

CLINICAL TRIAL

CHEST TUBE CLEARANCE STUDY

RESULTS PUBLISHED IN
JOURNAL OF CARDIOTHORACIC SURGERY

Yvon Berribeau, MD
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A recent clinical trial evaluated the use of the PleuraFlow active tube clearance to prevent retained blood related complications in heart surgery patients by actively clearing chest tubes during early recovery in the ICU. The study was a real world propensity matched analysis of 697 consecutive patients who underwent cardiac surgery. 302 patients served as a baseline

control (Phase 0). These patients had chest tube stripping only when clot was noticed. Then the program implemented an active clearance protocol to prevent chest tube clogging using Pleuraflow in 58 patients in a training and compliance verification period (Phase 1). After the staff was trained and compliance was verified, 337 patients were treated prospectively using active

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Drs. Yvon Baribeau (pictured right) and Ben Westbrook (pictured left) of the New England Heart and Vascular Institute, Catholic Medical Center in Manchester, New Hampshire, published their quality improvement efforts to enhance recovery by actively clearing chest tubes in the *Journal of Cardiothoracic Surgery*. >> [READ published ARTICLE](#)

THE ROLE OF PERIOPERATIVE NUTRITION ACROSS THE CONTINUUM OF SURGICAL CARE

A MULTI-PRONGED APPROACH TO OPTIMIZING PERIOPERATIVE NUTRITION HAS BEEN SHOWN TO BE BENEFICIAL IN ADDRESSING MANY OF THE CHANGES ASSOCIATED WITH SURGERY

Rakesh C. Arora, MD, University of Manitoba; Refaat AF Hegazi, MD, PhD, Abbott Nutrition Research & Development

Surgery for the cardiac patient is an "organized injury" that exerts metabolic, immunological and nutritional challenges. These changes comprise a well-described postoperative insulin resistance driven by the stimulated secretion of counter-regulatory hormones (growth hormone, glucocorticoids,

catecholamines and glucagon). Moreover, surgery is associated with an inflammatory response that results in an "arginine depletion syndrome" which extends for days to weeks postoperatively. A multi-pronged approach to optimizing perioperative nutrition has been shown to be beneficial in addressing many of

the changes associated with surgery.

The recently published ERAS®-Cardiac Surgery guidelines highlight the need for preoperative nutritional optimization; continued consumption of clear liquids until 2 to 4h before general anesthesia and preoperative oral carbohydrate (CHO) loading¹.

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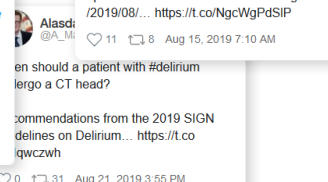
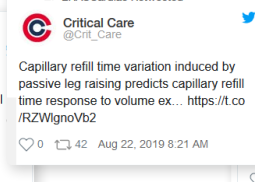
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CLINICAL TRIAL:

CHEST TUBE CLEARANCE CASE STUDY

Yvon Berribeau, MD, New England Heart and Vascular Institute, Catholic Medical Center in Manchester, New Hampshire

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tube clearance (Phase 2). The need to drain retained blood, pleural effusions, postoperative atrial fibrillation, Acute Kidney Injury (AKI), ICU resource utilization and hospital costs were assessed. Propensity matched patients in Phase 2 had a reduced need for drainage procedures for pleural effusions (22% vs. 8.1%, $p = 0.011$). There was also a marked reduction in AKI. This corresponded with fewer hours in the ICU (43.5 [24–79] vs 30 [24–49], $p = 0.04$).

“The cost reduction was particularly profound, which has helped us justify the costs of our quality improvement efforts with the hospital administration,” said Dr. Baribeau, the principle investigator of this study.

Another finding in this study, as also seen in other studies, was the volume of

bleeding (measured as chest tube output) was significantly less in Phase 2 patients at 24 h and in total. While this may seem counter intuitive, it suggest there may be an advantage of more rapidly clearing shed mediastinal blood to prevent on going microvascular bleeding from the cut surfaces in the early hours after surgery. Tissue plasminogen activator (t-PA) is known to significantly accumulate in shed mediastinal blood, which can promote on going microvascular bleeding within the post-surgical space if not promptly evacuated by chest tubes. Therefore perhaps having shed mediastinal blood more effectively evacuated could leave less t-PA remaining in contact with these tissues, facilitating a more rapid achievement of microvascular hemostasis in this time period.

