surgery that will hopefully shed some additional light on the subject.

The current study was hampered by several limitations, most significantly its nature as a small retrospective cohort analysis. Additionally, there is evidence that the patients in the methylene blue group were more critically ill than those in the hydroxocobalamin group, which may have affected the results. Dosing in methylene blue was not standardized, and while this was unlikely to have a major effect in the outcomes of the study, it cannot be ruled out. Finally the lack of a consensus definition for vasoplegic syndrome has a negative effect on any research done in this area, as without a standardized set of criteria for inclusion in the analysis, it remains possible that some patients may have had other, undiagnosed reasons for their shock state.

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Right Ventricular Hypertrophy in Refractory Acute Respiratory Distress Syndrome Treated With Venovenous Extracorporeal Membrane Oxygenation Support

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Background

Venovenous extracorporeal membrane oxygenation (VV-ECMO) has been increasingly used for treatment of refractory respiratory failure secondary to the advent of more reliable equipment and improvement in mechanical circulatory support management. VV-ECMO not only provides complete extracorporeal oxygenation and decarboxylation but also permits protective mechanical ventilation with enhanced lung protection and improved clinical outcomes in patients with acute respiratory distress syndrome (ARDS).[1] However, severe ARDS is often complicated by pulmonary hypertension leading to increased right ventricular (RV) wall thickness. RV failure results in decreased organ perfusion contributing to mortality and morbidity.[2] Moreover, RV dilation has been shown to be an independent predictor of early death in patients with ARDS requiring VV-ECMO.[3] The clinical relevance of RV hypertrophy can be extrapolated from conditions such as pulmonary arterial hypertension and congenital heart disease where RV hypertrophy develops as a response to chronic afterload and predisposes to RV ischemia and/or infarction in the absence of significant coronary artery disease.[4] Both mechanical ventilation and ARDS increase RV afterload leading to RV hypertrophy. While RV size and function have been studied, RV hypertrophy has not been investigated in patients with ARDS treated with VV-ECMO. This study aimed to assess the incidence of RV hypertrophy in this patient population.

Study Design

This study was a single center prospective observational study of patients with ARDS requiring VV-ECMO support admitted to ICU between 2016 and 2018.[5] The authors aimed to assess the incidence of RV hypertrophy identified by echocardiography. Echocardiographic exam was performed on every patient before the initiation of ECMO and repeated at discharge. The exam consisted of transthoracic echocardiography, transesophageal echocardiography, or both, according to best acoustic window. LV systolic function was determined using Simpson method. LV dysfunction was defined as LVEF <45%. RV size was assessed by RV end-diastolic area (EDA) obtained from 4-chamber view. RV EDA to LV EDA ratio was used to determine RV dilation defined as RVEDA/LVEDA > 0.6. RV systolic dysfunction was defined as tricuspid annular plane excursion <16 mm. RV end-diastolic wall thickness > 5 mm in subcostal view was defined as RV hypertrophy. Pulmonary artery systolic pressure was estimated using simplified Bernoulli's equation (CVP was obtained from central venous catheters). Each echocardiographic parameter was measured 3 times and mean value was recorded. Data on cardiovascular risk factors was obtained from history.

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Results

A total of 46 patients were included in the study. Pneumonia was the cause of ARDS in 67% of patients. Dual-lumen ECMO cannula was implanted in 82.6% of patients (femoral-femoral cannula was used in the remaining patients). RV hypertrophy was present in 60% of patients prior to initiation of ECMO. No significant differences in baseline and echocardiographic characteristics (including estimated PA systolic pressure, RV size and function, LV function) were found between the subgroups of patients with and without pre-existing RV hypertrophy. At ICU discharge all patients exhibited new onset or worsening RV hypertrophy. Only two patients with new onset RV hypertrophy after ECMO treatment were not mechanically ventilated while on VV-ECMO. Patients who did not have pre-existing RV hypertrophy developed it after initiation of ECMO. Additionally, patients without baseline RV hypertrophy showed a significantly greater absolute increase in RV wall thickness compared to those with pre-existing RV hypertrophy (3.1 +/- 1.3 mm vs 1.7 +/- 1.6 mm).

