



Nutritional Management of Emergency Gastrointestinal (GI) Surgeries

Alexander Sauper, MD, FACS

Introduction

Emergency gastrointestinal (GI) surgery is different than elective GI surgery in many ways. Emergencies are unplanned, are often associated with a greater number of patient comorbidities, and impart greater physiologic stress on the patient than elective operations.¹⁻³ Although the overall goals of treatment are essentially the same regardless of the urgent/emergent nature of the surgical procedure, there are some important nutritional considerations to take into account that are unique to the emergency GI surgery population.

Metabolism

The human body is composed of fat and lean masses. Fat mass, the larger of the two energy compartments, is metabolically inactive and is primarily used for energy storage. Lean mass is much smaller, but is both highly metabolically active and regulated. This lean compartment is composed largely of skeletal and smooth muscles.

Under normal circumstances, energy is obtained from the metabolism of ingested food, whereas the fat compartment is used to either store excess calories, or provide calories in times of need assuming adequate oxygen is available for energy production. Protein intake is used for protein synthesis and maintaining lean mass.

In starvation conditions, the metabolic rate decreases to about 20-25 kcal/kg/day with the majority of energy (>90% of kcal) obtained from the fat mass. The lean mass protein store is protected with <10% of energy sourced from protein. Following a catabolic insult, however, no adaptive response is achieved and there are several consequences: the metabolic rate increases to as high as 40 kcal/kg/day, lean mass is catabolized for energy, and the fat mass is inefficiently utilized as an energy source.⁴

Malnutrition

The malnutrition syndrome is the modern classification of different metabolic states in undernutrition and obesity (Figure). Undernutrition refers to three different disease states: chronic starvation without inflammation, chronic disease with inflammation (eg, cancer cachexia), and acute disease/injury with inflammation (eg, perforated ulcer). Undernutrition contributes to macronutrient (protein and fat) and micronutrient (vitamin and mineral) deficiencies, and sarcopenia.⁵

Obesity is not protective from complications relating to malnutrition since the lean mass compartment is preferentially catabolized in the face of acute stress. Additionally, obesity is associated with sarcopenia and the metabolic syndrome. Complications of the metabolic syndrome, eg, high blood pressure, high cholesterol/triglycerides, and insulin resistance, are risk factors for cardiovascular disease, diabetes, and stroke.⁵

