WINTER EDITION
January 2026

AmSECTOMORROW

TEG as a Perfusionist's Ally: Streamlining Workflow and Improving Hemostatic Outcomes in CPB

BY: Graham Downing (Lipscomb), Lanette Choi (RUSH)

Thromboelastography (TEG) is a tool used in cardiac surgery that provides real-time insight regarding the patient's hemostatic status. The device analyzes the dynamics and speed of clot formation, as well as the strength and lysis of blood clots. The utilization of TEG samples has begun to rise in clinical practice, enabling more accurate diagnosis and treatment of deficiencies in patient-specific clotting abilities. Regular TEG testing, perioperatively and intraoperatively, provides rational guidance on the type and amount of blood products used for treatment, which significantly decreases the unnecessary product usage up to 40%. TEG use, typically performed within 30 minutes post-protamine dose, can assess the efficacy of heparin reversal and aid in postoperative bleeding stabilization.

Why should we care? There is plenty of blood in the blood bank; why not use it? Numerous studies have shown increased blood product usage increases the risk for postoperative acute kidney injury, length of stay, hospital costs, and overall patient mortality.

Additionally, the administration of donor blood products inherently elicits an immune response in patients. Therefore, utilizing targeted product replacement can help mitigate some of this response and decrease the adverse effects on patient outcomes.

Institutions that mandate TEG use for cardiac surgery have seen benefits for both patients and hospital finances. TEG lowers the variable product costs of transfusion and transfusion-related complications by guiding blood component therapy and minimizing guesswork in surgery. In turn, these institutions have seen fewer re-operations for bleeding and shorter ICU and hospital stays.

Reduced blood product usage and improved hemostatic outcomes for the patients also have a direct impact on a perfusionist's workload in the operating room. Fewer transfusions result in fewer transfusion-related reactions and issues during surgery, which can streamline the intraoperative workflow for perfusionists. This consideration, alongside the decreased cost associated with transfusions and their potential complications, provides a strong justification for the current and future utilization of TEGs for cardiopulmonary bypass procedures.

Featured Articles

SPECIAL CONSIDERATIONS IN PERFUSION: MALIGNANT HYPERTHERMIA

BY: ISABELLE TEASEL, EDITOR IN CHIEF, NKU

Malignant hyperthermia [MH] is a rare skeletal muscle disorder involving the regulation of calcium. Researchers describe MH as an autosomal dominant mutation of the RYR1 gene located on the 19q13.1 chromosome with 25 different mutations responsible. The prevalence of hypermetabolic conditions is roughly 1 per 3,000 individuals. With MH, the skeletal muscle will develop acute hyperthermia along with possible myotonic reactions induced by its hypermetabolic state. Reactions can be triggered by potent inhalation anesthetics and depolarizing skeletal muscle relaxants. Triggers include sevoflurane, isoflurane, halothane, and succinylcholine.

An abnormal high release of calcium from the sarcoplasmic reticulum of the skeletal muscle will occur and cause rigidity via calcium binding to the myofilament. The hypermetabolic state will lead to a significant increase in oxygen consumption, carbon dioxide production, and lactic acid production. Signs of malignant hyperthermia include hypercarbia, hyperthermia, decreased oxygenation of arterial and venous blood, high lactate levels, acidosis, hyperkalemia, tachycardia, high CPK, rhabdomyolysis, myoglobinuria, and higher than expected VO2. These measures can be confirmed by patient monitoring and running ABGs. If these signs become apparent and MH is suspected, be sure to communicate with the rest of the surgical team!

A pre-bypass sign may be a high baseline temperature. An early sign can be an unexplained increased arterial PCO2. While on bypass, the end-tidal CO2 can be measured; however, minute ventilation will not reach normal levels.

While on bypass, the end-tidal CO2 can be measured; however, minute ventilation will not reach normal levels. Muscle rigidity can be present, yet this sign can be overshadowed by the great use of nondepolarizing neuromuscular blocking [NMB] agents. These patients may display rapid rewarming and VF after XC removal during the case. For confirmation, decrease the setting on the blanket warmer and watch for a temperature change. If the patient has MH, the temperature will continue to increase rather than decrease.