Discussion

This is the first study to investigate the incidence of RV hypertrophy in mechanically ventilated ARDS patients before and after ECMO support with the aim to elucidate its effect on the right ventricle. The authors found that RV hypertrophy was a common finding in severe ARDS before the initiation of ECMO. Furthermore, normal right ventricles before initiation of ECMO developed hypertrophy and hypertrophied right ventricles developed an additional increase in wall thickness after ECMO support. Increase in RV thickness suggests that RV is subjected to increased afterload during ECMO treatment. Both ARDS and mechanical ventilation complicate the relationship between pulmonary circulation and RV due to pulmonary vascular dysfunction resulting in increased RV afterload and even acute core pulmonale.2,6 It can be hypothesized that increasing RV afterload can account for the development of RV hypertrophy as an adaptive response to maintain stroke volume.6 However, 40% of patients with ARDS did not develop RV hypertrophy suggesting that likely other factors besides increased RV afterload contribute to RV hypertrophy.

In addition to being performed at a single center, the study's limitations include small sample size and largely descriptive data with inability to assess impact of RV hypertrophy on clinical management or outcomes. Further investigations should focus on the effect of RV hypertrophy on outcome, ascertain whether RV hypertrophy is reversible, and possible therapeutic options.

Despite these limitations, this study is a valuable contribution to the literature evaluating the relationship between RV physiology and VV-ECMO support in patients with refractory ARDS. Furthermore, it is the first study to report incidence of RV hypertrophy in patients treated with VV-ECMO. RV hypertrophy in this clinical scenario may represent an adaptive response suggesting that RV is subjected to increased afterload during VV-ECMO. Additional research is needed to elucidate the pathophysiology of RV hypertrophy, its effect on outcome, as well as therapeutic measures to prevent its development.

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The Low Risk Transcatheter Aortic Valve Replacement Trails — An Analysis

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Background

Transcatheter aortic valve replacement (TAVR) has revolutionized the treatment of aortic stenosis (AS). Initial approval for TAVR use began with Comite Europee Marking in 2007 and United States Food and Drug Administration (FDA) approval in 2011, and the procedure has been rapidly adopted worldwide. Progressive expansion of indications for TAVR has followed the extensive investigation into TAVR outcomes. The initial studies compared TAVR to medical therapy in the "prohibitive surgical risk" patients, and then TAVR versus surgical AVR for progressively lower risk patient populations. In the United States, TAVR currently has Class 1 recommendations for treatment of severe symptomatic AS in patients with prohibitive surgical risk and high surgical risk, and a Class IIa recommendation for those patients with intermediate surgical risk.

Study Design

This manuscript was an objective narrative review of 4 different TAVR trials published in 2018 and 2019. The four trials were compared in Table 1 of the manuscript with primary and secondary outcomes noted.

Study Results

PARTNER 3[1]

PARTNER3 (funded by Edwards Lifesciences) randomly assigned patients with severe AS and low surgical risk (<4%predicted 30-day mortality) to undergo surgery or transfemoral TAVR with the balloon-expandable SAPIEN 3 system. The primary endpoint was a composite of death, stroke, or rehospitalization at 1 year using both noninferiority and superiority testing. Nine hundred fifty patients underwent the assigned treatment with a mean predicted risk of mortality of 1.9%. For the primary endpoint (death, stroke, or rehospitalization at 1 year), TAVR was superior to surgery (8.5% v 15.1%). At 30-days, TAVR resulted in significantly lower rates of atrial fibrillation, stroke or death. Mortality at 1-year was not significantly different between TAVR and SAVR.

Evolut LOW RISK[2]

In the Evolut Low Risk trial (funded by Medtronic), 1,403 low risk patients with a <3% predicted 30-day mortality received either surgery or TAVR with a self-expanding supra-annular prosthesis (CoreValve, Evolut R, or Evolut PRO) on a randomized basis. The primary endpoint was a composite of death or disabling stroke at 24 months with a prespecified noninferiority margin of 6%. TAVR was noninferior to surgery with the primary endpoint occurring in 5.3% of the TAVR group versus 6.7% in the surgery group. TAVR patients had a lower incidence of stroke (0.5% v 1.7%), bleeding complications (2.4% v 7.5%), AKI

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(0.9% v 2.8%), and atrial fibrillation (7.7% v 35.4%) at 30 days, but higher rates of moderate or severe aortic regurgitation (3.5% v 0.5%) and pacemaker implantation (17.4% v 6.1%).

