Clinical Resource Guide

Enhanced recovery after surgery and the role of nutrition

Information in favor of providing nutritional support throughout the perioperative period so patients can benefit from proper nutrition during the recovery phase

Overview

Providing appropriate nutrition is an often-overlooked aspect of perioperative care (i.e., care relating to or occurring during the time around a surgical operation).[1] Despite the clear connection between nutritional status and surgical outcomes — poor nutrition is associated with worse outcomes — current protocols regarding nutrition in clinical practice do not adequately address the issue of poor nutrition. A deeper understanding of the human body's metabolic response during surgery has prompted several research studies on the effects of nutritional deficits combined with surgical stress.

Typically, parenteral and/or enteral nutrition is used to provide patients with the energy necessary to compensate for the loss of nutrients that occurs during a surgical procedure. Parenteral nutrition is administered intravenously; enteral nutrition is any method of feeding that uses the gastrointestinal tract to deliver some or all a person's caloric requirements.

Current perioperative protocols call for fasting before surgery and slow reintroduction of nutrition after surgery. However, there has been a recent shift in favor of providing nutritional support throughout the perioperative period so that patients can benefit from proper nutrition during the recovery phase.[2]

Metabolic response to surgery

Understanding the physiologic response to surgical stress is integral to providing proper perioperative care and achieving optimal surgical outcomes.

One of the major changes that occurs during surgery is insulin resistance — a fundamental reaction to injury and stress. Within minutes of an injury (in this case, the surgery), the neuroendocrine and inflammatory systems activate and the body goes into a state of metabolic stress, accompanied by a decrease in insulin sensitivity. This reduced sensitivity causes a significant change in the way muscle proteins and glucose are metabolized, resulting in an increase in hepatic glucose, a decrease in the uptake of peripheral glucose and the breakdown of muscle protein.

The muscles in the body depend largely on insulin-mediated glucose. A reduction of the glucose transporter protein (GLUT 4) lowers the uptake of glucose by muscles, resulting in the breakdown of muscle proteins and overall loss of lean muscle tissue.

Other factors such as pain, perioperative fasting and poor mobilization protocols can also contribute to loss of insulin sensitivity and an increased catabolic state (catabolism is a metabolic process that breaks down large molecules into smaller molecules).[3]

Given that insulin resistance is one of the key mechanisms that can trigger several types of surgical complications, it is important to minimize the effect. One approach to doing so is to provide adequate nutrition in the form of carbohydrate-rich food.

Importance of nutritional assessments for surgical patients

The Joint Commission recommends a nutritional screening within 24 hours of admission for all inpatients, and additional nutritional evaluation for patients considered high risk.[4] The idea behind this recommendation is to identify high-risk patients and correct any nutritional deficits before surgery to ease recovery.

When assessing a patient's preoperative risk, it is critical to consider the patient's current nutritional status, the risks associated with the planned surgery and the anatomic changes that might occur during surgery and use these insights to develop patient-specific nutritional treatment plans that can improve the patient's metabolic status before surgery.

Enhanced recovery after surgery

The enhanced recovery after surgery (ERAS) protocol is a multimodal perioperative care pathway designed to promote rapid recovery after surgical procedures by maintaining preoperative organ function and reducing the profound stress response that follows surgery.[5] One of its central tenets is improving delivery of preoperative and postoperative nutrition for patients undergoing elective surgery to promote early recovery and reduce complications.

Providing the right nutrition during the perioperative phase modulates the stress response, promotes insulin sensitivity and reduces the breakdown of protein, thus improving postoperative outcomes and healing. The ERAS protocol was developed with the goal of maintaining normal physiology (i.e., managing metabolic changes due to surgical stress), thus optimizing patient outcomes and minimizing postoperative complications and readmissions.

Studies of the ERAS protocol contradict the traditional nutritional management of surgical patients, which involves prolonged fasting (no intake of food for six hours before surgery) and a liquid postoperative diet. The ERAS protocol, which takes a bundle approach to perioperative management, has demonstrated significant clinical benefits.[6] [7]

The ERAS nutritional protocol suggests eliminating fasting and instead providing patients with a carbohydrate-rich (100 grams) beverage on the night before the surgery followed by another with 50 grams of carbohydrates two hours before surgery. Giving patients carbohydrates preoperatively eliminates the long periods of fasting that lead to insulin resistance. Preoperative carbohydrate consumption also reduces thirst, hunger, anxiety and hyperglycemia. Patients who receive preoperative carbohydrates also develop an anabolic state rather than the usual catabolic state before surgery.[5]

The following are the basic recommendations of the ERAS protocol[8]:

Counseling: Before the surgical procedure, the nurse or dietician should explain the metabolic changes that will occur during surgery along with recommended nutritional strategies to help guide the patient through the process.

Anesthesia: Consider the use of regional anesthetic and nonopioid analgesics to avoid the gastrointestinal disturbances (e.g., nausea, vomiting and impaired bowel function) and depressed respiratory effects that can occur with opioid use.

