



**Kathryn E. Glas**  
MD, MBA, FASE

*President, Society  
of Cardiovascular  
Anesthesiologists*

## PRESIDENT'S MESSAGE

This edition of the President's message includes a message from Dr. Annemarie Thompson who is leading the Presidential Education Strategy Task Force efforts towards recommendations for planning our educational offerings for the next ten years and beyond. What meetings will be provided, and in what format? Where will they occur, how will they be structured and organized? What role will online and hybrid education play in the future? Is there a need to add regional venue meetings? Are there topics that warrant a standalone meeting? We look forward to using the Task Force's recommendations to enhance our programming.

I was excited to have attended the EACTAIC Board of Directors meeting and conference in October. Our international collaborations are vital to continuing advances in cardiothoracic and vascular patient care. This will be followed in early December by the ICCVA Congress in Cape Town, South Africa. Use your end of year CME funds to join us in this beautiful country for an outstanding international collaboration. Thanks to Dr. Mitnacht and the International Council for their efforts to generate an excellent meeting every other year.

Sincerely,



Kathryn E. Glas, MD, MBA, FASE



**Annemarie  
Thompson, MD**

*Educational Strategy  
Task Force, Chair*

*Dear Colleagues,*

As Chair of the SCA Presidential Task Force on Educational Strategy, I'd like to introduce you to our Task Force and provide you with an update of our initiatives and progress. Education is a fundamental component of the SCA's mission and activities. Take a moment to think about all the SCA's educational offerings: workshops, courses, plenary sessions, meetings, and online CME and review content. It is important to make sure we deliver the right educational content at the right time in the right way. Even our learning is changing in our busy, information-saturated, technology-driven lives, and the SCA seeks to not only adapt but to lead in providing you with valuable content and updates efficiently and effectively.

The Task Force was convened to propose a strategic vision that examines and even reimagines our educational organization and content. Cardiovascular anesthesiologists have unique skill sets and expertise that is of value not only to our membership, but also to the larger perioperative community.

*continued...*

**"This Task Force aims to create an educational programming network to bring value to our members."**

I'd like to introduce you to the members of the Educational Strategy Task Force and take a moment to publicly thank them for their many hours of dedicated service to this ongoing initiative:

**Educational Strategy Task Force:**

- Annemarie Thompson, MD – *Chair*
- Mary Beth Brady, MD, FASE
- Jessica Brodt, MD
- Kathryn E. Glas, MD, MBA, FASE – *SCA President*
- Hilary P. Grocott, MD, FASE, FRCPC
- Jennifer Hargrave, DO
- Stephanie O. Ibekwe, MD
- Nicholas (Nick) W. Markin, MD, FASE
- Ludmil Mitrev, MD
- Alexander Mittnacht, MD, FASE
- Peter Neuburger, MD
- Daryl A. Oakes, MD
- Andrew D. Shaw, MB, FRCA, FFICM
- Stanton K. Shernan, MD, FAHA, FASE

And lastly, I'd like to invite all of you to let us know your educational needs and ideas. You may contact any member to provide suggestions. The Educational Strategy Task Force is working diligently to create an educational programming network that brings value to members and ultimately our patients.

Kindest Regards,

*Annemarie Thompson*

Annemarie Thompson, MD



**SCA  
ECHO**



# Registration is NOW OPEN for SCA Echo 2024!

**February 15-18**  
**Loews Atlanta Hotel**  
**1065 Peachtree St. NE**  
**Atlanta, Georgia 30309**

The SCA Echo four-day conference will showcase multidisciplinary panels delving into the pivotal role of echocardiography in surgical decision-making concerning valvular disease and mechanical circulatory support. Below are a few of the topics that will be covered:

- **3D Image Optimization: It's Not Magic, It's Physics**
- **Do I Have to Do a Double Valve? – Mitral Regurgitation in Setting of Aortic Valve Replacement**
- **Nuts and Bolts for A2-P2 TEER**
- **Tips and Tricks for Left Atrial Appendage Occlusion**
- **Pitfalls and Controversies in Tricuspid Regurgitation Quantification**

[VIEW AGENDA](#)

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**Register  
for SCA Echo  
Today!**



SOCIETY OF  
CARDIOVASCULAR  
ANESTHESIOLOGISTS  
Knowledge • Care • Investigation

**SCA  
ECHO  
2024**



**February 15 - 18 • Atlanta, Georgia**

# TAS PBLDs and Abstract Submission



## Call for Abstracts NOW OPEN! Deadline: Friday, December 1, 11:59 PM CT

The Society of Cardiovascular Anesthesiologists invites the submission of abstracts and difficult cases to be presented at the upcoming 12th Thoracic Anesthesia Symposium and Workshops in Toronto, Canada.

### IMPORTANT REMINDERS

- Abstract Submission system closes at 11:59 PM CT on December 1, 2023.
- Additional submissions will not be accepted after the submission system closes.
- Co-Authors must complete their disclosure forms by December 1.
- The submission will not be reviewed unless all listed authors complete their disclosure form by the deadline.
- Notifications regarding abstract selection will be sent in January 2024.

Submit Your  
Abstracts  
Soon!

[CLICK HERE](#)

**for Abstract Submission and Instructions!**



# SCA2024

ANNUAL MEETING & WORKSHOPS



## Annual Meeting & Workshops ABSTRACTS

**Deadline: Friday, December 1, 11:59 PM CT**

The Society of Cardiovascular Anesthesiologists invites the submission of abstracts for presentation at the SCA 2024 Annual Meeting & Workshops on April 27-30 in Toronto, Canada.

### SCIENTIFIC ABSTRACTS

- To view instructions and submit an abstract, [click here](#).
- Co-authors must complete their bio and disclosure forms by **December 1, 2023**.
- 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 2024**.

### SCA FELLOW AND RESIDENT COMPLEX CASES

- If you are a fellow or resident, please consider submitting to the SCA Fellow and Resident Complex Case.
- To view instructions and submit a Fellow and Resident Complex Case, [click here](#).
- Co-authors must complete their bio and disclosure forms by **December 1, 2023**.
- 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 2024**.

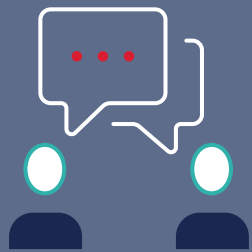
### SUPER ECHO CALL

- Submissions must be made by a fellow or a junior attending who is less than five (5) years from training. All fellow submissions must have an attending named on the submission who will participate in the session with you.
- To view instructions and submit an abstract, [click here](#).
- Co-authors must complete their bio and disclosure forms by **December 1, 2023**.
- The submission will not be reviewed unless all listed authors complete a bio and disclosure form by the deadline.
- An abstract or case may be submitted for consideration to multiple calls; however, the submission will not be accepted for presentation to more than one call. The author must indicate submission to multiple calls at the time of submission.
- Notifications will be sent in **January 2024**.