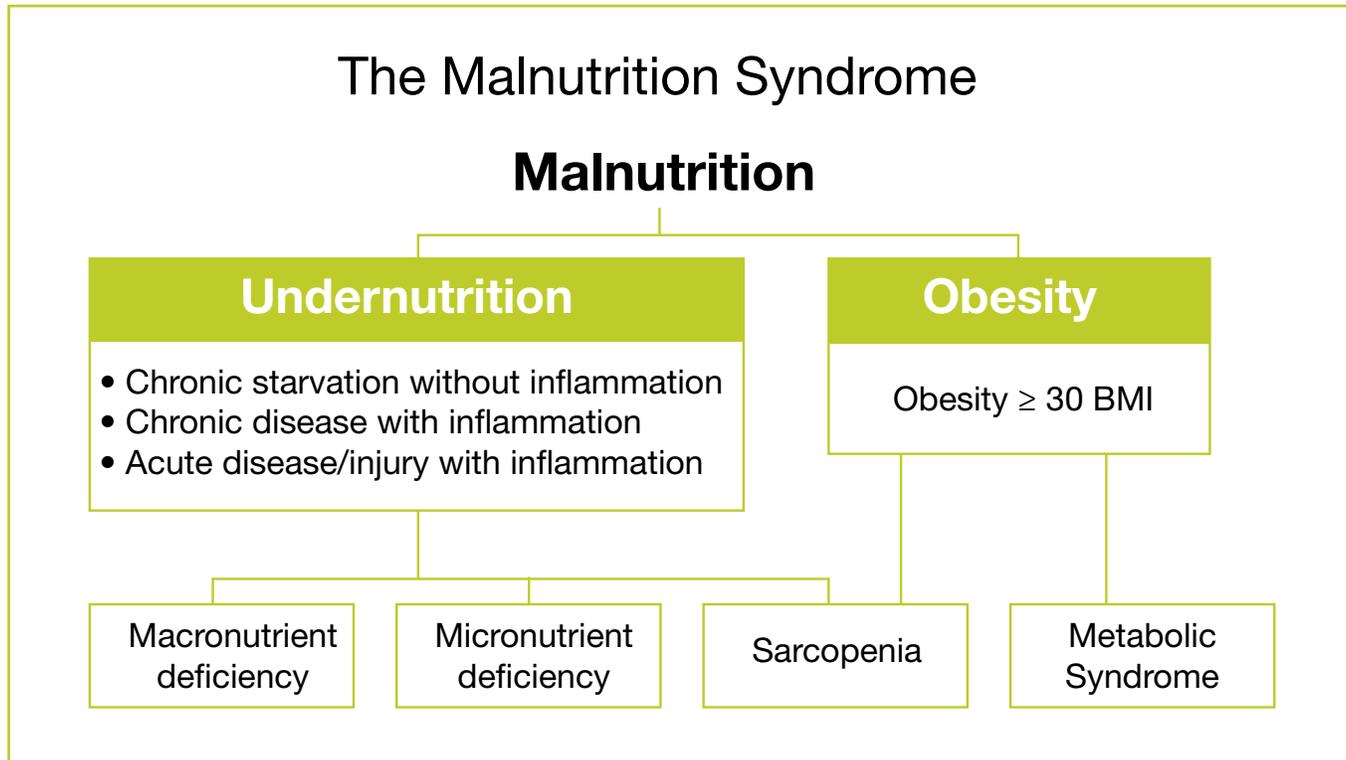


Figure. The malnutrition syndrome.⁵

BMI=Body Mass Index

Source: Advisory Faculty: Correia MI, Hegazi R, Llido L, Rugeles S, Sriram K. TNT 3.0. Total Nutrition Therapy. An Integrated Approach to Patient Care. Chicago: Abbott Nutrition Health Institute. 2011.

GI Surgeries

The indications for performing an emergency GI surgery are for organ perforation, ischemia (lack of blood flow) with or without organ death, bleeding, infection, obstruction, or loss of function. This might involve removing all or part of an organ, draining a deep infection, altering the flow of the various GI contents (eg, bile, pancreatic fluid, food transit), or restoring function to an organ (eg, relieving an obstruction). Some or all of these procedures may be combined depending on the complexity of the problem. In essence, the goals are to treat the condition, such as bleeding or perforation, and restore GI continuity so the body can continue to function.

The technical aspects of performing an operation are only part of the treatment plan, and consideration must be given to how the clinician manages the patient both pre- and postoperatively so the body can heal properly while avoiding, or at least minimizing, complications. There is a window of opportunity within the first 24 to 72 hours following a hypermetabolic insult, such as surgery, in which starting enteral feedings are associated with preserving gut integrity as well as diminishing the activation of inflammatory and counterproductive cytokines.⁶



Enteral versus Parenteral Nutrition

Because of the challenges involved in patient care, prescribing the proper nutrition support has been given much attention and has led to the creation of national guidelines by multiple collaborating national and international societies. In an intensive care unit (ICU) setting, there are many barriers to the successful implementation of enteral feeding due to the complexity of these patients. One example mnemonic, “CAN WE FEED,” is helpful to the clinician by simplifying the process of prescribing nutrition support. It involves assessing the patient, defining the timeframe in which to start feeding, determining formula selection, and monitoring for tolerance and complications.⁷ One might ask why not simply feed everyone intravenously with total parenteral nutrition until they are recovered and avoid having to go through this evaluation process? The answer is the medical literature has definitively established the benefit of enteral nutrition over parenteral nutrition in multiple studies across a wide variety of patients in terms of cost, complications, and benefit.⁶ In essence, if the gut works, use it.

In the event parenteral nutrition is required, the American Society for Parenteral and Enteral Nutrition (A.S.P.E.N.) guidelines recommend a “late” approach, ie, after seven days of inadequate nutrition support as opposed to their European counterpart (European Society for Clinical Nutrition and Metabolism, ESPEN), who suggests an “early” approach may be better, ie, within 48 hours.^{6,8} In one recent study of critically ill patients that were not malnourished at baseline, those who had parenteral nutrition and started “late” did better than those started “early” in terms of infections, ventilator days, and ICU stay. There was no difference in mortality. Furthermore, in the subgroup of sicker patients with complicated pulmonary or abdominal surgery, a lower infection rate was also noted with a relative increase in earlier ICU discharge alive. The authors concluded that earlier achievement of nutritional goals by utilizing parenteral nutrition did not improve outcomes for critically ill patients.⁹

Several studies utilizing the National Surgical Quality Improvement Project database (NSQIP) have examined the difference between elective and emergency GI surgeries. In general, elective GI surgery patients are undergoing planned operations with minimal to no stress response preoperative. In addition, they have less complications as well as a lower mortality than emergency GI surgery patients.³

In the elective GI surgery population, the safety and efficacy of early enteral nutrition have been very well established and is supported by numerous major international organizations. Furthermore, it has been incorporated into the Enhanced Recovery After Surgery (ERAS) concept and adopted by many medical centers and hospitals in the care of those patients.¹⁰ In the general critically ill population, it has also been established that early enteral feeding is beneficial.¹¹ The question that remains is what can be done about one of the sickest populations--emergency GI surgery patients--who have more complications and die more frequently than the elective patients? Can the data from elective surgery be extrapolated to emergency GI surgery populations to improve outcomes?

