

## Chapter 18

# Gastrointestinal Issues in the Cardiothoracic ICU

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### ABSTRACT

*A thorough understanding of gastrointestinal issues in critical illness is necessary to optimize management of the cardiothoracic patient. Post-operatively, these patients are at increased risk of GI complications due a combination of underlying vascular disease, cardiopulmonary bypass, and low cardiac output, all of which lead to splanchnic hypoperfusion and subsequent damage to the gut mucosa. While GI complications are uncommon, they are associated with a disproportionately high rate of morbidity and mortality. Presence of unexplained fever, leukocytosis, bacteremia, hemodynamic compromise or abdominal pain or distention are concerning and require prompt assessment. Other GI management issues include delivery of adequate nutrition to counteract catabolism and promote wound healing and stress ulcer prophylaxis in patients with risk factors for upper gastrointestinal bleeding.*

### INTRODUCTION

Gastrointestinal management is an important component in the systems-based care of the critically ill patient. Although GI issues may appear minor when compared to the cardiorespiratory derangements encountered in the cardiothoracic ICU, certain complications can be catastrophic. Additionally, the best practices regarding nutrition and stress ulcer prophylaxis can be confusing due to differing interpretations of the literature. This chapter will therefore present an evidence-based foundation of four major topics: the differential diagnosis of abdominal pain, specific gastrointestinal complications, nutrition in the critically ill patient, and stress ulcer prophylaxis.

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## BACKGROUND

Gastrointestinal (GI) complications develop in 1-2% of cardiac surgery patients, but with mortality rates reaching 30% (Rodriguez et al., 2010). This excessively high rate is felt due to both delay in diagnosis, due to non-specific signs and symptoms, and the types of complications, such as GI bleeding and mesenteric ischemia, which already carry a poor prognosis.

Cardiac surgery with or without cardiopulmonary bypass (CPB) increases tissue oxygen demands while also causing a profound reduction in splanchnic perfusion (Fiore et al., 2006; Velissaris et al., 2003). This effect is further exacerbated by low cardiac output and the use of vasoconstrictors (Ohri & Velissaris, 2006). The resultant tissue hypoxia leads to breakdown of typical mucosal functions and potential for atrophy, ulceration, bacterial translocation, the systemic inflammatory response syndrome, and eventually, multi-system organ failure. Risk factors for the development of GI complications are listed in Table 1 (D'Ancona et al., 2003; Filsoufi et al., 2007; Mangi et al., 2005; McSweeney et al., 2004; Rodriguez et al., 2010).

Typical signs of an acute abdominal process, such as fever, leukocytosis, and hemodynamic changes are not specific and common in critical illness. As many patients are sedated, physical exam is unreliable. Diagnostic studies, such as CT scan, can be logistically difficult if the patient is unstable. Therefore, deviation from the normal post-operative course should prompt workup for an acute abdominal process to avoid delays in diagnosis.

Figure 1 outlines the incidence of various GI complications as determined from a review of over 150,000 cardiac surgery patients. Other considerations in the differential diagnosis include: small bowel obstruction, *Clostridium difficile* colitis, abdominal compartment syndrome, retroperitoneal hemorrhage, and urinary tract infection.

Evaluation requires review of the patient's medical and surgical history, serial abdominal exams, relevant laboratory tests (e.g. serum lactate, transaminases, lipase, stool *C. difficile* toxin PCR), and appropriate diagnostic imaging. For the majority of acute abdominal processes, CT abdomen with contrast remains the best initial study. An upright (or lateral) abdominal radiograph can evaluate for intra-peritoneal free air. If biliary pathology is suspected, upper abdominal ultrasound is the best initial study, with follow-up HIDA scan in select cases. Plain abdominal radiograph can be used to evaluate for bowel obstruction, but is far less sensitive and specific than CT scan and is of limited utility. Consultation with general surgery early is recommended, not only to help guide diagnosis, but also because early surgical exploration may reduce morbidity and mortality (Hackert et al., 2003). In general, patients have improved cardiac function post-operatively and are able to withstand anesthesia and an abdominal operation if necessary (Rodriguez et al., 2010).

Table 1. Risk factors for the development of GI complications following cardiac surgery

Pre-Operative	Operative	Post-Operative
Age >70 years	Emergent procedure	Use of vasoconstrictors
Poor left ventricular function	Duration of CPB	Use of intra-aortic balloon pump
Peripheral vascular disease	Multiple blood transfusions	Multiple blood transfusions
Chronic renal failure		Surgical re-exploration
Anticoagulant use		Dysrhythmias

Adapted from: Rodriguez et al., Journal of Cardiac Surgery, 2010

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