**Don't Delay!  
Submit  
Today!**

**SCA ANNUAL MEETING  
& WORKSHOPS | 2024**  
APRIL 27 - 30 *Toronto, Canada*





# SCA NEWS

## NEW MODULES RELEASED!



**SCA UNIVERSITY**

An Online Learning Management System

## ARC: A Review Course for the ABA's Adult Cardiac Anesthesia Board Examination

**SCA's ARC: A Review Course** focuses on the Adult Cardiac Anesthesia Board Examination that will be administered by the American Board of Anesthesiology for the first time in December 2023.

Our review course embraces the intersection of technology and education and hosts a series of 36 interactive modules that will walk you through the content outline of the ACA exam. These modules contain images, videos, tables, and text from a variety of sources, but have been arranged for members in easy-to-navigate modules. Work through our modules that are rigorously cited and peer reviewed.

### New Modules Added:

- Coronary Revascularization
- Aortic Regurgitation

[ACCESS COURSE](#)

**These courses are FREE to all SCA members within the SCA University account!**

If you have not created an account, you will need to do so before you can access. If log in assistance is required, please contact [info@scahq.org](mailto:info@scahq.org). For non-members, you can join and have access to this compelling series.

## Call for Research Grants Opening November 7th!

The 2024 Research Grant applications opens in November.

SCA Members are eligible to apply for 1 of 4 types of grants offered in 2024:

- **SCA In-Training Grant** – \$15,000 for one year
- **SCA Starter Grant** – up to \$25,000 a year for 2 years
- **SCA Diversity and Inclusion Grant** – up to \$25,000 a year for 2 years
- **SCA Mid-Career Grant** – up to \$50,000 a year for 2 years (2 grants will be rewarded)

Award recipients will be announced during the SCA 2024 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 24, 2024**. More information about these funding opportunities will be posted on the SCA website.



## 2024 Kaplan Leadership Development Award — Now Accepting Applications!

Applications for the 2024 Kaplan Leadership Development Award will be accepted through January 15, 2024. 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.

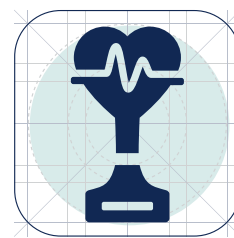
The Kaplan Leadership Award will be adjusted accordingly to offer an aggregate of \$5,000 to either one recipient or divided among two.

- **\$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.**

The deadline to submit your application is January 15, 2024.

**Click here [Kaplan Leadership Development Award](#) for more information on this award and how to apply.**

Questions about the grant and grant application should be emailed to [operations@scahq.org](mailto:operations@scahq.org), or via telephone at 855.658.2828.



CARE  
INVESTIGATION  
KNOWLEDGE

SOCIETY OF CARDIOVASCULAR ANESTHESIOLOGISTS  
**ENDOWMENT**

### Help Build the SCA Future Together through the SCA Endowment

SCA is the preeminent international educational organization for this subspecialty, leading the way in treatment innovations through care, investigation, and knowledge. By donating to the SCA Endowment, the funds help support SCA professionals to further their education, research, and professional development and to achieve their goals.

The SCA Endowment Fund online donation page is available. Making an online donation is quick, easy, and secure. To complete the online donation form, **[visit www.SCA Endowment](http://www.SCA Endowment)**.

#### 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.*

For more details on the endowment, please email [donation@scahq.org](mailto:donation@scahq.org).

## 2025 SF Match Opens November 6

### Watch your in box for details and submission link!

In-order to provide more consistency and predictability to the ACTA fellowship application process, the ACTA programs participate in a common application and match process provided by SF Match for recruitment. The schedule for the 2025 training year is as follows:

<b>November 6, 2023</b>	Applicant Registration Began
<b>March 6, 2024</b>	Central Application Service Target / Deadline Date
<b>June 5, 2024</b>	Program Rank List Submission Deadline (12 PM PT)
<b>June 5, 2024</b>	Application Rank List Submission Deadline (12 PM PT)
<b>June 5, 2024</b>	Application Rank List Submission Deadline (12 PM PT)
<b>June 19, 2024</b>	Match Results
<b>July 2025</b>	Training Position Starts

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

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

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

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

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

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

**Program Directors – watch your in-box for details and submission link!**



**2025  
SF Match  
OPENS  
SOON!**



*New Open!*

## 2024 SCA Junior Resident Scholarship

The Society of Cardiovascular Anesthesiologists Diversity, Equity, and Inclusion Committee (DEI) Junior Resident Scholar Program provides selected underrepresented minority (URM) anesthesiology residents (CA1) an opportunity to attend the SCA annual meeting. Applications will be accepted November 1, 2023, through January 15, 2024. Watch your in box for details!



### The goals of this scholarship are:

- To expose URM residents to the clinical practice of cardiothoracic anesthesiology by attending the SCA annual meeting.
- To give URM resident scholars early involvement in the SCA through interactions with and mentorship by leaders of the sub-specialty and other cardiothoracic anesthesiologists.

### SCHOLARSHIP INFORMATION

Ten scholarships will be awarded in 2024!

### REQUIREMENTS

- Nomination of URM resident by the program director or cardiothoracic faculty.
- The nominee must be an academically promising URM CA1 resident in good standing in an ACGME-accredited residency program.
- Each nominee must submit an essay addressing the following (maximum 500 words):
  - Diverse background of the nominee
  - Nominee's understanding of the issues of DEI in Cardiovascular medicine
  - Nominee's interest in CV anesthesia
- A letter of support from the program director and one additional letter of recommendation from a faculty member.
- The CV of the nominee.
- Recipients must be members of the SCA, or agree to become one, to accept the scholarship. Non-members will receive a complimentary, one-year resident/fellow membership to meet this requirement.

### FUNDING

\$1,000 travel stipend; complimentary basic registration to the 2024 SCA Annual Meeting.

### EVALUATION AND SELECTION

Scholarship applications will be reviewed and selected by the Scholarship Review & Selection Sub-Group of the DEI Committee at the SCA. Up to 10 scholarships will be awarded yearly.

Questions? Please write to us at [dei-cmte@scahq.org](mailto:dei-cmte@scahq.org).