SURTAVI (Low Risk Cohort)[3]
The SURTAVI study, funded by Medtronic, enrolled 1,746 patients with severe AS and intermediate surgical risk (defined as estimated 30-day mortality risk from surgery was 3%-15%) at 87 centers in North America and Europe and randomized them to receive TAVR or SAVR. There was no significant difference observed in the primary endpoint between the TAVR and SAVR groups (12.6% v 14.0%) within this prospectively studied risk group, suggesting noninferiority for TAVR intervention. The "low-risk" subgroup included 254 patients with STS PROM of less than 3%, and 131 underwent TAVR. The rate of other important morbidities favored TAVR: there was less AKI (0.8% in TAVR v 17.9%in SAVR) and less atrial fibrillation (15.4% in TAVR v 47.3% in SAVR). The need for permanent pacemaker implantation was much higher in the TAVR group (24.5% in TAVR v 4.1% in SAVR); this pacemaker need is consistent with recent investigations of other self-expanding TAVR valves.

NOTION (5-year, Low Risk Outcomes)[4]
The NOTION trial, funded by the Danish Heart Foundation, was conducted at 3 centers in Denmark and Sweden where 280 patients >70 years of age with isolated severe AS were randomized to self-expanding TAVR with CoreValve or SAVR treatment groups with primary outcome being the composite of all-cause mortality, stroke, or myocardial infarction. Participants with history of severe CAD, heart surgery, severe nonaortic valvular disease, stroke, MI, severe lung, or renal disease were excluded, but those patients whom met inclusion criteria were included regardless of surgical risk profile (i.e there was no exclusion based on "high risk" versus "intermediate risk"). This resulted in the first study of TAVR without a prespecified sur-gical risk. The initial study cohort had a mean age of 79.1, comprised of 81.8% "low-risk" patients based on a STS-PROM score of <4%, and a median score of 3%. The primary endpoint data reported so far (1, 2, and 5 years) did not show any significant difference in all-cause mortality, stroke, or MI between the TAVR and SAVR treatment groups in this low risk population. Secondary endpoint data at 5 years revealed that the SAVR group saw a higher incidence of atrial fibrillation than the TAVR group, and the TAVR population continued to have a higher aortic valve effective orifice area (and lower mean gradient), lower ejection fraction, and more residual aortic insufficiency owing to paravalvular leak and higher need for pacemaker implantation compared with SAVR. Long-term outcome data for TAVR bioprosthesis remains limited compared with that of SAVR valves, but the NOTION study provides the longest follow-up data directly comparing TAVR and SAVR in lower risk patients.

Discussion

These four studies, well as a recent meta-analysis of these studies, now shed much light on low risk groups undergoing TAVR. These trials show that TAVR is a safe and viable alternative to SAVR in patients with low surgical risk (defined as an STS-PROM score <4%). Both the PARTNER 3 trial and the post hoc subgroup analysis of low-risk patients in the SURTAVI trial showed superiority of TAVR for their respective composite primary outcomes. The NOTION trial found no difference between TAVR and SAVR in their primary outcome and the Evolut Low Risk trial concluded that TAVR was noninferior to SAVR for their primary endpoint. Kolte et al.'s meta-analysis, which incorporated these trials, concluded not only that TAVR was a safe alternative to SAVR, but that it was superior for multiple outcomes.

Patients who received TAVR had lower rates of new or worsening atrial fibrillation, life-threatening/disabling bleeding, and AKI stage 2 or 3. However, more patients who received TAVR needed permanent

(continued)

pacemaker implantation or had moderate or severe paravalvular leak than those who received SAVR. Despite these promising results, it is important to remember several points about these trials. All these studies used composite endpoints, and none were powered for any of the individual components of these composites. The trials also differed in the type of TAVR device that they used. There was no statistically significant difference in paravalvular leak, permanent pacemaker implantation, acute MI, stroke, AKI, annular rupture, procedural success, or major bleeding between patients receiving general anesthesia or monitored anesthesia care for TAVR. Going forward, it is increasingly likely that we have seen the end of the era of general anesthesia for TAVR, especially for the coming cohort of low risk patients.

It was only in 2011 when the FDA approved TAVR for prohibitive risk patients. So, in the United States, outcomes at 10 years are still unknown. The durability of TAVR valves is of considerable concern, particularly in patients who are at low surgical risk: long-term transcatheter valve durability data is not avail-able at this point in time, in comparison to the considerable data available on SAVR valve longevity. Further long-term follow-up will shed more light on many important comparisons between TAVR and SAVR.