“The results of the trial, combined with earlier published evidence, is a further advancement in our understanding in how prevention of chest tube clogging after cardiac surgery can help enhanced patient recovery and reduce costs after cardiac surgery,” said Louis Perrault, MD, Ph.D., Chief of Cardiac Surgery at the Montreal Heart Institute, Montreal, Canada and Co-Principal Investigator of the study. “These findings, combined with other groups’ studies describe a compelling vehicle for improving patient care and economic outcomes and offer further support of the Class I, Level B-NR ERAS recommendations to keep chest tubes clear of clogging.”

>> READ published ARTICLE

SILENT STOKES:

THE NOT-SO-SILENT STROKES SEEN IN TRANSCATHETER AORTIC VALVE IMPLANTATION PATIENTS

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Stroke is a well-documented potential post-operative complication that can occur after Transcatheter Aortic Valve Implantation (TAVI/TAVR). It occurs in approximately 2 to 5 percent of patients within 30 days.¹ There is much data regarding the risk of stroke associated with different equipment, procedures, and severity of stenosis, but the data on the rate of clinically silent cerebral infarcts post-TAVI are unknown.²

TAVI is now ubiquitous in the daily practice of cardiothoracic surgery. Tied to a shorter recovery time, fewer complications, and easier implantation, TAVI has become a favorable method for valve replacement. Younger and lower risk patients are electing to undergo TAVI each year.¹

While the data on clinically apparent strokes post-TAVI is well documented, the occurrence of silent or “covert” strokes remains obscure. One well-conducted pooled analysis of 25 prospective studies documented clinically asymptomatic cerebral ischemia to be seen in as many as 77.5%

of patients post-TAVI on MRI.³ The danger of clinically silent strokes is that while they may initially be asymptomatic, they have been linked to increased risk for dementia, steeper decline in cognitive function, and an increase in subsequent strokes.² The older, higher risk population undergoing TAVI may be even more vulnerable to silent infarcts. On the other hand, clinically silent strokes may be of even greater concern in the lower risk patient population due to the potential long-term sequelae.

While asymptomatic strokes will be clinically silent at the time of the index procedure, complications may subsequently develop. This is driving active research on cerebral embolic protection devices and strategies for TAVI patients.³ Along with further research on prevention, the development of improved stroke risk stratification for TAVI patients should be discussed. Is there a role for MRI assessment post-TAVI to identify patients with clinically silent infarcts who may be at risk for future complications? Or could we employ some-

thing as simple as a modified mini-mental status exam to screen for so-called covert strokes? In our growing enthusiasm for this transformative therapy, we should not forget the dangers of these perhaps not-so-silent strokes.

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2. Longstreth T, W., Dulberg A, C., Manolio R, T., et al. Incidence, manifestations, and predictors of brain infarcts defined by serial cranial magnetic resonance imaging in the elderly: The cardiovascular health study. *Stroke: Journal of the American Heart Association*. 2002;33(10):2376-2382. doi: 10.1161/01.STR.0000032241.58727.49.

3. Pagnesi M, Martino EA, Chiarito M, et al. Silent cerebral injury after transcatheter aortic valve implantation and the preventive role of embolic protection devices: A systematic review and meta-analysis. *Int J Cardiol*. 2016;221:97-106. doi: 10.1016/j.ijcard.2016.06.143.

NUTRITION:

THE ROLE OF PERIOPERATIVE NUTRITION ACROSS THE CONTINUUM OF SURGICAL CARE

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In addition to preoperative nutrition optimization and CHO loading, early postoperative enteral nutrition and perioperative immunonutrition (IMN) are evolving as essential components of perioperative nutrition within ERAS protocols (figure 1). IMN is defined by multiple professional societies' guidelines as enteral feeding formulas supplemented with fish oil

Recovery and Perioperative Quality Initiative (ASER-POQI) recommend that IMN should be considered for all major abdominal surgical patients³. ASER-POQI consensus guidelines also recommend early high protein (defined as at least 20% of calorie content from protein) post-operative diet (clear liquid and full liquid diets not indicated).

isonitrogenous nutritional shake⁴. Delayed type hypersensitivity response to recall antigens and host defense mechanism improved preoperatively and remained better until hospital discharge with IMN. Importantly, data from this study suggest that benefits can be achieved with a minimum of 5 days preoperative IMN in high-risk patients who are undergoing elective cardiac surgery.

