Perfecting the Surgical Journey

ERAS® CARDIAC

NEWSLETTER

May 6, 2023 | VOLUME 06 | ISSUE 02

Editor: Rawn Salenger, MD

FROM THE EDITOR

2ND ANNUAL AATS ENHANCED RECOVERY CONCLAVE

Rawn Salenger, MD

UM St Joseph Medical Center, Towson, MD

This year's AATS meeting features an Enhanced Recovery After Surgery (ERAS) Conclave on Saturday May 6 from 8-9:30AM. Like previous ERAS Cardiac Conclaves, presenters will focus on issues critical to patient recovery as part of our Society's endeavor to perfect the patient journey. Our mission includes disseminating the science of ERAS, and this conclave will focus on implementation. We will provide attendees with points for practical bedside care that can help achieve optimal outcomes. The topics discussed will include multimodal analgesia, acute kidney injury, postoperative atrial fibrillation, goal-directed therapy, surgical site infections, and patient blood

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AN OUNCE OF PREVENTION IS WORTH A POUND OF CURE: *Exploring the Role of Pharmacologic Preconditioning in Improving Post-Operative Outcomes*

Daniel Engelman, MD

University of Massachusetts Chan Medical School-Baystate, Springfield, MA

More than one million cardiac surgeries are performed annually worldwide, creating a need to devise strategies to reduce morbidity and mortality and improve patient outcomes. Operative interventions employing cardiopulmonary bypass (CPB) trigger systemic and tissue-derived inflammation and oxidative stress which, can incite organ dysfunction and lead to post-operative complications. In spite of attempts to mitigate post-operative complications through improvements in surgical techniques and post-operative care, inflammation and oxidant stress continue to adversely impact clinical outcomes (e.g., acute kidney injury, atrial fibrillation, and vasoplegia).[1]

Although translational research has explored several approaches to protect against surgically-induced systemic inflammation and oxidative stress, a clinically meaningful impact on patient outcomes has yet to be realized.[2] Remote ischemic preconditioning was one approach that has shown great

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CRYO NERVE BLOCK AS ADJUNCTIVE PAIN CONTROL IN FULL STERNOTOMY DURING CARDIAC SURGERY

David J. Caparrelli, MD, FACS

New England Heart and Vascular Institute, Manchester, NH

Significant post-operative pain can occur after sternotomy, which can result in pulmonary and respiratory complications. The recent ERAS Cardiac Society consensus report recommends perioperative opioid stewardship and a multi-modal, non-opioid analgesic approach for cardiac surgery patients.[1]

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MORE **INSIDE:**

VISCOELASTIC TESTING IN THE CARDIAC OR

Bruce Spiess, MD, FAHA

Professor Emeritus Department of Anesthesiology, University of Florida

Patient blood management (PBM) is a patient centered, individualized, team approach based upon the belief that the "best" blood is the patient's own blood.[1] PBM is a perfect fit for ERAS in that it enhances the patient experience, reduces complications, involves the patient in their own decision making, reduces medical care costs, and enhances public health.[2] One of the key pillars of PBM, as outlined in the seminal World Health Organizations call to action for all 192 nations to adopt PBM, is the concept of individualized coagulation care.[3] Individualized coagulation care/monitoring is endorsed in the cardiac surgery guidelines (since 2007) through universal utilization of viscoelastic testing (VET) as point of care (POC) decision making (Level I B evidence).[4] Whole blood coagulation