Related Reading

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SOCIETY OF CARDIOVASCULAR ANESTHESIOLOGISTS
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Vitamin D and Postoperative Delirium After Coronary Artery Bypass Grafting: A Prospective Cohort Study

Velayati A, Shariatpanahi MV, Dehghan S,
et al. J Cardiothorac Vasc Anesth 2020;34:1774-1779

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Study Design
Prospective cohort study

Background
In this study the authors evaluated the association of preoperative serum levels of 25-hydroxyvitamin (OH) D with the incidence of delirium after coronary artery bypass surgery (CABG).

Methods
Adult patients (n=398) who underwent CABG from 2016-2018 at a single academic institution were enrolled in the study. Serum 25 (OH) D levels were collected a day before surgery. The levels were categorized as severe deficiency (<10 ng/ml), moderate (10-20 ng/ml), mild (20-30 ng/ml) or normal (> 30 ng/ml). The patients were monitored for postoperative delirium in the intensive care unit (ICU) with the confusion assessment method for the ICU (CAM-ICU).

Results
The median serum level of 25 (OH) D was 21 ng/dL in patients with delirium and 24.3 ng/dL in patients without delirium ($p = 0.04$). An adjusted multivariate analysis demonstrated that patients with severe serum 25 (OH) D deficiency had a 3.18 odds ratio (CI 1.29-7.78) of postoperative delirium than patients with normal serum levels ($p = 0.01$).

Discussion
Vitamin D deficiency is prevalent in surgical patients and the population at large. Vitamin D receptors are abundant throughout the body and are involved in regulatory processes in cardiovascular, skeletal, pulmonary, endocrine, and neurological systems. Large population studies have demonstrated an association between vitamin D deficiency and cardiovascular disease such as hypertension, coronary heart disease, stroke, and diabetes.[1-3] Recently due to the discovery and improved understanding of functional vitamin D receptors in the human cortex and hippocampus, there has been an increase in clinical trials looking at the association between cognitive decline (delirium, dementia, Alzheimer's) and low serum vitamin D concentrations.

There are a multitude of reasons for acute neuropsychiatric changes after cardiac surgery. Perioperative hemodynamic perturbations, preexisting cardiovascular disease and an increased inflammatory state can all contribute to worsened cognitive dysfunction. The authors in this study control for many of confounding risk factors associated with postoperative delirium and present an interesting trial that can lead to further investigational work in this field.

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Limitations

There are a few notable limitations with this study. Foremost, the preoperative vitamin D levels may not be representative of postoperative levels. In another study, 25 (OH) D levels measured within 24 hour of ICU admission did not find an association with delirium in critically ill patients.[4] Postoperative serum levels of vitamin D after cardiopulmonary bypass should be included as a confounding variable within the data analysis. Further the preoperative nutritional state of the patient is not taken into consideration. Preoperative serum albumin levels should have been reported and statistically adjusted for, as low levels are associated with postoperative delirium.[5] Certainly, low preoperative vitamin D levels may be due to a poor nutritional state.

Another limitation is that the authors don't explicitly state how long patients were followed up for signs of delirium. The reader can extrapolate that it was for the duration of the ICU stay. The mean length of ICU stay in non-delirious patients was 2 days versus 4 days in delirious patients. The incidence of delirium may be underreported as patients may experience it after ICU transfer.

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Anesthetic Considerations During Heart Transplantation Using Donation After Circulatory Death

Jennie Ngai, MD, Kiriko Masuno, MD, Nader Moazami, MD
J. Ngai et al. Journal of Cardiothoracic and Vascular Anesthesia 00 (2020) 1-5.

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Background

The majority of heart transplants worldwide are from donation after brain death (DBD), however donation after circulatory death (DCD) has increased the number of organs available for donation. Over three thousand patients are currently awaiting a heart transplant in the United States. DCD organs can increase the number of available organs and decrease time on the waitlist[1].

The DCD procurement process and protocol is unique compared to DBD. DCD organs can be evaluated prior to transplantation by utilizing either an ex vivo perfusion machine or normothermic regional perfusion (NRP) if procurement is done in a controlled fashion. In addition to cold ischemia time, DCD protocols evaluate warm ischemia time and functional ischemia time as part of organ assessment[1].