A MULTI-PRONGED APPROACH TO OPTIMIZING PERIOPERATIVE NUTRITION HAS BEEN SHOWN TO BE BENEFICIAL IN ADDRESSING MANY OF THE CHANGES ASSOCIATED WITH SURGERY.

and arginine. The consensus guidelines by the Society of Critical Care Medicine and American Society for Parenteral and Enteral Nutrition suggest the routine use of IMN in the surgical ICU for all postoperative patients who require enteral nutrition². Similarly, consensus guidelines of the American Society for Enhanced

Although more studies of perioperative IMN in cardiac surgery patients are warranted, the currently available evidence shows beneficial clinical outcomes. In a study of patients who were scheduled to undergo coronary artery bypass grafting, 50 participants were randomly assigned to receive either an IMN or isocaloric

CHO loading and IMN, when implemented as a component of the perioperative bundle in enhancing recovery protocols, will continue to evolve as effective nutritional interventions, potentially associated with reduced length of postoperative hospital stay and complications, while improving patient-reported outcomes. Investigating the clinical effects of perioperative IMN in cardiac surgery patients will be an important area of future research.

Abbreviations:

CHO	Carbohydrate
IMN	Immunonutrition
ASER-POQI	American Society for Enhanced Recovery and Perioperative Quality Initiative

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Figure 1:
Perioperative nutritional interventions within ERAS protocols.

HEMOSTASIS:

TOTAL TIME TO HEMOSTASIS AND SURFACE BLEEDING SEVERITY SCORE:**CONCEPTS TO IMPROVE QUALITY BY QUANTIFYING SURGICAL BLEEDING TREATMENT AND SEVERITY**

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Abbas Ardehali, Department of Surgery, University of California at Los Angeles, Los Angeles, CA

A recently published trial¹ suggests that total time to hemostasis (TTTH) may be a better method to evaluate the quality of a hemostatic agents benefits than the traditional method of time to hemostasis (TTH). TTTH combines the

and products that take a longer time to prepare may be less desirable. Elimination of bleeding and its complications remain an important issue to cardiac surgeons as do the costs associated with such bleeding.²

TTTH BECOMES A MORE RELEVANT QUALITY INDICATOR AND PRODUCTS THAT TAKE A LONGER TIME TO PREPARE MAY BE LESS DESIRABLE.

preparation time of a hemostatic agent and the time for the agent to create hemostasis after application to a target bleeding site (TBS). TTTH may be a better quality indicator of hemostatic agent function, because it reflects the actual time that a surgeon must wait to achieve hemostasis after identification of a bleeding site requiring treatment with a hemostatic agent. Specifically, that is the time for which a patient may be exposed to continued hemorrhage, have the length of an operation prolonged, and be exposed to additional safety risks. As newer hemostatic agents become available in the operating room that are essentially immediately ready, TTTH becomes a more relevant quality indicator

An example is provided here¹ that shows statistically significant benefits to an immediately ready hemostatic agent (HEMOBLAST™ Bellows; Biom'Up, Lyon, France), 19.5 ± 9.8 seconds, compared to one with time required for preparation (FLOSEAL Hemostatic Matrix; Baxter Healthcare Corporation, Hayward, CA), 2 minutes and 26.4 ± 52.3 seconds ($p < 0.001$). As noted in Table 1, the proportion of patients achieving hemostasis at a TTTH of 3 minutes was significantly higher in the HEMOBLAST™ Bellows group.

This same study¹ was also one of the first randomized, controlled trials³ to use a validated surface bleeding severity

scale (SBSS),⁴ SPOT GRADE™. The scale also provided the ability to more precisely determine the efficacy of a hemostatic agent against different levels of bleeding severity permitting efficacy comparisons between agents based on baseline TBS bleeding severity. The proportion of patients achieving hemostasis for the most severe level 3 bleeding (up to 117 mL/min)⁴ at a TTTH of 5 minutes was significantly more for the immediately ready hemostatic agent.

Thus, both TTTH and the SPOT GRADE™ may be useful to cardiac surgeons to enhance the quality of surgical operations and potentially improve outcomes.

1. Dang NC, Ardehali A, Bruckner BA, et al. Prospective, multicenter, randomized, controlled trial evaluating the performance of a novel combination powder vs hemostatic matrix in cardiothoracic operations. *J Card Surg.* 2020; 35: 313-319.