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FROM THE EDITOR

2ND ANNUAL AATS ENHANCED RECOVERY CONCLAVES

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management. In an effort to assist with implementation of cardiac enhanced recovery after surgery (ERAS), we have created sample ERAS turnkey order sets (TKOs). These order sets have been translated by subject matter experts using accumulated evidence, peer-reviewed literature, and current enhanced recovery practices. In these manuscripts Table 1 will provide an overview of existing Class I and IIA recommendations from relevant guidelines and consensus statements. Table 2 translates recommendations into a turnkey order set (TKO). Orders derived from Class I or IIA recommendations across all referenced guidelines and consensus manuscripts appear in the TKO in bold type. Selected orders that were inconsistently Class I or IIA, Class IIB, or supported by evidence in published in peer-reviewed journals, were also included in italicized type. Decisions regarding order inclusion have been made based on estimated benefit, risk, cost, implementation complexity, and generalizability. Each of these orders should be considered based on local institutional priorities, resources, practices, and expertise. Although a genuine turnkey order set that works for all institutions is impractical, we are attempting to provide an outline of the basic activities needed to achieve excellent outcomes. Our hope is that these sample order sets can be modified locally to allow widespread implementation of the ERAS principles of care. Digital and hard copies of the order sets will be available to attendees at the conclave.

OUR HOPE IS THAT THESE SAMPLE ORDER SETS CAN BE MODIFIED LOCALLY TO ALLOW WIDESPREAD IMPLEMENTATION OF THE ERAS PRINCIPLES OF CARE.

Follow this link to a publication summarizing the 2022 AATS ERAS Cardiac Conclave:

State of the Art: Proceedings of the AATS Enhanced Recovery after Cardiac Surgery Summit

TACKLING PERIOPERATIVE ANXIETY

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Patients facing cardiac surgery often experience fear, nervousness, and worry which can contribute to anxiety. This can increase stress hormones release, resulting in increased heart rate, blood pressure, and postoperative pain. Strategies to lessen anxiety prior to surgery may positively impact patients' functional recovery. [1] Alleviating preoperative anxiety is considered a key component of pre-habilitation, however, providing patients with interventions that support anxiety reduction can be challenging.[2] Baystate Medical Center has tackled the challenge of perioperative anxiety for cardiac surgery patients by partnering with a collaborative partner to build a digital patient engagement platform (DPEP). This platform provides patients with detailed education and customized videos to help prepare them for each phase of their surgical journey. [3] The DPEP has recently been enhanced to include access to self-directed complementary alternative medicine (CAM) resources. Patients are given instructions on how to perform numerous CAM practices including breathing techniques, guided imagery, meditation, and to how to download a customized music playlist. Patients are encouraged to directly contact healthcare professionals that specialize in emotional and spiritual support if they so desire. The foundation of Enhanced Recovery After Surgery (ERAS) is to provide standardized, evidence-based, patient-centered best practice that cumulatively mitigates surgical stress and optimizes patient recovery. Reducing perioperative anxiety is an example of an additional important and often neglected layer of care that will likely enhance recovery.

ALLEVIATING PREOPERATIVE ANXIETY IS CONSIDERED A KEY COMPONENT OF PRE-HABILITATION, HOWEVER, PROVIDING PATIENTS WITH INTERVENTIONS THAT SUPPORT ANXIETY REDUCTION CAN BE CHALLENGING.

1. Bedaso A, Mekonnen N, Duko B. Prevalence and factors associated with preoperative anxiety among patients undergoing surgery in low-income and middle-income countries: a systematic review and meta-analysis. BMJ Open. 2022;12(3):e058187.

2. Arora RC, Brown CHt, Sanjanwala RM, McKelvie R. "NEW" Prehabilitation: A 3-Way Approach to Improve Postoperative Survival and Health-Related Quality of Life in Cardiac Surgery Patients. Can J Cardiol. 2018;34(7):839-849.

3.Grady K, Vital C, Crisafi C. Use of Complementary Pain Management Strategies in Postoperative Cardiac Surgical Patients. J Nurs Care Qual. 2023.

AN OUNCE OF PREVENTION IS WORTH A POUND OF CURE:

EXPLORING THE ROLE OF PHARMACOLOGIC PRECONDITIONING IN IMPROVING POST-OPERATIVE OUTCOMES

Daniel Engelman, MD
University of Massachusetts Chan Medical School-Baystate, Springfield, MA

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promise in pre-clinical models,[3] but failed in larger clinical trials due to challenges in determining and delivering an 'effective dose' of ischemia, and the inconsistency of its impact across various organs. Cumulative evidence does not support the use of ischemic preconditioning as a means of improving post-operative outcomes.