Although the utilization and outcomes of DCD organs in solid organ transplantation (liver, pancreas, kidney) have been overall favorable, these metrics for DCD heart transplantation are still under active investigation. Lastly, the controlled withdrawal of life support for the purpose of procurement creates a difficult ethical conundrum to be explored as the field of transplantation continues to expand.

Methods

The article describes the authors' experience and protocol utilizing normothermic regional perfusion (NRP) for 4 heart transplants from DCD donors. The procurement process begins with the anesthesia, surgical, nursing, and perfusion teams preparing the donor for transplantation in the operating room (OR). The critical care team would then withdraw life support after all other providers exit the OR. Warm ischemia time was started upon discontinuation of life support (including extubation and discontinuation of vasoactive medications) and functional ischemia time started once systolic blood pressure reached below 80 mmHg. Time of death would be declared by the critical care team and the surgical team would re-enter the operating room. If death did not occur within 3 hours of withdrawal of support, the donor would be taken back to the ICU.

Incision and sternotomy were performed, and the aortic arch vessels were clamped to exclude blood flow to the brain. Cardiopulmonary bypass (CPB) was then initiated via central cannulation and the heart was re-perfused for 30 minutes. During reperfusion, a maximum of 5 mcg/kg/min of dobutamine with the addition of vasopressors would be titrated to maintain a mean arterial pressure of 70-90 mmHg while attempting to separate the donor heart from CPB. Both hemodynamic and echocardiographic assessment of heart function following CPB separation were performed to determine if the organ was suitable for transplantation. If accepted, CPB would be reinitiated and cardioplegia would be given to arrest the donor heart. The organ would then be harvested and placed on ice (beginning cold ischemic time) followed by transplantation into the recipient.

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Results

All four DCD organs were successfully transplanted into recipients. Following transplantation, none of the four patients required mechanical support and all were extubated on the first post-operative day. Patients were discharged from the hospital a median 12.5 days post transplantation. The mean warm ischemia times and functional ischemia times were 35 minutes and 31.75 minutes respectively. The mean time from incision to CPB initiation was 11.25 minutes with a mean cross clamp time of 78.5 minutes.

Discussion

DCD organs have expanded the number of solid organ transplants by as much as 40% and may increase the donor pool of heart and lung transplantation similarly. The first human heart transplant performed in 1967 was from a DCD donor. The ethical lessons from this donation eventually lead to the development of the brain death criteria. DCD heart transplantation has since been performed in Australia and the United Kingdom since 2015, with the first DCD heart transplant in the United States in 2019. A retrospective single-center study from the United Kingdom (n=28) showed similar 90-day survival, 1-year survival, ICU length of stay, hospital length of stay, and graft function comparing DCD and DBD heart transplant recipients[2].

This article described the authors protocol and outcomes for 4 heart transplants utilizing DCD organs. The study is limited in being a single center trial with a very small sample size, acknowledged by the authors. Within this sample size, the results are excellent with every case resulting in a successful transplant with excellent patient outcomes.

When evaluating the data, the patient and donor demographics, the reported ischemia times, and the surgical times are relatively similar across all trials. It is within the authors protocol to allow up to 3 hours for death to naturally occur upon discontinuation of life support (the start warm ischemia time). Furthermore, an additional 5 minutes of waiting is protocolized after death is declared to account for the Lazarus effect before organ procurement can begin. Theoretically, the success of DCD heart transplantation may ultimately be determined by how extensively the organ is compromised by the warm ischemia time, and if organ reperfusion can recover additional myocardial function. The maximum warm ischemia time reported across the four trials was 41 minutes. If warm ischemia times increase in future trials, the function of the graft may prove to be compromised accordingly.

This protocol poses a challenging ethical dilemma. Clinicians must weigh the ethical standards of DCD organ procurement against the potential of organ dysfunction caused by following these standards. In addition, it can be postulated that unlike solid organs, thoracic organs may be less forgiving to warm ischemic injury depending on individual donor factors. Despite these ethical considerations, the utilization of NRP allows for the assessment of organ function in vivo, which provides a significant advantage on the decision of transplantation as warm ischemia times vary in future trials. Future trials and investigation are necessary with larger samples sizes in order to determine if DCD heart transplantation can have similar success as solid organ transplantation.

