

Anaesthesia for gastrointestinal surgery

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Abstract

Patients with gastrointestinal disease will present with a range of nutritional, fluid and electrolyte disturbances. This article will discuss how to recognize these problems and try to minimize their impact on recovery. A growing body of evidence shows that adoption of a package of care known collectively as enhanced recovery significantly reduces postoperative morbidity and reduces length of hospital stay. For anaesthetists the changes involve analgesic regimens and perioperative fluid and nutrition management. This evidence has been brought together in the national *Enhanced Recovery After Surgery Programme* and has been introduced to many hospitals for elective bowel surgery patients. The principles of the programme will be discussed. Aspects of it can be applied to many other surgical groups.

Keywords Abdominal plane blocks; analgesia; enhanced recovery after surgery; fluid replacement; malnutrition; opioid sparing; post-operative gastrointestinal disturbance; starvation

Royal College of Anaesthetists CPD Matrix: 2A00; 3A03

Common gastrointestinal problems requiring surgery

Table 1 lists some of the common reasons that patients with gastrointestinal disease will require an anaesthetic. Rather than discuss each pathology separately, this article will discuss the common themes that many of these patients have and how best to manage them based on current evidence.

Malnutrition in the surgical patient

The main function of the gastrointestinal system is to provide energy and nutrients to the body and to process the associated waste products. Any problems interfering with this function will result in malnutrition. Malnourished patients have increased rates of postoperative morbidity and mortality usually related to poor wound healing and increased susceptibility to infections.

Up to 20% of patients admitted to hospital are malnourished¹ and Table 2 lists some of the causes. Emergency admissions and patients with gastrointestinal disease may have higher rates. Identification of major risk factors (Table 2) is useful, along with a high index of suspicion. Clinical signs include low body mass index (BMI), recent weight loss, mid-arm circumference less than

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Learning objectives

After reading this article, you should be able to:

- recognize malnutrition, understand its implications and initiate feeding
- understand the importance of targeted intraoperative fluid replacement
- apply the principles of the *Enhanced Recovery After Surgery Programme*

22 cm, mid-calf circumference less than 31 cm, poor skin quality and serum albumin less than 35 g/litre. Individually these are all fairly non-specific signs, but taken together they become more useful. There are a number of simple validated questionnaires available.²

The metabolic consequences of malnutrition are listed in Table 3, and explain why malnourished patients do not do well in the postoperative period.

Perioperative starvation

The metabolic response to starvation is exacerbated by the stress response to surgery – both of which are catabolic. The body prepares for a fight or flight response and switches from a glucose-based energy supply to a fat-based supply, reducing the

Common operative procedures for patients with gastrointestinal disease

Elective

Ulcerative colitis – colectomy
Crohn's – strictuoplasty
Bowel resection for carcinoma
Formation of ileostomy/colostomy
Revision of stoma
Reversal of stoma

Emergency

Appendicectomy
Bowel resection for obstruction
Hartmann's procedure for large bowel obstruction
Colectomy for toxic megacolon
Oversew of duodenal ulcer perforation
Laparotomy for bowel perforation

Table 1

Causes of malnutrition

Poor dietary intake	Poor appetite	Nausea
Malabsorption	Food not easily available	Chemotherapy
Protein loss	Protein and nutrient poor diet	Pain on eating
	Inflammatory bowel disease	Elderly
	Infection	Immobile
	Short gut syndrome	Drug users
	Catabolic state	Sepsis
		Chronic infection
		Carcinoma

Table 2

insulin secretion and making cells insulin resistant to allow glucose to be used by the brain as an essential organ. Muscle proteins are broken down to provide energy substrate and this is the reason that lean muscle mass decreases so rapidly, rather than fat stores becoming depleted. This weakens the skeletal muscles and the respiratory muscle weakness predisposes to chest infection. The reduction in new protein synthesis reduces the ability to fight infection (immunoglobulins are proteins) and also delays wound healing.

However, there is growing evidence that perioperative nutritional supplements can lead to significant improvements in the postoperative course for these patients. If patients are given clear carbohydrate-based drinks the evening before and on the day of surgery (up to 2 hours preoperatively), the postoperative insulin resistance is reduced. Not only do patients feel better (less hungry, thirsty and anxious) before and after surgery, there is a reduction in length of stay.