Pharmacologic preconditioning, which entails advanced administration of a pharmaceutical agent before surgery that produces predictable, measurable, and effective activation of cytoprotective pathways, is another potential, yet underexplored method for reducing post-operative complications. A recent phase 2, double-blind, randomized, placebo-controlled study evaluated the effect of RBT-1, a preconditioning drug administered 1-2 days prior to cardiac surgery.[4] A statistically significant increase in anti-inflammatory and anti-oxidant proteins (cytoprotective biomarkers) was observed with treatment. More importantly, clinically meaningful improved outcomes (e.g., decreased time on ventilator, ICU and hospital length of stay, 30-day readmission rates, reduced incidence of atrial fibrillation, trend towards reduced mortality) were observed.[4]

With an expansive body of experimental work demonstrating the potential benefit of preconditioning, coupled with recent clinical advances, further investigation is warranted to explore the ability of pharmacologic preconditioning to impact the quality and outcomes of cardiovascular surgery.

PHARMACOLOGIC PRECONDITIONING ... IS ANOTHER POTENTIAL, YET UNDEREXPLORED METHOD FOR REDUCING POST-OPERATIVE COMPLICATIONS.

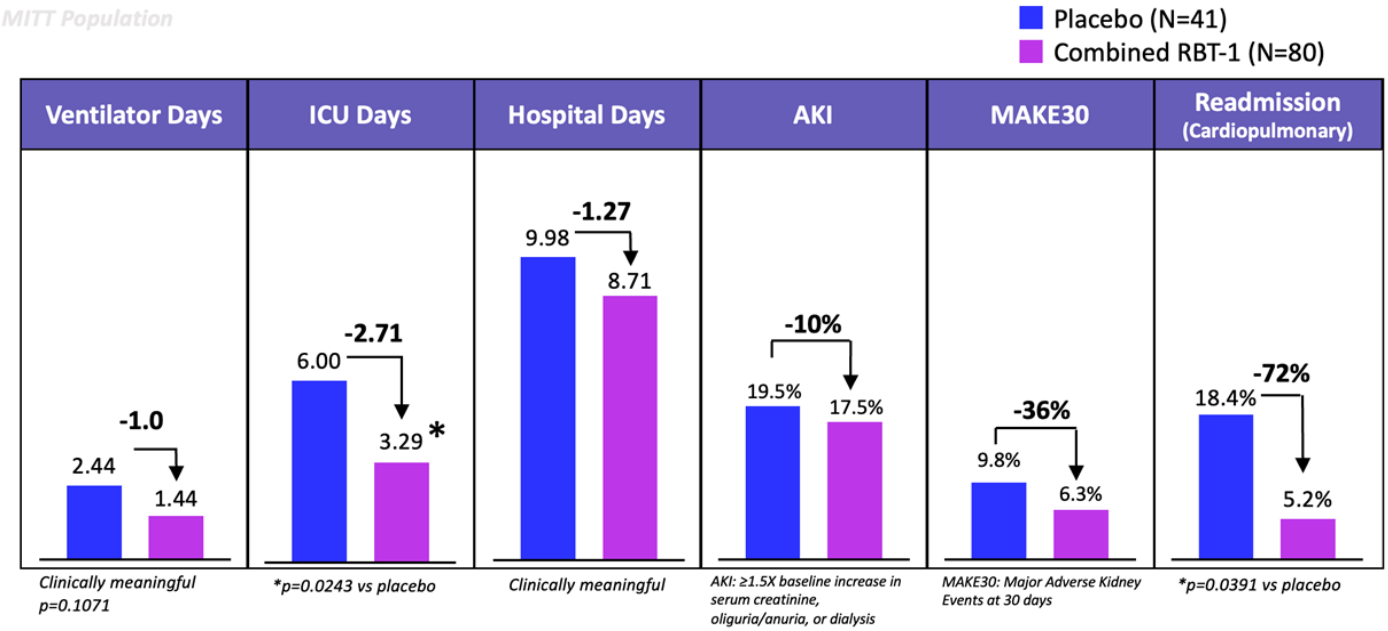
1. Pahwa S, Bernabei A, Schaff H, Stulak J, Greason K, Pochettino A, Daly R, Dearani J, Bagameri G, King K, Viehman J, Crestanello *J. Impact of postoperative complications after cardiac surgery on long-term survival. J Card Surg. 2021 Jun;36(6):2045-2052. doi: 10.1111/jocs.15471. Epub 2021 Mar 9. PMID: 33686738.*