**Application will be accepted November 1, 2023, through January 15, 2024.**

**Watch your in box for details!**

Start  
Shopping  
Today!

## 2023 ICCVA-CASSA CONGRESS

TOWARDS SAFE CARDIOVASCULAR AND THORACIC SURGERY OUTCOMES



The 19th International Congress of Cardiothoracic  
and Vascular Anesthesia in conjunction  
with the CASSA-JPC Congress

**30 November – 2 December 2023**

Century City Conference Centre  
Cape Town, South Africa

[LEARN MORE](#)


[REGISTER NOW](#)

## Start Building Your Team Through the SCA Career Center










Take the next step in building your dream team. SCA Career Center is the source to hire top cardiovascular anesthesiologists team members. With a membership of 4,000 professional members, the SCA Career Center is the first-place employers look to build their team. Put your job opening in front of the largest network of highly skilled cardiovascular anesthesiology professionals at all levels.

**Get started now – new team members are just a few clicks away!** Visit [SCA Career Center](#) for more details and to get started on your search.


## Don't Forget Your SCA Swag!



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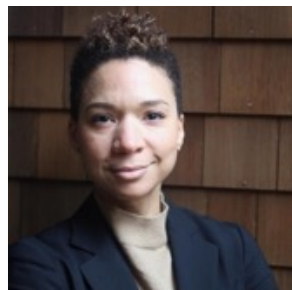
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## DEI COMMITTEE

Author: Ashley P. Oliver, MD MA

Division of Cardiothoracic Anesthesia

Department of Anesthesiology and Perioperative Medicine

University of California, Los Angeles

## A DEI Needs Assessment: Early Reporting from the Diversity, Equity, and Inclusion Committee Survey June 2023

Since its inception in 2021, the Diversity, Equity, and Inclusion (DEI) Committee has been working in partnership with the SCA board to nurture a diverse and inclusive future for our specialty. Early questions from our committee meetings included *how diverse is our subspecialty? Are there ways we can improve the DEI of our community going forward? How will we assess efforts to improve diversity and inclusion over time?* To answer these questions, from June through September 2023, the DEI Committee partnered with the SCA Membership Department to launch a baseline demographic survey. The aim of the survey was to capture baseline demographics of SCA membership and assess DEI related priorities of respondents. Of the 2,980 members surveyed, there were 243 respondents. There was 100% completion of surveys, and 98.3% (228) of respondents were willing to answer questions regarding DEI initiatives. Of these respondents, only 63.5% (132) and only 54.3% of total respondents (132/243) somewhat or strongly agreed with the statement "Diversity is important in cardiovascular anesthesia." Further, 13.5% (28) strongly disagreed to this statement; 6.7% (14) disagreed; 16.3% (34) neither agreed nor disagreed; and 35 declined to answer. Limitations of our survey include low response rate. However, our responses are comparable to surveys previously administered to groups such as the Society for Thoracic Surgery.<sup>1</sup>

For those of us working with the SCA Board on DEI initiatives for our specialty, this data is not surprising and identifies an important starting point.<sup>2</sup> Our survey did not elucidate why individuals believe that diversity is not an issue in cardiothoracic anesthesia. More investigation must be done to elucidate why some groups may feel neutral to or against improving diversity. Rather than a challenge, we see this as an opportunity to have more nuanced discussions about the "Whys and the Hows" of DEI-related work.

The principle of **diversity** acknowledges that as humans we belong to heterogeneous groups with varied life experiences. There are limitless categories of diversity, which may include gender and gender identity, to sexual orientation, to nationality, to race and ethnicity, to religion and spiritual practices, to primary language, to physical ability/disability, to socioeconomic status. Some forms of diversity may be more "visible" or "objective," such as country of origin or skin color. Other forms may be internally identified by an individual or may shift over the life course, such as a person's age. Further, diversity may refer to the composition of a collective of individuals, and it can also refer to the range of ideas and responses that stem from a collective that comprises individuals from many walks of life.<sup>3</sup> Literature suggests that the latter can depend greatly on the former: both are important in navigating the complex world of patient care, medical innovation, and medical decision-making. The principle of **equity** refers to the fact that all human individuals deserve respect and consideration, as well as an equal opportunity for advancement, good health, and equal outcomes; however, due to inherent diversity, individuals may face different challenges to equal outcomes.<sup>4-5</sup> **Inclusion** – sometimes also called inclusion and belonging – is a principle of community-mindedness invoking a shared, collaborative space for diverse groups. Inclusion is one tool used to advance equity.<sup>6</sup>

Lack of diversity in anesthesia and in the subspecialty of cardiac anesthesia is well-established.<sup>7,8,9,10</sup> In 2019, the Accreditation Council for Graduate Medical Education (ACGME) published that of the 173 adult cardiothoracic anesthesia fellows, four (2.5%) identified as black/African American and 121 (69.9%) identified as white. Of the total fellows that year, 59 (34%) identified as female. This is despite the fact that women comprise greater than 50% of undergraduate medical school matriculants, and black Americans were 8% of enrolled medical



# DEI COMMITTEE

students in 2022-2023, proportions that have been roughly unchanged over the last ten years.<sup>12</sup>

Literature borrowed from the business sector suggests that the merits of team diversity are expansive, leading to better creativity, problem-solving, and higher return on investments.<sup>13-14</sup> In the medical sphere, research on diverse teams suggests that patient care improves with team diversity- ethno-racial as well as gender.<sup>16,17,18</sup> Investigations on racial concordance and health outcomes have given us mixed messages,<sup>19,20</sup> and our argument is not that more racial, or gender concordance will always result in better outcomes. Rather, training and working on medical teams staffed with diverse representation may equip those teams to provide effective, compassionate care to a diverse range of patients.<sup>21,22</sup> In other words, there is evidence that when care teams navigate internal diversity and foster a sense of equality and belonging, they may also be able to improve care for all patients – not just minority-identifying patients, patients of marginalized status, or non-native English speakers, for example.<sup>23,24</sup>

For example: despite advances in technology and skill, there continue to be racial, gender, and socioeconomic disparities after coronary revascularization and valve replacements.<sup>25,26</sup> These disparities persist when controlling for comorbidities such as renal insufficiency, diabetes, hypertension, and obesity.<sup>27</sup> This suggests that there are other forces contributing to worse outcomes for some groups of patients with shared racial identities. Additionally, cardiac anesthesiologists who are women, gender minorities, who identify as non-white, non-heterosexual, and who may belong to groups historically underrepresented in medicine have reported higher rates of microaggressions, lack of courtesy and less respect in training, and are underrepresented in academic medical faculty particularly at higher ranks.<sup>28,29,30,31</sup> Together, this evidence indicates that deficits in DEI principles result in worse care for some patient groups, as well as uneven playing fields for physicians of diverse backgrounds.