Dantrolene is a working diagnostic tool and go-to drug treatment for MH. The hospital issued MH cart will be brought into the operating room. Volatile agents and any trigger mechanisms will be immediately discontinued. Anesthesia will be switched to intravenous anesthetics and nondepolarizing NMB agents along with starting to hyperventilate the patient. Amiodarone or lidocaine can be used for arrhythmia treatment. Calcium channel blockers should not be used; and calcium infusions should be decreased. Dantrolene will be dosed to 2.5mg/kg through intravenous route or the cardiopulmonary bypass machine. Additionally, if the potassium value is greater than 5.9 mEq/L, the perfusionist may need to dose sodium bicarbonate, insulin with dextrose, and frequently monitor glucose levels per hour. Near the end of the case, the patient should be slowly rewarmed, dose out vasodilators to decrease post-op temperature changes, and consider ECMO transition in severe cases.

If the patient is not treated accordingly, the condition may be fatal. Genetic testing has increased in sensitivity, but there is still a risk, especially when there is a family history. Unfortunately, MH genetic defect is not routinely tested for pre-operatively.

Test your knowledge

A post-heparin administration dose ACT has been performed prior to CPB, and the ACT is determined to be 300 seconds. What is a resonable explanation?

A. Thromboxane A2 inhibitors
B. Hyperfibrinolysis
C. AT III deficiency
D. Inadvertent use of bovine heparin

BACK TO THE STACKS
Burnout in Perfusion Education: Insights From a Survey of Student Stressors and Experiences
BY: LANETTE CHOI, RUSH

Burnout among perfusion students has increasingly become a concern within the profession. Considering the wide differences in academic, professional, and personal backgrounds, the pressures of programs are perceived differently by students and result in varying degrees of perceived stress and burnout. Through a survey of 76 first- and second-year cardiovascular perfusion students, 81% of participants experienced burnout. First-year students were more likely to identify multiple contributing factors and described their burnout as mild. In comparison, second-year students more frequently described their burnout as moderate; and when asked if they experienced more burn out compared to their first year, only 24% of second-year students said 'yes'.

Across all respondents, heavy workload was the most common contributor. First-year students also frequently reported inconsistent or insufficient sleep and limited personal time. Second-year students, now well into their clinical experience, frequently identified performance pressures along with lack of personal time. Many second years also listed challenging or demanding clinical preceptors as a stressor. Notably, several respondents did not report burnout yet selected factors in the burnout-related stressors column, which suggests that actual rates of burnout could be higher than self-reported.

The survey queried a wide range of factors contributing to burnout in perfusion school, including the learning environment, academic pressure, sleep habits, distractions, economic concerns, and other personal, family, or work obligations. These findings demonstrate how burnout changes over time for students with first-year students struggling more with academic and lifestyle transitions, and second-year students experiencing increased clinical demands. Students may view the didactic year as more challenging given the shift from varied lifestyles and backgrounds to the high demands of perfusion coursework and curriculum. Importantly, even "mild" burnout correlates with decreased clinical confidence, poorer learning retention, less resilience, and increased risk of future moderate to severe burnout. Addressing stressors and burnout for perfusion students can foster environments where students are able to thrive and become more confident, effective perfusionists.

Cruisin' for Perfusion Winners!!

Distance: Patrick Hood 26.12mi (MUSC Second Year)
Daniel Nguyen 3.48mi (CCP)

Highest Donation: Justin Sleasman

Scrub Cap Giveaway: Zach Gorman

Social Media Interaction Trophy: MUSC!

We received $1325 in donations! Thank you to everyone who participated this year.

Connect with us on Instagram!
@amsectstudentcouncil

THE RESERVOIR

AmSECT Membership:
Student Memberships are free! Register now and become an official part of the perfusion community.
Go to: https://www.amsect.org/Members/Student-Corner

Have a perfusion goof & blunder? Please email Teaseli1@mymail.nku.edu to have yours featured in the next issue!

PEDIATRIC PALOOZA: Partial Anomalous Pulmonary Venous Return

Student Perspective

BY: Lauren Dudeck, SUNY

Partial anomalous pulmonary venous return [PAPVR] is a congenital anomaly in which some of the pulmonary veins return blood to locations other than the left atrium. Most commonly, the right superior pulmonary vein drains into the SVC, and the right inferior pulmonary vein drains into the IVC, although other configurations can also occur. These patients almost always have an ASD, usually a sinus venosus ASD, accompanying the PAPVR.

Patients may not be diagnosed with PAPVR until adulthood. Often, these patients are asymptomatic during childhood and become symptomatic during adulthood due to pulmonary overcirculation. Over time, the right heart becomes volume overloaded and dilates, leading to right heart dysfunction. The greater the number of anomalous pulmonary veins, the greater the degree of shunting and volume overload. The decision is made to surgically repair the PAPVR once the Qp:Qs is greater than 1.5:1, indicating significant shunting.