There is a limited amount of data regarding the use of early enteral nutrition in the emergency GI surgery population. Several smaller observational studies, a retrospective analysis, and a randomized controlled trial have examined this issue, and found that in both traumatic and non-traumatic conditions leading to emergency GI surgery, there is no increase in surgical complications, such as anastomotic leak, wound dehiscence, sepsis, and death with early enteral nutrition. Vomiting appears to be the only identified complication from initiating early enteral nutrition in these patients. Unfortunately, there are many different clinical permutations in these patients



that make it very difficult to establish a “one size fits all” approach to nutrition support in the emergency GI surgery patients.¹²⁻¹⁵

Several key points regarding the management of nutrition support are important to highlight. Nutrition support planning should start from admission in terms of the type of support needed (parenteral vs enteral), how it will be administered (eg, oral, enteric tubes, central line), and when it will start. Enteral nutrition should always be the default choice, being mindful of the difference between true contraindications and barriers to initiating enteral nutrition. Other patient-related and practical considerations also need to be taken into account such as the ability to recognize both complications of enteral nutrition as well as intolerance. In patients who are unable to communicate, this can be especially challenging.

Summary

Routine early initiation of parenteral nutrition does not appear to be beneficial to GI surgery patients, and early enteral nutrition in emergency GI surgery patients is not worse than “traditional” management, and may have benefit. Many of the traditional barriers to feeding the gut are based on dogma rather than data, and hopefully over time, practice will reflect a simpler evidence-based philosophy of ‘if the gut works, use it...but don’t abuse it!’

References

1. Sorenson LT, Malaki A, Wille-Jorgensen, et al. Risk factors for mortality and postoperative complications after gastrointestinal surgery. *J Gastrointest Surg*. 2007;11(7):903-910.
2. Ingraham AM, Cohen ME, Bilimoria KY, et al. Comparison of 30-day outcomes after emergency general surgery procedures: potential for targeted improvement. *Surgery*. 2010;148(2):217-238.
3. Havens JM, Peetz AB, Do WS, et al. The excess morbidity and mortality of emergency general surgery. *J Trauma Acute Care Surg*. 2015;78(2):306-311.
4. The Department of Surgery, Brigham and Women’s Hospital; Burn and Wound Program, Health South Braintree Rehabilitation Hospital. *Wounds*. 2000;12(1). Health Management Publications. Available at <http://www.medscape.com/viewarticle/407543>. Accessed November 8, 2015.
5. Advisory Faculty: Correia MI, Hegazi R, Llido L, Rugeles S, Sriram K. TNT 3.0. Total Nutrition Therapy. An Integrated Approach to Patient Care. Available from: Abbott Nutrition Health Institute. Chicago. 2011.
6. McClave SA, Martindale RG, Vanek VW, et al. Guidelines for the provision and assessment of nutrition support therapy in the adult critically ill patient: (SCCM and A.S.P.E.N.). *JPEN J Parenter Enteral Nutr*. 2009;33(3):277-316.
7. Miller KR, Kiraly LN, Lowen CC, Martindale RG, McClave SA. “CAN WE FEED?” A mnemonic to merge nutrition and intensive care assessment of the critically ill patient. *JPEN J Parenter Enteral Nutr*. 2011;35(5):643-659.
8. Singer P, Berger MM, Van den Berghe G, et al. ESPEN guidelines on parenteral nutrition: intensive care. *Clin Nutr*. 2009;28(4):387-400.
9. Casaer MP, Mesotten D, Hermans G, et al. Early versus late parenteral nutrition in critically ill adults. *N Engl J Med*. 2011;365(6):506-517.



10. Lewis SJ, Andersen HK, Thomas S. Early enteral nutrition within 24h of intestinal surgery versus later commencement of feeding: a systematic review and meta-analysis. *J Gastrointest Surg.* 2009;13(3):569–575.
11. Marik PE, Zaloga GP. Early enteral nutrition in acutely ill patients: a systematic review. *Crit Care Med.* 2001;29(12):2264-2270.
12. Singh S, Ram RP, Khanna SK. Early postoperative enteral feeding in patients with nontraumatic intestinal perforation and peritonitis. *J Am Coll Surg.* 1998;187(2):142-146.
13. Malhotra A, Mathur AK, Gupta S. Early enteral nutrition after surgical treatment of gut perforations: a prospective randomised study. *J Postgrad Med.* 2004;50(2):102-106.
14. Lee SH, Jang JY, Kim HW, Jung MJ, Lee JG. Effects of early enteral nutrition on patients after emergency gastrointestinal surgery: a propensity score matching analysis. *Medicine (Baltimore).* 2014;93(28):e323.
15. Klappenbach RF, Yazzi FJ, Alonso Quintas F, Horna ME, Alvarez Rodriguez J, Oria A. Early oral feeding versus traditional postoperative care after abdominal emergency surgery: a randomized controlled trial. *World J Surg.* 2013;37(10):2293 – 2299.