2. Kraft F, Schmidt C, Van Aken H, Zarbock A. Inflammatory response and extracorporeal circulation. Best Practice & Research Clinical Anaesthesiology, 29 (2) (2015), pp. 113-123, 10.1016/J.BPA.2015.03.001

3. Engelman DT, Chen CZ, Watanabe M, et al. Improved 4- and 6-hour myocardial preservation by hypoxic preconditioning. Circulation. 1995;92(9 Suppl):417-422.

4. Lamy A, Assi R, Brown C, Arghami A, Mack C, Jessen M, Smith J, Marzouk M, Washburn TB, Savage D, Collar A, Scavo V, Bennetts J, Zager R, Wang C, Lavin P, Ruiz S, Singh B. Phase 2 Study Interim Results of RBT-1 Effect on Postoperative Course in Elective CABG/VALVE Surgery. Critical Care Medicine 51(1):p 2, Jan 2023. | DOI: 10.1097/01. ccm.0000905888.62846.0d

RBT-1 Improves Postoperative Outcomes in Patients Undergoing Cardiac Surgery



CRYO NERVE BLOCK AS ADJUNCTIVE PAIN CONTROL IN FULL STERNOTOMY DURING CARDIAC SURGERY

David J. Caparrelli, MD, FACS
New England Heart and Vascular Institute, Manchester, NH

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Intercostal cryo nerve block (cryoNB) has been described as adjunctive therapy for postoperative analgesia during minimally invasive cardiac surgery.2 We use this technique bilaterally during heart surgery through a full sternotomy. Here we briefly describe our technique in a case report as recently published.3

A 65-year-old man was scheduled for thymoma resection and surgical aortic valve replacement (SAVR) through full sternotomy. At 6-cm from the midline incision, the pleura along the chest wall was incised with electrocautery from T1—T6. Each nerve was cryoablated for two minutes bilaterally. Then, SAVR was performed per standard protocol. The operation took 2 hours 54 minutes with approximately 35 minutes for cryoNB.

Following an intravenous 50-µg (12.5 morphine milligram equivalents [MME]) fentanyl dose administered on arrival to the intensive care unit while the patient was still intubated and sedated and 2 doses of 1000 mg of intravenous acetaminophen on the night of surgery, a total dose of 25-mg (37.5 MME) of oxycodone was administered as needed through post-operative day (POD) 2. The patient was discharged POD4, taking acetaminophen as needed. At 1 month postoperatively, the patient's sternal incision was well-healed, the sternum was stable, and he reported no use of any pain medication other than acetaminophen. Incision site sensation was normal at 6 months. He is now over 1 year from surgery with no complaints or adverse sequelae.

In summary, bilateral intercostal cryoNB was effectively used to ameliorate pain in open-heart surgery through a full sternotomy. The patient required minimal opioid analgesia as an inpatient, fully recovered without incident, and has returned to normal activity without limitation.

1. Grant MC, et al. Pain management and opioid stewardship in adult cardiac surgery: Joint consensus report of the perioperative quality initiative and the enhanced recovery after surgery cardiac society. J Thorac Cardiovasc Surg 2023; https://doi.org/10.1016/j.jtcvs.2023.01.020.

2. Lau W, et al. Intercostal cryo nerve block in minimally invasive cardiac surgery: The prospective randomized FROST trial. Pain Ther 2021; 10:1579-92.