Fluid balance: Maintain the patient's fluid balance, as hypervolemia (fluid overload) leads to abnormalities in electrolytes, peripheral edema, delayed bowel function and pulmonary congestion, while hypovolemia (decreased fluids) leads to decreased cardiac output and thereby affects oxygen delivery.

Body temperature: Maintain the patient's body temperature. A reduction in core temperature stimulates adrenal steroid and catecholamine production, which increases wound infection rates, cardiac arrhythmias and loss of blood.

Surgical drain removal: Remove any surgical drains as early as possible after surgery. Drains make it difficult for patients to move, delaying mobilization.

Postoperative recovery strategies: Focus on postoperative recovery strategies including early mobilization, which reduces thromboembolic complications, as well as addressing insulin resistance, nutrition and fluid balance to promote faster recovery.[9]

The benefits of the ERAS protocol include shorter hospital stays, decreased postoperative pain and need for analgesia, more rapid return of bowel function, decreased complication and readmission rates and higher patient-reported satisfaction.

Nutritional products and ERAS

Several commercial products on the market were developed specifically to meet the ERAS nutritional recommendations. Products for use after surgery are available in the hospital and are to be consumed under medical supervision. Products for preoperative consumption can be bought from authorized stores or at the hospital during presurgery visits.

These products fall into three categories, depending on when the patient consumes them[10]:

- Products recommended for use before and after surgery
  - Provide nutrients such as arginine, omega-3 fatty acids, eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), all of which help to boost the patient's immunity
- High-carbohydrate drinks for the night before the surgery and up to two hours before surgery.
  - Help prevent the physiological changes associated with surgery after fasting
- Postoperative shakes
  - Provide calcium, omega-3 fatty acids, antioxidants, prebiotic fiber, vitamins, minerals and proteins to support recovery

Any surgical procedure is a major stressor that disrupts the homeostasis of the body's cell functions and compromises immune status, resulting in an increased susceptibility to infection and poor wound healing, all of which lead to a longer recovery period for the patient. Current evidence supports the use of perioperative nutritional support to alleviate the surgically induced metabolic response and allow for optimal patient recovery following major surgery. The ERAS program is built around treatments that reduce physiologic stress, thereby minimizing insulin resistance and the catabolic responses that develop with traditional surgical protocols.

Hospitals should consider adopting the recommended perioperative nutritional guidelines to optimize surgical outcomes.

Vizient contract resources

Product category	Contract number	Supplier	Expiration
Medical Nutritionals	EN0152	Kate Farms	10/31/2024
	EN0153	Nestle Healthcare	10/31/2024
	EN0154	Nutritional Medicinals	10/31/2024
	EN0155	Nutricia Medical	10/31/2024

Supplier resources

The Abbott Nutrition Health Institute website provides information on courses, certificates of education, webinars and other educational materials.

Other resources

Resource	Publisher
Enhanced Recovery After Surgery Toolkit	American Society for Parenteral and Enteral Nutrition (ASPEN)
List of guidelines	ERAS Society
ESPEN guideline: Clinical nutrition in surgery	European Society for Clinical Nutrition and Metabolism (ESPEN)

References

1. Grocott MPW, Plumb JOM, Edwards M, Fecher-Jones I, Levett DZH. Re-designing the pathway to surgery: better care and added value. *Perioper Med (Lond).* 2017;6(June 20):9. doi:10.1186/s13741-017-0065-4.

2. Weimann A, Braga M, Carli F, et al. ESPEN guideline: clinical nutrition in surgery. *Clin Nutr.* 2017;36(3):623-650. doi:10.1016/j.clnu.2017.02.013.

3. Thorell A, Nygren J, Ljungqvist O. Insulin resistance: a marker of surgical stress. *Curr Opin Clin Nutr Metab Care.* 1999;2(1):69-78.

4. Enomoto TM, Larson D, Martindale RG. Patients requiring perioperative nutritional support. *Med Clin North Am.* 2013;97(6):1181-1200.

5. Enhanced recovery after surgery toolkit. American Society for Parenteral and Enteral Nutrition website. Accessed March 8, 2019.

6. Committee on Gynecologic Practice. ACOG committee opinion no. 750—Perioperative pathways: enhanced recovery after surgery. American College of Obstetricians and Gynecologists website. Published August 22, 2018. Accessed March 8, 2019.

7. Yuill KA, Richardson RA, Davidson HI, Garden OJ, Parks RW. The administration of an oral carbohydrate-containing fluid prior to major elective upper-gastrointestinal surgery preserves skeletal muscle mass postoperatively—a randomised clinical trial. *Clin Nutr.* 2005;24(1):32-37.

8. Ren L, Zhu D, Wei Y, et al. Enhanced Recovery After Surgery (ERAS) program attenuates stress and accelerates recovery in patients after radical resection for colorectal cancer: a prospective randomized controlled trial. *World J Surg.* 2012;36(2):407-414.

9. Enhanced recovery after surgery. American Association of Nurse Anesthetists website. Accessed March 8, 2019.

10. Webb D. Optimizing nutrition before surgery. Today's Dietician. 2015;17(1):10. Accessed March 8, 2019

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