A crucial message to those who are not convinced by the importance of diversity for the betterment of our health care system and the professional lives of our colleagues: do continue to engage with us.<sup>32</sup> There may be a range of reasons why individuals would disagree with the statement that diversity is important, and it will improve our collective work if we can understand where there may be differences in viewpoints, differing concerns, or even differential data that should be evaluated.

We in the DEI committee would like to partner with you all. Assuming we share standards of professionalism, civility, and knowledge-sharing – core tenants of our society – we do not shy away from difficult discussions, including discussions with those who question the merits of increasing diversity, equity, and inclusion. We are grateful for the honest responses to the DEI survey, and we will use these responses in service of our mission to continue to improve professional advancement for all SCA members, raise standards of care, and improve health outcomes for our diverse patient populations.

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# DEI COMMITTEE

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# DEI COMMITTEE

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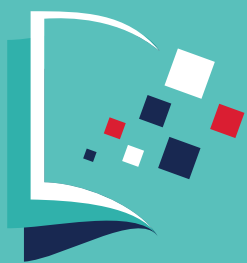
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# Comparative Effectiveness of Percutaneous Microaxial Left Ventricular Assist Device vs Intra-Aortic Balloon Pump or No Mechanical Circulatory Support in Patients with Cardiogenic Shock

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## Background

Current management of acute myocardial infarction with cardiogenic shock (AMICS) involves immediate percutaneous coronary intervention (PCI) and consideration of mechanical circulatory support (MCS) in refractory shock. The use of MCS, particularly percutaneous microaxial left ventricular assist devices (PMLVAD) such as the Impella, have significantly increased in the past decade in AMICS patients undergoing PCI. Although AMICS is associated with significant morbidity and mortality, there is controversy regarding the safety and effectiveness of MCS in this setting. Some studies have suggested increased risk of bleeding and death<sup>1,2,3</sup> while others have shown improved outcomes.<sup>4</sup> In this study, the authors utilize different approaches to evaluate the effect of PMLVAD compared to alternative treatments of intra-aortic balloon pump (IABP) or medical therapy in patients with AMICS undergoing PCI.

## Methods

This was a comparative effectiveness research study that considered all Medicare fee-for-service patients hospitalized with AMICS who underwent PCI for inclusion from October 2015 to December 2019. Analyzed outcomes included 30-day all-cause mortality and readmission at 30 days post-PCI. Covariates included patient characteristics, comorbidities, hospital characteristics, and procedural characteristics. Treatment effects were compared using four methods: the inverse probability treatment weighting (IPTW) approach, the instrumental variable (IV) approach, the instrumented difference-in-difference design (DiD) approach, and the grace period approach.

## Results

Of the 56,983 patients who were initially considered for study inclusion, 23,478 were ultimately included in the analysis. In the analyzed population, 4,063 patients (17.3%) received PMLVAD, while 19,415 patients (82.7%) received IABP (6,964 patients, 35.9%) or no MCS (12,451 patients, 64.1%). Those who received PMLVAD showed a higher unadjusted risk of death and 30-day readmission at 30 days. The IPTW approach, used to analyze the effectiveness of initiating PMLVAD compared to no PMLVAD on the day of PCI, showed the initiation of PMLVAD on the day of PCI to be associated with higher mortality risk (53.8%, 95% CI of 52.0% to 55.7%) compared to patients who did not undergo this treatment (38.9%, 95% CI of 38.1% to 39.7%). The IV analysis, which was used to assess treatment influenced by cross-sectional institutional preferences, showed higher risk of 30-day mortality with PMLVAD compared to patients that did not undergo this treatment (difference of 13.5%, 95% CI of 3.9% to 23.2%). The DiD analysis, used to examine the effectiveness of treatment in patients influenced by changes in institutional practice over time, showed that the proportion of PMLVAD use in AMICS patients undergoing PCI increased from 11.4% in 2016 to 22.4% in 2019. There was also significant variation among hospitals in longitudinal trends in PMLVAD use and differences in baseline characteristics.



Thirty-day mortality risk difference for PMLVAD versus no PMLVAD varied from -4.7% (95% CI of -33.7% to 25.1%) in moderately increasing versus declining PMLVAD use hospitals, to 9.7% (95% CI of -15.9% to 39.9%) when comparing rapidly increasing versus moderately increasing PMLVAD use hospitals. The grace period approach was used to determine the effectiveness of initiating PMLVAD within 2 days of PCI. This analysis showed a 30-day post-PCI mortality of 55.1% (95% CI of 48.6% to 61.5%) in patients treated with PMLVAD and 36.6% (95% CI of 35.6% to 37.6%) in those who were not treated with PMLVAD. The risk difference for all-cause mortality or readmission at 30 days was 18.9% (95% CI of 11.5% to 26.3%). Covariates that were significantly associated with the use of PMLVAD within 2 days of PCI included right heart catheterization, intubation, and use of vasopressors.

## Discussion

This study utilized different approaches to analyze outcome and rehospitalization at 30 days post-PCI in patients receiving PMLVAD compared to the alternative interventions of IABP or medical treatment. The four approaches used in this study yielded varying results. Although the IPTW, IV, and grace period analyses found PMLVAD use to be associated with increased 30-day mortality and readmission, the DiD approach supported the null hypothesis with wide confidence intervals and indicated potential time-varying confounding between groups. The covariates that were significantly associated with PMLVAD use in the grace period analysis also suggested potential confounding that led to intervention within 2 days of PCI. More importantly, the results suggested violation of key assumptions in the analyses, including differences in institutional practices and patient characteristics between treatment groups, changes in treatment use over time, and parameters for illness severity that were not present in the data set. Therefore, the authors were not able to draw meaningful conclusions that could be used in causal interpretation. Study limitations included lack of data in the database important in the clinical picture of the patient, such as cardiogenic shock severity, vasopressor dosing, hemodynamic measurements, and markers of tissue perfusion. Thus, a more detailed database would be helpful for future studies. Furthermore, the study was limited to patients enrolled in Medicare fee-for-service. Since the mortality of AMICS patients remains high and the use of PMLVAD is increasing<sup>1,3</sup> future randomized clinical trials are warranted to compare different MCS modalities.