3. Caparrelli DJ. Case report of cryo nerve block in a patient undergoing full sternotomy: A novelapproach to pain control in cardiac surgery. A A Pract. Feb 1 2023;17(2):e01654. doi:10.1213/XAA.0000000000001654.

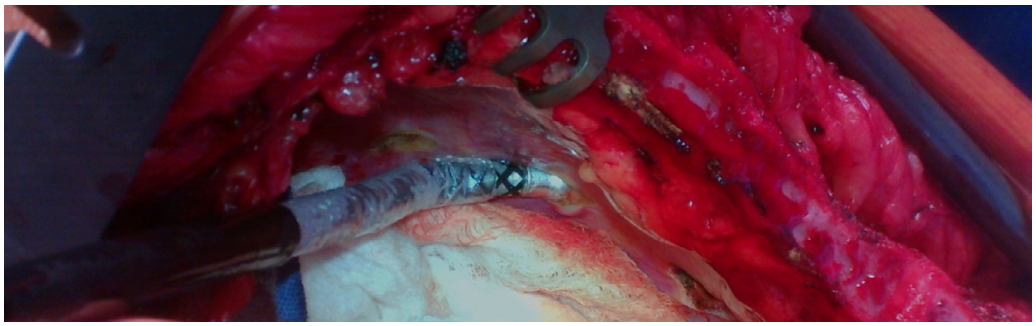

Figure 1:
Positioning of cryoprobe in the intercostal space (right side)

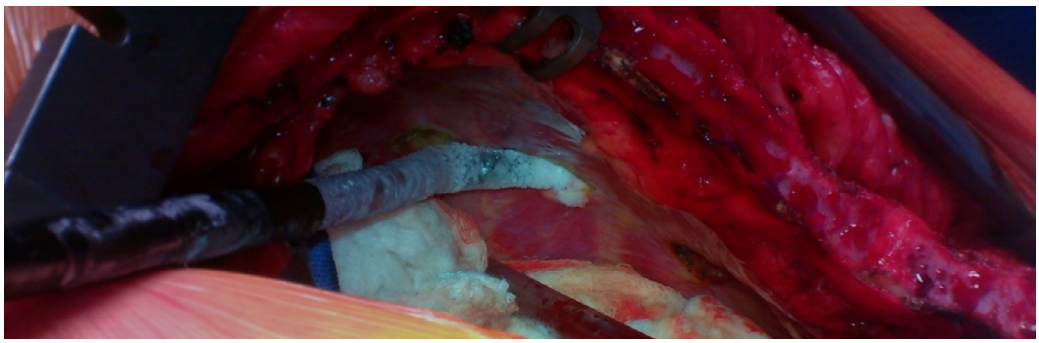

Figure 2:
Cryoablation of the intercostal nerve

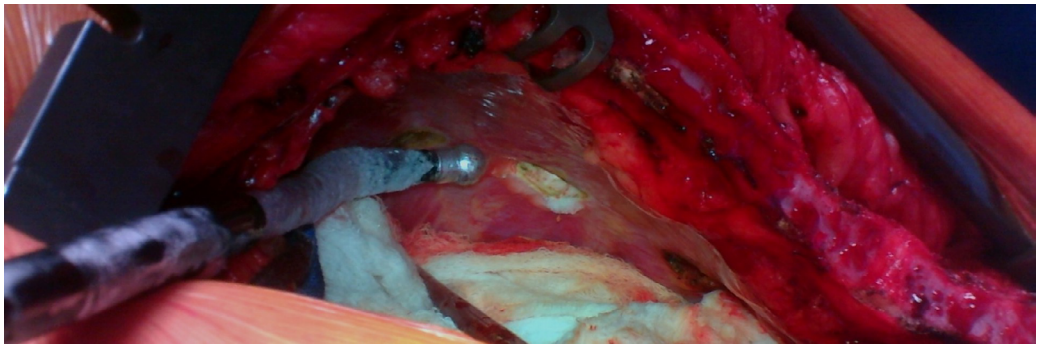

Figure 3:
Active defrost and safe removal from tissue

VISCOELASTIC TESTING IN THE CARDIAC OR

Bruce Spiess, MD, FAHA
Professor Emeritus Department of Anesthesiology, University of Florida