Surgical repair of PAPVR aims to facilitate communication between the anomalous pulmonary veins and the left atrium. This can be accomplished in one of two ways: a direct anastomosis of the anomalous pulmonary veins to the left atrium and closure of the previous connection with the systemic venous system, or the creation of a baffle from the original site of return to the left atrium. With the baffle approach, a baffle is constructed using autologous pericardium or expanded polytetrafluoroethylene (ePTFE) and routed through the ASD to the left atrium. If there is not already an ASD present, an ASD is created to create the communication channel. Another approach is the Warden Procedure which transects the SVC above the entrance of the anomalous pulmonary veins and is anastomosed to the right atrial appendage, followed by the construction of the intra-atrial baffle. The Warden Procedure has demonstrated success in better preserving the blood supply and function of the SA node compared to other techniques.

I have had the opportunity to pump two PAPVR cases in adult patients. Both patients also presented with a sinus venosus ASD, right-sided overload, and tricuspid regurgitation. Aortic cannulation for both patients involved cannulation of the ascending aorta. Venous cannulation differed between patients. The first patient presented with a persistent LSVC, requiring tricaval venous cannulation, while the second patient underwent bicaval venous cannulation. In both cases, the surgeon created an intra-atrial baffle through the ASD using autologous pericardium, as mentioned earlier.

Overall, understanding the underlying pathology in these cases is essential for understanding the downstream consequences and strategy for surgical repair. I look forward to being involved in more adult and pediatric congenital cases like these as I continue my clinical rotations.

Sustainability in Cardiovascular Medicine
Student Perspective
BY: BRYCE ORE, RUSH

The healthcare sector is a major contributor to global environmental degradation, generating an estimated 33.8 pounds (15.3 kilograms) of waste per patient per day and nearly 6 million tons annually. This environmental burden is particularly pronounced in high-acuity procedural environments such as cardiac operating rooms [ORs] and interventional cardiology suites, where complex and urgent care demands extensive use of single-use, disposable supplies. Essential materials, such as sterile drapes, catheters, and packaging, are vital for maintaining patient safety and procedural efficiency. However, their use significantly increases landfill waste, greenhouse gas emissions, and resource depletion. Improper disposal of healthcare waste poses health hazards to workers, patients, and nearby communities.

The rising burden of cardiovascular disease [CVD] further intensifies these challenges. As the leading global cause of death, CVD prevalence is projected to rise substantially by 2060 due hypertension, diabetes, dyslipidemia, and obesity expected to increase by as much as 39.3%. Consequently, major cardiovascular conditions such as ischemic heart disease, myocardial infarction, and stroke are anticipated to grow by 27.5% to 34.3%. The environmental footprint of a single heart surgery can equal the emissions from a 670-mile airplane journey per passenger, highlighting the sustainability challenge associated with cardiac interventions. Although awareness of healthcare's environmental impact has grown, sustainability efforts in clinical settings remain fragmented and underdeveloped.

Goofs & Blunders
We've all been there!

"Broke the rubber top into the medication bottle without realizing... as you can imagine, it went everywhere when I flipped it over"

"Make sure your hemoconcentrator is isolated from positive pressure when draining it"

SUBMISSIONS FROM AMSECT STUDENTS

Before You Go!

The AmSECT Student Council exists to promote student involvement within AmSECT. While our current members hail from over 19 different programs, our goal is to have every perfusion program in the country represented on the council. Our major projects include an annual fundraising event, the perfusion bowl, and this very newsletter, with multiple opportunities for student leadership!

Our current officer team consists of a president/chief student liaison, vice president, fundraising project lead, communications coordinator, and newsletter editor, pre-perfusion coordinator, events, and perfusion bowl coordinator. The Student Council meets monthly via Zoom for one hour, so the time commitment is designed to be manageable! Don't forget to sign up to come to the annual AmSECT Conference in the spring! It's a great way to network and see the student council in action.

INTERESTED IN JOINING THE STUDENT COUNCIL?

PLEASE EMAIL AMSECTSTUDENTHQ@GMAIL.COM AND BE SURE TO INCLUDE YOUR CONTACT INFORMATION. SHARE YOUR VOICE, DEVELOP YOUR NETWORKING AND LEADERSHIP SKILLS, AND BECOME INVESTED IN THE PROFESSIONAL DEVELOPMENT OF OUR FIELD! WE LOOK FORWARD TO SEEING YOU JOIN OUR TEAM.