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# Supplemental Fibrinogen Restores Thrombus Formation in Cardiopulmonary Bypass-induced Platelet Dysfunction Ex Vivo

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British Journal of Anaesthesia, 131 (3): 452-462 (2023)  
doi: 10.1016/j.bja.2023.03.010

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## Background

Bleeding after cardiac surgery has been associated with increased 30-day mortality and morbidity.<sup>1,2</sup> In addition to surgery itself as cause of bleeding, hemodilution, hypothermia and coagulation abnormalities such as low fibrinogen, fibrinolysis, decreased platelet count and function, have been associated with microvascular bleeding after cardiopulmonary bypass (CPB).<sup>3-7</sup> Transfusion algorithms based on point-of-care testing have been found to be more effective than empirical management for post CPB microvascular bleeding.<sup>8,9</sup>

Platelet dysfunction after CPB has been described but the degree of dysfunction varies with CPB conditions such as time/ specifics of surgery, temperature, medication effects. The shear stress from CPB results in release of ADP and hypothermia decreases hydrolysis of ADP. ADP is a platelet activator, and the platelet activation will result in dysfunction.<sup>10-14</sup> Although there are safety concerns regarding platelet transfusion, there is no consensus on transfusion triggers, and alternative treatments are not well studied or known. Fibrinogen increases clot firmness by binding on the IIb/IIIa receptor of the platelets. In a recent study, among thrombocytopenic patients after complex cardiac surgery, patients with high levels of fibrinogen received fewer platelet and plasma transfusions and had decreased chest tube drainage.<sup>15</sup> Evaluation of fibrinogen supplementation compared to placebo in patients after complex cardiac surgery in the REPLACE trial showed increased transfusion requirements and chest tube drainage.<sup>19</sup> In contrast, other investigators demonstrated the opposite showing a transfusion benefit and decreased bleeding among fibrinogen treated patients.<sup>20,21</sup> The above discrepancy underscores the need for further research.

The authors of this study prospectively evaluated the effects of moderate hypothermic CPB on platelet function and clot formation and the effect of supplemental fibrinogen before and after CPB in vitro.

## Methods

This was a prospective observational ex vivo study that was conducted, after institutional approval, in the Medical University of Graz, Graz, Austria. According to power calculation, for the number of patients that would require to show the CPB effect on platelet aggregation, activation and on thrombogenesis, (based on a previous study<sup>16</sup>), 18 patients were included in the study, from February to September 2021.

Inclusion criteria: patients scheduled for elective aortic valve replacement (AVR), with or without prior aspirin therapy.

**Exclusion criteria:** Redo procedure, AVR combined with additional surgery, patients on P2Y<sub>12</sub> receptor inhibitors, vitamin K or non-vitamin K antagonist anticoagulants that were not discontinued per guidelines, patient with liver cirrhosis, on hemodialysis, anemia with Hgb  $\leq$  10 g/dl and patients who refused informed consent.

Anticoagulation for Cardiopulmonary bypass (CPB) was achieved with unfractionated heparin and the ACT was maintained greater than 400 sec, per institutional protocol. All patients received Tranexamic acid bolus 15 mg/kg and infusion 8 mg/kg/h. Blood transfusion trigger was hematocrit



(Hct) 25%, in the absence of active bleeding or low cardiac output, and Hct 20% while on CPB. A thromboelastography (TEG) based institutional algorithm was implemented for correction of microvascular bleeding with additional protamine, coagulation proteins or platelets.

Blood was drawn from the existing central line on 3 different occasions: after induction of anesthesia and before CPB, 30 min after initiation of CPB and 3 min after administration of protamine. Platelet aggregation, platelet activation, in vitro thrombogenesis, Hct, platelet count, fibrinogen, factor XIII, aPTT, PT and antithrombin were assessed.

Platelet aggregation, the gold standard for the assessment of platelet function, detects changes in the transmission of light through platelet rich plasma (PRP) as those occur when the shape of the platelets changes when they aggregate after been exposed to an agonist. ADP, collagen, and thrombin receptor activated peptide 6 (TRAP) were used as agonists as each act on a different platelet receptor.<sup>17,18</sup>

Measurement of the activated glycoprotein IIb/IIIa on the platelet surface and the expression of P-selectin and phosphatidylserine were used to assess platelet activation. Monoclonal antibody PAC1 and binding of annexin V respectively were applied for the above quantifications and the % over baseline or % positive results were detected with flow cytometry.

Standardized techniques were used for in vitro thrombogenesis, whereas fibrinogen was added to the blood in reaction tubes. The clot formation was detected with microscope and was subsequently stained.<sup>16</sup> Photomicrographs of the stained thrombi were obtained with a confocal laser scanning microscope.

The hypothesis that the platelet dysfunction (expressed as impaired in vitro platelet aggregation, activation and in vitro thrombogenesis) which occurs from exposure to moderately hypothermic CPB can be improved with addition of fibrinogen, was examined with statistical analysis. (GraphPad Prism9, D'Agostino-Pearson omnibus normality test, comparison of groups using Wilcoxon signed-rank and Friedman tests).

## Results

In the group of patients examined, platelet count, fibrinogen and factor XIII were found significantly lower after CPB. PTT returned to pre CPB levels and Hct decreased from 39.2% (35.5-45.5) to 31% (28.8-35.2) post CPB.

Although a non-significant increase in ADP-induced platelet aggregation was observed 30 minutes after initiation of CPB, a significant decrease in ADP and TRAP induced platelet aggregation by 40% and 10% of the pre bypass values was seen respectively.

Similarly, although non-significant platelet activation occurred 30 minutes after initiation of CPB, a higher percentage of unstimulated protein expression and a lower induced signal was observed after CPB compared to baseline.

CPB caused a small but significant decrease in thrombogenesis in vitro. Although addition of fibrinogen increased thrombus formation in vitro both in the pre and post CPB blood samples, the increase post CPB was only 145% vs 245% pre CPB.

Similarly, addition of fibrinogen increased the area staining positive for clot in blood samples drawn before and after CPB but to a smaller degree after CPB.

## Discussion

In this ex vivo prospective observational study the authors demonstrated platelet dysfunction and impaired clot formation after CPB, by testing blood from patients before, during and after CPB for simple AVR. Improvement of clot formation and platelet function was observed after in vitro supplementation of fibrinogen. Although the increase in clot formation and improvement in platelet function were greater after addition of fibrinogen in the blood drawn before CPB, addition of fibrinogen post CPB still resulted in thrombus formation equal or higher than the pre CPB baseline level, in the test tube.