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analysis with VET (clot shear modulus over time) encompasses all elements of clot formation, stabilization and lysis with the exception of live interaction with an endothelium. VET has been demonstrated to be a better predictor of coagulopathies and the need for transfusion than standard laboratory testing.[5] The use of VET demonstrated reductions in transfusion rates, complications and mortality.[5,6] Prior to the last 3 years, when VET advanced to true POC, blood samples obtained in the operating rooms were sent to central laboratories for VET analysis, resulting in long turnaround times for results. Today, advances in VET automated with ultrasound technology allows samples to be run in the ORs either by the anesthesiology team or the perfusionists. Decision making in as little as 12 minutes allow the cardiac teams to hone their usage of plasma (FFP), platelets (PLT) and cryoprecipitate (Cryo) as well as to make informed judgements regarding expensive pro-coagulant pharmaceuticals.[6-10] FFP and PLT concentrates are linked more closely to ARDS, TRALI and prolonged ventilation than packed red blood cells.[11-12] PLT are linked to increases in stroke rate and mortality, so appropriate usage, only when VET demonstrates that deficit in conjunction with active bleeding, is good PBM practice for coagulation care.[13] Instituting POC VET testing in recent publications show that morbidity, mortality and costs are reduced when these technologies are embraced.[7-11] PBM coagulation individualized care is now possible in every cardiac operating room. Patient care improves when teams embrace ERAS. The new POC coagulation technologies further that end goal.

PBM IS A PERFECT FIT FOR ERAS IN THAT IT ENHANCES THE PATIENT EXPERIENCE, REDUCES COMPLICATIONS, INVOLVES THE PATIENT IN THEIR OWN DECISION MAKING, REDUCES MEDICAL CARE COSTS, AND ENHANCES PUBLIC HEALTH.

1. Shander A, Hardy F-F, Ozawa S, et. al. A global definition of patient blood management. Anesth Analg 2022; 135 (3): 476-488.

2. Guinn NR, Goobie SM. Patient blood management: The forgotten element of enhanced recovery after surgery programs. Anesth Analg 2022; 135 (3) 474-475.

3. World Health Organization. The urgent need to implement patient blood management: Policy Brief. WHO. https//apps.who.int/iris/handle/10665/346655.

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6. Zlotnik D, Abdallah GA,Lang E, et al. Assessment of a Quantra-guided hemostatic algorithm in high-bleeding-risk cardiac surgery. JCTVA 2023. Feb 3; S1053-0770(23) 00057-5/ doi: 10.1053/j.JCVA.2023.01.034. on line ahead of print.

7. Baulig W, Akbar S, Schűtt PK et. Al. Comparison of the resonance Sonorheometry based

Quantra® system with rotational thromboelastometry RoTEM®sigma in cardiac surgery- a prospective observational study. BMC Anesthesiology (2021) 21: 260 https//doi.org/10.1186/S12871-021-01469-S.

8. Baryshnikova E, DiDedala U, Ranucci M. A compasrison study of SEER Sonorheometry versus standard coagulation tests rotational thromboelastometry, and multiple electrode aggregometry in cardiac surgery. JCTVA 2019;33:1390-1399.

9. Naik BI, Tanaka K, Sudhagoni RG, Viola F. Prediciton of hypofibrinogenemia and thrombocytopenia at the point of care with the Quantra QPlus system. Thromb Res 2021; 197:88-93.

10. DeAnda A, Levy G, Kinsky M et. al. Comparison of Quantra QPlus system with thromboelastography in cardiac surgery. JCTVA 2021;35: 1030-1036.

11. Koch C, Li L, Figeroua P et al. Transfuison and pulmonary morbidity after cardiac surgery. Ann Thorac Surg 2009;88: 1410-1418.