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Time	HEMOBLAST™	FLOSEAL	Difference (95% ci)	p-value
3 minutes	34/53 (64.2%)	5/52 (9.6%)	54.5% (37.4%, 71.6%)	<0.001

Table 1: Proportion of Patients Achieving Hemostasis at 3 minutes¹

Baseline SBSS	HEMOBLAST™	FLOSEAL	Difference (95% ci)	p-value
1 (N=53)	22/23 (95.7%)	18/30 (60%)	35.7% (12.4%, 58.9%)	<0.007
2 (N=31)	17/18 (94.4%)	3/13 (23.1%)	42.3% (39.5%, 100%)	0.001

Table 2: Proportion of Patients Achieving Hemostasis at 5 Minutes Based on Bleeding Severity¹

IN THE NEWS:

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"And the Beat Goes On"
Episode 9 of the Ahead of the Curve Podcast

An interview with Dr. Daniel Engelman is featured in Ahead of the Curve, a podcast moderated by Jeff Gonzales, MD, and produced for physicians and health care providers to provide a form of discussion, evaluation, and reflection of the times during the COVID-19 pandemic.

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Seminars in Thoracic and Cardiovascular Surgery, February 28, 2020

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NEJM Catalyst, June 4, 2020

Kevin W. Lobdell, MD; Siddharth Hariharan, MA, BA; Will Smith, MBA, BA; Geoffrey A. Rose, MD; Brian Ferguson, MSc, BA; Chris Fussell, MS, BA

commentary

The Need for Better Identification of Postoperative Delirium

The Journal of Thoracic and Cardiovascular Surgery, 2020

Subhasis Chatterjee, MD; Daniel T. Engelman, MD

delirium

Delirium definition influences prediction of functional survival in patients one-year postcardiac surgery

(original article) The Journal of Thoracic and Cardiovascular Surgery, July 2020

Dubiel C, Hiebert BM, Stammers AN, Sanjanwala RM, Tangri N, Singal RK, Manji RA, Rudolph JL, Arora RC.J

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Addressing the Cardiac Surgical Opioid Crisis

STS Summer Series

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Moderators: Rakesh C. Arora, MD, PhD; Michael C. Grant, MD, MSE

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Olle Ljungqvist; Nader K. Francis; Richard D. Urman, (Editors)

The following articles are all from an ERAS-dedicated issue of *The Journal Critical Care Clinics* August 12, 2020.

How to Start an Enhanced Recovery After Surgery Cardiac Program

Oliver K. Jawitz, MD; William T. Bradford, MD; Gina McConnell, RN; Jill Engel, NP; Jessica Erin Allender, PharmD; Judson B. Williams, MD, MHS

Preoperative Treatment of Malnutrition and Sarcopenia in Cardiac Surgery

Aileen Hill, MD; Rakesh C. Arora, MD; Daniel T. Engelman, MD; Christian Stoppe, MD

Prevention of Acute Kidney Injury

Mira Küllmar, MD; Alexander Zarbock, MD; Daniel T. Engelman, MD; Subhasis Chatterjee, MD; Nana-Maria Wagner, MD

Surgical Site Infections in Cardiac Surgery

Jayakumar, MBBS; Ali Khoynzad, MD, PhD, FHRS; Marjan Jahangiri, MBBS, MS, FRCS (CTh)

Early Extubation in Enhanced Recovery from Cardiac Surgery

Ciana McCarthy, MB, FCAI, JFICMI, EDIC, MEd; Nick Fletcher, MBBS, FRCA, FFICM

Goal-Directed Therapy for Cardiac Surgery

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Journal of Cardiothoracic and Vascular Anesthesia, August 10 2020

Alexander J. Gregory; Michael C. Grant; Edward Boyle; Rakesh C. Arora; Judson B. Williams; Rawn Salenger; Subhasis Chatterjee; Kevin W. Lobdell; Marjan Jahangiri; Daniel T. Engelman >> [read article](#)

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Who we are

ERAS® stands for Enhanced Recovery after Surgery, and we improve surgical care and recovery through research, education, audit, and implementation of evidence-based practices. In early 2017, a group of cardiac surgeons, anesthesiologists, and intensivists first met to establish the Enhanced Recovery After Cardiac Surgery (ERACS®) Society to achieve these goals for patients undergoing heart surgery. This initial organization's work led to the publication of the first-ever expert consensus recommendations for a cardiac surgical enhanced recovery protocol. We have since joined with the ERAS® Society and have established an organization of multinational experts representing all aspects of healthcare delivery. ERAS® Cardiac is a non-profit organization with the mission to develop evidence-based expert consensus statements promoting best practice recovery practices. The goal is to provide hospitals with better guidance for developing local protocols that are part of a continuous quality improvement process for better patient care, and reduce postoperative complications and costs after heart surgery.

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 Institutet) 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 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. Our organization is divided into an Executive Board, Advisory Board, and a pool of Subject Matter Experts.

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Edwards



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