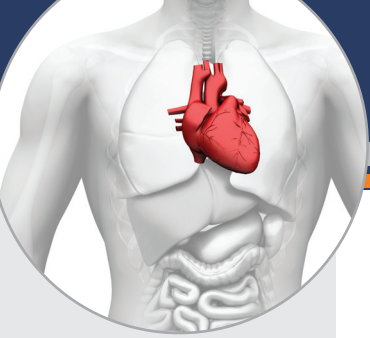


There are several limitations to this study as follows:

1. Patients undergoing moderately hypothermic CPB for simple AVR were studied. Worse coagulopathy most likely occurs after more complex cardiac surgery, and the efficacy of fibrinogen in such conditions was not studied.
2. Because platelet dysfunction and coagulopathy seen after CPB improves over the first 24 hours, different results may be shown if different time points are chosen. The authors think the time points studied are the most clinically pertinent.
3. Because the efficacy of fibrinogen was only demonstrated in vitro, more clinical studies are needed, and in more complex cases to demonstrate a clinical benefit or not.
4. It is unclear from the study whether fibrinogen improves platelet function or strengthens the clot by improving platelet crosslinking.

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## Echo Corner Case

### Echo Case: Young Man with New Onset of Dyspnea, Fatigue and Murmur

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#### **Learning Objectives:**

At the end of this program, participants will be able to:

- Assess tricuspid regurgitation using multiple imaging and monitoring modalities.
- Review perioperative TEE assessment and diagnosis of severe tricuspid regurgitation.

#### **Disclosure Statement**

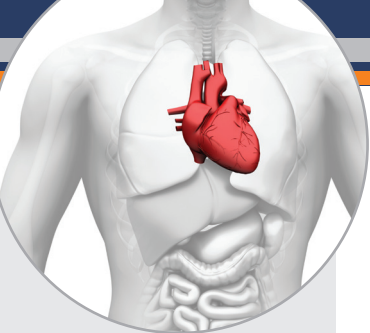
All the faculty members have no disclosures.

### CASE REPORT

A 30-year-old man comes in new onset of dyspnea, fatigue, and fever. Initial physical exam reveals a holosystolic murmur heard along the left parasternal border at the fourth intercostal space. Patient is admitted for workup. Electrocardiogram shows sinus rhythm with heart rate 90. Evidence of right atrial enlargement was noted by large P waves in V1, V2, and II and right ventricular enlargement was suggested by T wave inversions and large R waves in V1, V2, V3. A chest x-ray and TEE are obtained.







# QUESTIONS

## QUESTION 1

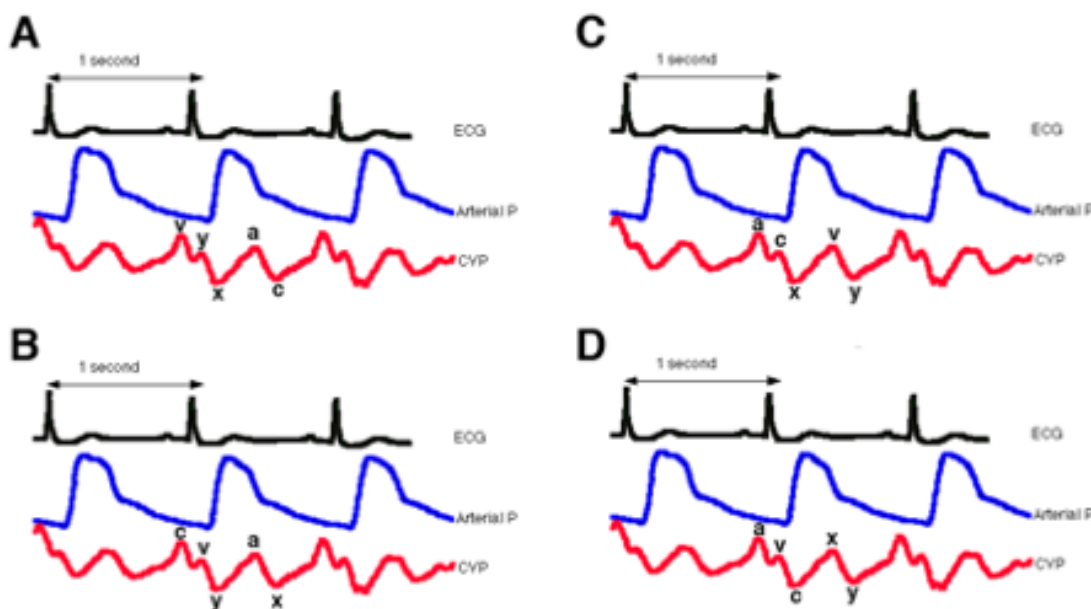
The CXR demonstrates:

- A. Normal cardiac size
- B. Bilateral pleural effusion
- C. Right heart enlargement
- D. Normal pulmonary arteries

## QUESTION 2

Which of the central venous waveforms is labeled correctly?

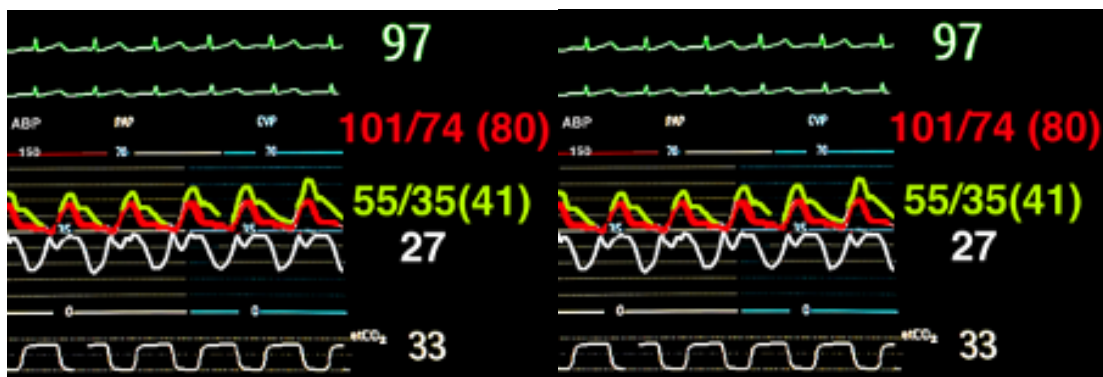
- A. Anterior Mitral Leaflet
- B. Posterior Mitral Leaflet
- C. LVOT
- D. Aortic Valve

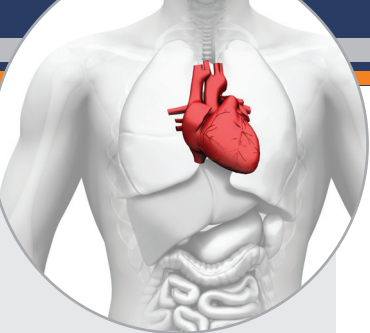


## QUESTION 3

The central venous waveform below was obtained in the case discussed. What is the diagnosis?