12. Khan H, Belcher J, Yulmay M et al. Fresh-frozen plasma and platelet transfusions are associated with development of acute lung injury in critically ill medical patients. Chest 2007; 131:1308-1314.

13. Spiess BD, Royston D, Levy J et. al. Platelet transfusions during coronary artery bypass graft surgery are associated with serious adverse outcomes. Transfusion 2004;44: 1143-8.

Disclosure: Dr Spiess discloses that he is medical director of HemoSonics, Durham, NC

RECENT ERAS® CARDIAC PUBLICATIONS:

>> Click titles for weblinks

1: Doruker NC, Oden TN, Korkmaz FD. ***Determination of Knowledge and Attitudes of Cardiac Surgery Nurses Regarding the Enhanced Recovery After Surgery Protocol.*** J Perianesth Nurs. 2023 Mar 24:S1089-9472(22)00592-5. doi: 10.1016/j.jopan.2022.11.005. Epub ahead of print. PMID: 36967302.

2: Yamamoto T, Schindler E. ***Regional anesthesia as part of enhanced recovery strategies in pediatric cardiac surgery. Curr Opin Anaesthesiol.*** 2023 Mar 14. doi: 10.1097/ACO.0000000000001262. Epub ahead of print. PMID: 36924271.

3: Magoon R, Jose J. ***Enhanced Recovery After Cardiac Surgery and Postoperative Delirium: Comment.*** J Cardiothorac Vasc Anesth. 2023 Feb 7:S1053-0770(23)00059-9. doi: 10.1053/j.jvca.2023.01.039. Epub ahead of print. PMID: 36878816.

4: Grant MC, Chappell D, Gan TJ, Manning MW, Miller TE, Brodt JL; PeriOperative Quality Initiative (POQI) and the Enhanced Recovery After Surgery (ERAS) Cardiac Society Workgroup. ***Pain management and opioid stewardship in adult cardiac surgery: Joint consensus report of the PeriOperative Quality Initiative and the Enhanced Recovery After Surgery Cardiac Society.*** J Thorac Cardiovasc Surg. 2023 Jan 28:S0022-5223(23)00089-2. doi: 10.1016/j.jtcvs.2023.01.020. Epub ahead of print. PMID: 36868931.

5: Ohliger S, Harb A, Al-Haddadin C, Bennett DP, Frazee T, Hoffmann C. ***Addition of Deep Parasternal Plane Block to Enhanced Recovery Protocol for Pediatric Cardiac Surgery.*** Local Reg Anesth. 2023 Feb 16;16:11-18. doi: 10.2147/LRA.S387631. PMID: 36814520; PMCID: PMC9940490.

6: Jelly CA, Clifton JC, Billings FT 4th, Hernandez A, Schaffer AJ, Shotwell ME, Freundlich RE. ***The Association Between Enhanced Recovery After Cardiac Surgery-Guided Analgesics and Postoperative Delirium.*** J Cardiothorac Vasc Anesth. 2023 May;37(5):707-714. doi: 10.1053/j.jvca.2022.12.023. Epub 2023 Jan 8. PMID: 36792460; PMCID: PMC10065906.

7: Duran AT, Keener-DeNoia A, Stavrolakes K, Fraser A, Blanco LV, Fleisch E, Pieszchata N, Cannone D, McKay CK, Whittman E, Edmondson D, Shelton RC, Moise N. ***User-centered design of a telehealth-enhanced hybrid cardiac rehabilitation program as hospital quality improvement.*** Res Sq [Preprint]. 2023 Jan 16:rs.3.rs-2475875. doi: 10.21203/rs.3.rs-2475875/v1. PMID: 36711987; PMCID: PMC9882652.

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9: El-Andari R, Fialka NM, Nagendran J. ***Enhanced recovery after cardiac surgery: The next step towards optimized care.*** Int J Cardiol. 2023 Feb 1;372:48-49. doi: 10.1016/j.ijcard.2022.12.012. Epub 2022 Dec 6. PMID: 36493928.