Patients who remain nil by mouth or who are expected to have reduced oral intake for a significant period should be considered for another form of nutrition. Enteral feeding – orally with supplemental drinks, by nasogastric, nasojejunal or percutaneous endoscopic gastrostomy (PEG) feeding tubes – is the preferred route. Patients who are unable to receive enteral feed should be commenced on total parenteral nutrition (TPN) until enteral feeding can be re-established.

Management of elective patients

Preoperative assessment

Elective patients should be seen in an anaesthetic lead preoperative clinic. This should be multidisciplinary with emphasis placed on patient education, expected length of stay and discharge planning. It will also allow time for some nutritional advice and supplements to be given, and electrolyte corrections to be made. Haemoglobin, folic acid and ferritin should be measured in any patient with on-going blood losses.

Patients with inflammatory bowel disease take a range of immunosuppressive drugs including steroids. A perioperative management plan for these drugs should be made.

Enhanced recovery programmes for elective surgery are increasingly common and the preoperative clinic plays an essential role in this.

The enhanced recovery programme

The success of the programme depends upon cooperation between the patient and the care givers, and strict adherence to

protocol. The process begins in the preoperative assessment clinic and is a multidisciplinary approach involving nurses, physiotherapists, stoma care nurses, anaesthetists and surgeons. All staff are expected to follow the protocol unless there is a clinical reason not to. The protocol uses a number of evidence-based interventions shown to reduce length of stay, the elements of which are shown in Table 4.

Fluid management in elective care

Traditional use of large volumes of perioperative fluids has been shown to prolong length of stay by promoting ileus, increasing the rate of complications, and possibly leading to anastomotic breakdown.

Perceptions of how much fluid is lost during laparotomy have been challenged such that currently either a restrictive fluid regime or one using individualized targeted fluid boluses against measurement of cardiac output are recommended.^{3,4} Both of these strategies have been shown to reduce total intravenous fluid administration and improve outcome. Balanced crystalloid or colloid are the preferred fluids.

Cardiac output monitoring can be flow (oesophageal Doppler), pulse contour analysis, or thoracic bio-impedance based.

Laparoscopic versus open surgery

More elective and now some emergency surgery is being performed using laparoscopic techniques, presenting different challenges to the patients (and their anaesthetist). Prolonged pneumoperitoneum and steep head down make ventilation more difficult and can result in basal atelectasis. The raised intra-abdominal pressures may not be well tolerated by those with cardiac dysfunction due to the increase in afterload, and can also reduce perfusion to the splanchnic bed. It may be necessary to provide a pause in surgery both in terms of positioning and pneumoperitoneum.

Potential benefits include a reduced stress response, less postoperative pain and a faster return to normal function. Some centres report a shorter time to adjunctive chemotherapy for cancer cases.

Analgesia

The goals of early mobilization and nutrition are only possible in the presence of good analgesia. A multimodal approach aiming to reduce the use of morphine is best and there are many ways to achieve this.

A thoracic epidural was once considered the gold standard; however, recent evidence suggests using spinal anaesthesia and long-acting intrathecal opiates (diamorphine), or patient-controlled analgesia alone may reduce length of stay compared to epidural after laparoscopic surgery.

Epidural depo morphine is useful – a single shot at the time of surgery providing 48 hours of analgesia, yet allowing early patient mobilization. This technique avoids the complications of excessive fluid overload and hypotension associated with local anaesthetic epidural infusions.

Many centres are using spinals, abdominal field infusion catheters (transversus abdominis plane (TAP) or rectus sheath) or a combination of both in open surgery and have seen reductions in length of stay compared to epidurals. However,

Metabolic consequences of malnutrition

Reduced protein synthesis	Poor wound healing
Increased extracellular fluid volume	Decreased immunity
Decreased basal metabolic rate	Altered bioavailability of drugs
Decreased enzyme function	Increased circulating free fatty acids
Increased glycogenolysis	Insulin resistance
Muscle weakness	Respiratory muscle weakness
	Cardiomyopathy

Table 3

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