- A. Pericardial Tamponade
- B. Constrictive Pericarditis
- C. Tricuspid Regurgitation
- D. Tricuspid Stenosis





# QUESTIONS

## QUESTION 4

**Which of the following is most consistent with a diagnosis of torrential tricuspid regurgitation?**

- A. Hepatic vein systolic flow blunting
- B. Peak tricuspid regurgitant jet velocity  $<2.5$  m/s
- C. Late systolic maximal trans-tricuspid pressure gradient
- D. Parabolic continuous wave doppler jet

[VIEW ECHO CORNER VIDEO HERE](#)

## QUESTION 5

**What is an advantage of computed tomography angiography when compared to echocardiography in the assessment of TR?**

- A. Ability to evaluate right heart dimensions
- B. Ability to evaluate vena caval size
- C. Ability to evaluate the anatomic regurgitant orifice area
- D. Ability to evaluate the tricuspid valve annular dimensions

## QUESTION 6

**When viewing TR color Doppler jets:**

- A. The most important physical factor determining jet size is velocity
- B. Reduction of the color scale makes the jet appear smaller
- C. Jets that are directed eccentrically into an adjacent wall may appear reduced in size
- D. Multiple views are often unnecessary for adequate jet visualization

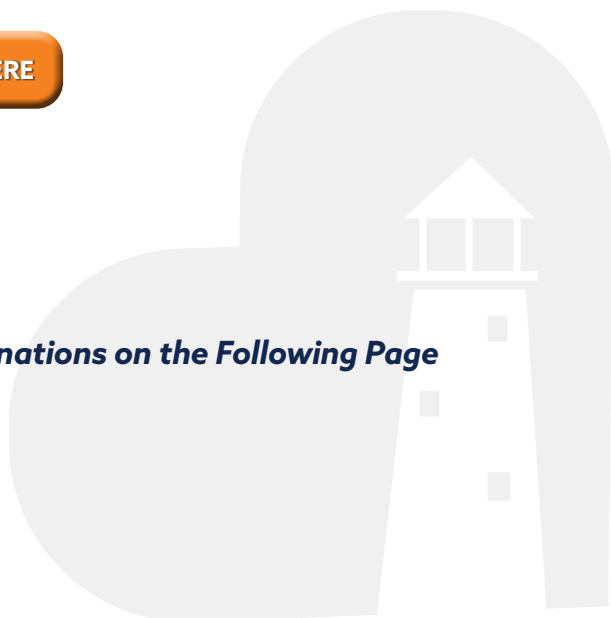
## QUESTION 7

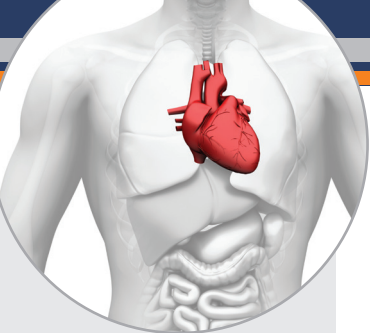
**Advantages of 3D color Doppler over 2D color Doppler assessing of TR includes:**

- A. Measurement of vena contracta width
- B. More accurate measurement of the color Doppler area
- C. Identification of multiple jets
- D. A and C

[VIEW ECHO CORNER VIDEO HERE](#)

**>> Please Note: Answers / Explanations on the Following Page**



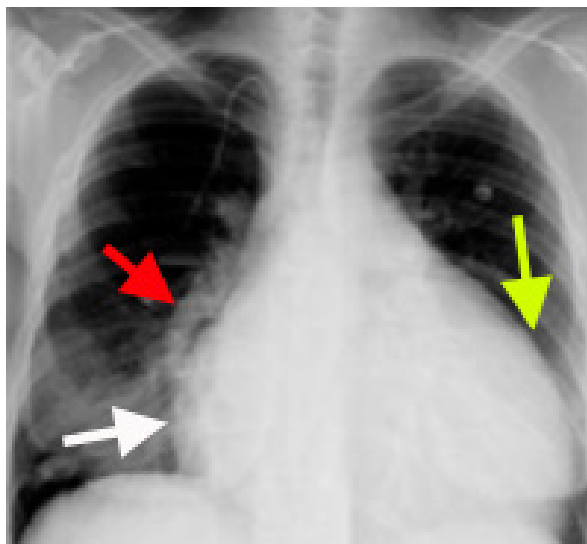


# ANSWERS

## QUESTION 1 – ANSWER C

**Chest radiography demonstrates right atrial and right ventricular enlargement.**

The cardiothoracic ratio is  $> 0.6$  suggesting that the heart is enlarged. The right atrium is enlarged when it is more than 5 cm from midline seen in the lower half of the right cardiac border (**white arrow**). The right ventricle is when the cardiac apex appears uplifted, and the left heart border appears rounded (**yellow arrow**). The pulmonary vasculature along the right side appears prominent (**red arrow**).



*Patient is admitted to ICU where intra-arterial and pulmonary artery catheters are placed, following by echocardiographic evaluation.*

## QUESTION 2 – ANSWER C

**'a' wave (end diastole):** Rise in atrial pressure with atrial contraction.

**'c' wave (early systole):** Isovolumic contraction, atrial bulging of tricuspid valve cusps, atrial filling

**'x' descent (mid systole):** Right atrial relaxation

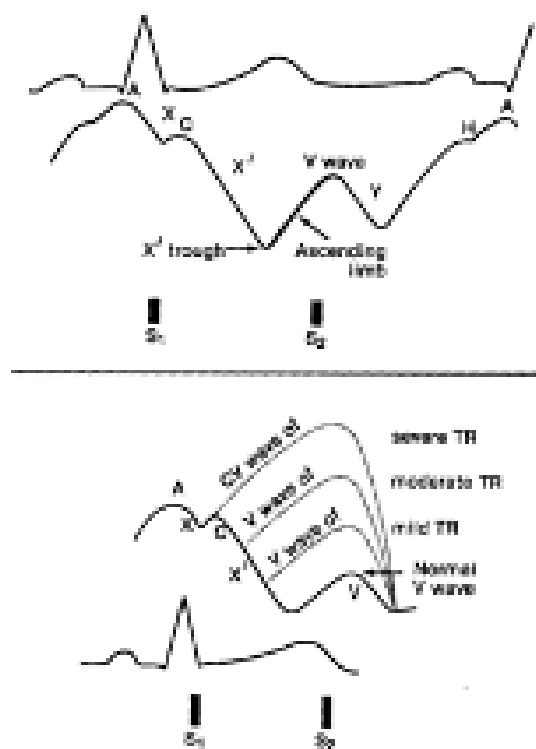
**'v' wave (late systole):** Rapid filling of the right atrium