10: Hendy A, DiQuinzo C, O'Reilly M, Hendy A, Vician M, Theriault C, Chedrawy E, Hirsch G, Aliter H. ***Implementation of enhanced recovery in cardiac surgery: An experimental study with the control group.*** Asian Cardiovasc Thorac Ann. 2023 Feb;31(2):88-96. doi: 10.1177/02184923221138504. Epub 2022 Nov 14. PMID: 36377227; PMCID: PMC10034473.

11: Magoon R, Jose J. ***Multimodal Analgesia in Paving the Way for Enhanced Recovery After Cardiac Surgery***. Braz J Cardiovasc Surg. 2023 Apr 23;38(2):316-317. doi: 10.21470/1678-9741-2022-0058. PMID: 36259997; PMCID: PMC10069262.

12: Parra MF, Brown ML, Staffa SJ, Nathan M, Roy N. ***Post-operative vomiting and enhanced recovery after congenital cardiac surgery.*** Cardiol Young. 2023 Feb;33(2):260-265. doi: 10.1017/S1047951122000592. Epub 2022 Mar 24. PMID: 35322768.

UPCOMING MEETINGS:

>> Click on icons for weblinks

9th World Congress of the Enhanced Recovery After Surgery Society, *Lisbon, Portugal, May 31- June 2*

EBPOM World Congress of Prehabilitation Medicine, *London, England, July 4-6*

European Association For Cardio-Thoracic Surgery 37th Annual Meeting, *Vienna, Austria, October 4-7*

European Association of Cardiothoracic Anaesthesiology and Intensive Care 37th Annual Meeting, *Budapest, Hungary, October 11-13*

American Society of Anesthesiologists Annual Meeting, *San Francisco, CA, October 13-17*

ERAS® CARDIAC

To learn more about our organization, including our board members and upcoming meetings:
www.erascardiac.org

ERAS© Cardiac Society MISSION

The mission of the ERAS® Cardiac Society is to optimize perioperative care of cardiac surgical patients through collaborative discovery, analysis, expert consensus, and dissemination of best practices worldwide.

Who We Are

The ERAS® Cardiac Society is an international non-profit organization comprised of experts from around the world, including participation from all members of the healthcare team. Led by an executive board, an advisory board, and a pool of subject matter experts, our members strive to implement enhanced recovery principles at their local institutions while advancing improved patient care internationally through collaboration, education, and dissemination of up-to-date knowledge regarding optimal perioperative care.

ERAS® Society

The ERAS® Society is an international organization with enhanced recovery guidelines for several surgical sub-specialties. Beginning as the ERAS® Study Group in 2001, team leaders Professor Ken Fearon (University of Edinburgh) and Professor Olle Ljungqvist (Karolinska Insitutet) spearheaded the developments made in multimodal surgical care. The ERAS® Study Group soon discovered that there were a variety of local traditions in practice, as well as an inconsistent application of evidence-based best practices. This prompted the group to examine the process of change from tradition to best-practice. Since its inception, the ERAS® Society has expanded to include several subspecialties, emphasized the benefits of standardized best-practices across the continuum of the perioperative period, highlighted the importance of data-driven self-evaluation, and promoted the improvement of patient care.

Our Organizational Structure

Our ERAS® Cardiac Society is made up of experts from around the world, including participation from all members of the healthcare team. Our members strive to implement enhanced recovery principals at their local institutions while advancing improved patient care internationally through collaboration, education, and dissemination of up-to-date knowledge regarding optimal perioperative care. Our organization is divided into an Executive Board, Advisory Board, and a pool of Subject Matter Experts.

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Corporate financial support will be used to promote the mission of the ERAS® Cardiac Society. We are committed to standardizing best practice surrounding the preoperative and perioperative care of cardiac surgical patients through expert consensus, review of the literature and open communication. This unrestricted support does not represent the ERAS® Cardiac Society's support or agreement to promote any pharmaceutical, device, or technology related to the sponsors.

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