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Echo Corner

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CASE HISTORY

33 Years old male with past medical history of migraines and COVID-19 pneumonia (tested positive on 10/2020), was transferred to our institution for evaluation of shortness of breath and hypoxemia. Patient received oxygen therapy for COVID lung and after intense treatment, was taken out of COVID precautions after one month. His shortness of breath persisted, and viral cardiomyopathy was suspected. Transthoracic echocardiogram done and showed the following findings (Video 1 & Video 2).

QUESTION 1

The echocardiographic findings are most probably the result of

A. COVID 19 Cardiomyopathy
B. Ischemic cardiomyopathy
C. Stress induced Cardiomyopathy
D. Restrictive Cardiomyopathy

QUESTION 2

All the following statements are true regarding left ventricular echocardiographic mass except

A. Transesophageal echocardiography (TEE) is more sensitive than transthoracic echocardiography (TTE) to diagnose this intracavitary mass
B. TEE can diagnose intracavitary mass by mid-esophageal views with additional manipulations (lateral tilt and retroflexion)
C. Embolization is higher with mobile and protruding lesions during acute phase of cardiomyopathy
D. Immediate anticoagulation is indicated

This patient was anticoagulated with heparin and TTE done 20 days later revealed resolution of thrombus. He presented to the operating room for Impella insertion. TEE was done and showed the following (Video 3-6).

QUESTION 3

The following course of action is indicated in the operating room

A. Proceed to Impella insertion
B. Abort the procedure and insert intra-aortic balloon pump (IABP)
C. Left ventricular thrombectomy
D. Thrombolysis with tissue plasminogen activator

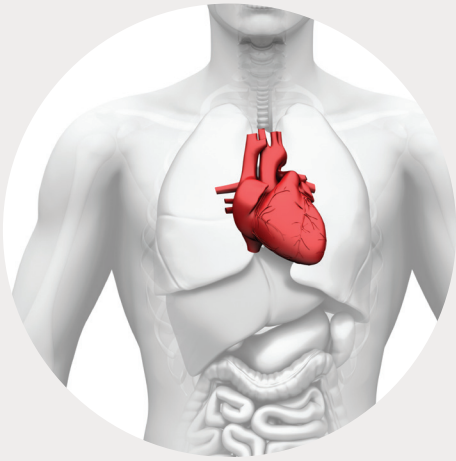
QUESTION 4

Immediately after arrival from the operating room, patient's pupils were unequal. He had delayed emergence and CT scan showed basilar artery occlusion. Immediate action will be

A. Continue heparin no intervention required
B. Thrombolysis
C. Electroencephalogram monitoring
D. Angiogram and thrombectomy of basilar artery

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

Echo Corner



ANSWERS/EXPLANATIONS

Question 1: Answer A

This young patient suffered from COVID 19 cardiomyopathy; COVID 19 infection can affect the heart by ischemia resulting from respiratory failure, microvascular thrombosis, cytokine storm due to systemic inflammatory response and viral myocarditis. Angiotensin Converting Enzyme -2 receptors found in the heart may be involved in the pathogenesis of cardiomyopathy.

Question 2: Answer A

TTE (92-95%) is described in the literature to be more sensitive than TEE (25-55%) in detection of left ventricular thrombus because of fore-shortened left ventricular apex and LV apex being father away from TEE transducer, although this has been debated. As in this case, modification of TEE views with careful comprehensive intraoperative TEE examination can detect LV thrombus that was missed by preoperative TTE. Intraoperative TEE mid-esophageal views did not reveal thrombus in this patient but deep trans-gastric long axis view with anteflexion revealed clear echogenic mass.

Question 3: Answer B

This finding by intraoperative TEE helped to make a decision to avoid Impella insertion, which is contraindicated in the presence of intraventricular mobile thrombus. Since the patient was in cardiogenic shock, IABP was inserted to stabilize the situation. Open cardiac surgery with removal of thrombus and durable VAD insertion were not considered in this critically ill patient with cardiogenic shock.

Question 4: Answer D

Unfortunately, the patient suffered an embolic stroke postoperatively. Neuro-intervention using aspiration and microcatheter disruption techniques can be useful to treat acute ischemic stroke if performed within 8 hours. Aggressive therapy rather than conservative management was instituted in this young patient with localized occlusion. He had only partial neurologic recovery.

VIEW ECHO CORNER WITH VIDEOS