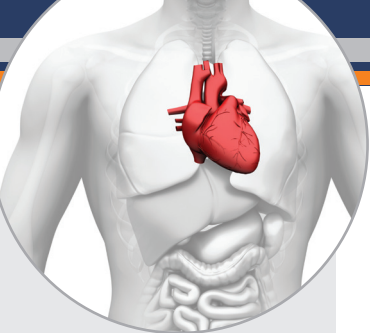
**'y' descent (early diastole):** Tricuspid leaflets open and early ventricular filling

## QUESTION 3 – ANSWER C

**Tricuspid regurgitation (TR) results in progressively larger 'v' wave with increasing severity.**

Severe TR evidenced by a fusion of the 'v' and 'c' waves consistent with the holosystolic murmur. The 'y' descent is blunted in pericardial tamponade. The 'x' and 'y' descents appear preserved, rapid, and steep relative to the elevated 'a' and 'v' waves. For patients with tricuspid valve stenosis the 'a' wave appears larger as the atrium is contracting against a narrowed valve.

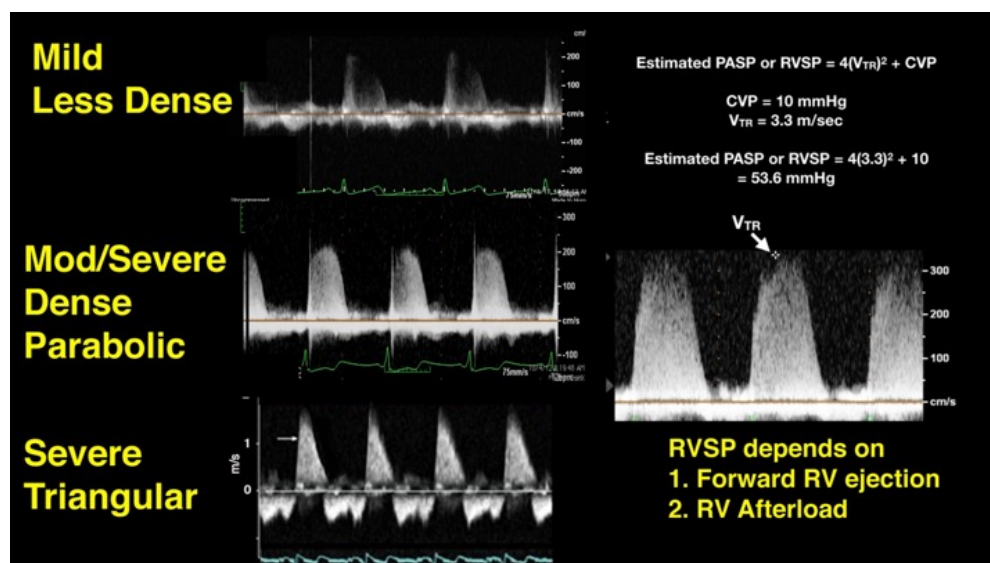




# ANSWERS

## QUESTION 4 – ANSWER B

In the setting of severe, wide open (torrential) TR, the peak jet velocity is frequently low ( $<2.5$  m/s) as the right atrial and ventricular pressures equalize quickly i.e., the right atrial waveform appears 'ventricularized'. Although severe or torrential TR is often associated with systolic flow reversal in the hepatic veins (answer A), this finding depends on the compliance of the right atrium. Systolic blunting does not suggest more than moderate TR. Systolic blunting may also not be reliable in patients with atrial fibrillation, paced rhythm with retrograde atrial conduction. Most TR tracings are parabolic in shape, reflecting the typical rise and fall of RV pressure. The denser the profile, the greater the TR will be. With more severe TR the RA pressure rises early in systole, resulting in an earlier systolic maximal instantaneous trans-tricuspid gradient and leads to a dense and triangular CW spectral shape with early peaking of the velocity). (Video 1) TR=Tricuspid Regurgitation; TV=Tricuspid Valve; RA = Right Atrium; RV=Right Ventricle; CW=Continuous Wave; CTA=Computed Tomography Angiography; MRI=Magnetic Resonance Imaging



## QUESTION 5 – ANSWER C

**CTA provides excellent spatial resolution and is the gold standard for anatomical information and structural planning in the assessment of TV function.**

CTA, echocardiography, and cardiac MRI are all able to adequately structurally evaluate the right heart, vena cava, and TV annular dimensions (answers A, B, and D). TR=Tricuspid Regurgitation; TV=Tricuspid Valve; RA = Right Atrium; RV=Right Ventricle; CW=Continuous Wave; CTA=Computed Tomography Angiography; MRI=Magnetic Resonance Imaging

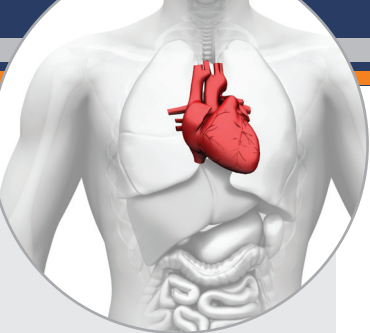
## QUESTION 6 – ANSWER C

**The most important physical factor determining jet size is its momentum, not velocity (answer A).**

Reducing the color scale also reduces the minimal velocity detected, which makes the jet appear larger, not smaller (answer B). Multiple views are necessary, and images need to be optimized for adequate TR jet visualization (answer D). TR=Tricuspid Regurgitation; TV=Tricuspid Valve; RA = Right Atrium; RV=Right Ventricle; CW=Continuous Wave; CTA=Computed Tomography Angiography; MRI=Magnetic Resonance Imaging

## QUESTION 7 – ANSWER C

Given that there are three (or more) valve leaflets and commissure, the tricuspid regurgitant jet regurgitant orifice is more likely to be complex (i.e., not circular), and multiple, as seen in up to 40% of cases with the regurgitant jet between the anterior and posterior leaflets being larger than that between the posterior and septal leaflets. Two-dimensional color Doppler assessment underestimates that measured by three-dimensional color Doppler and compared to reference measures. (Video 2)



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