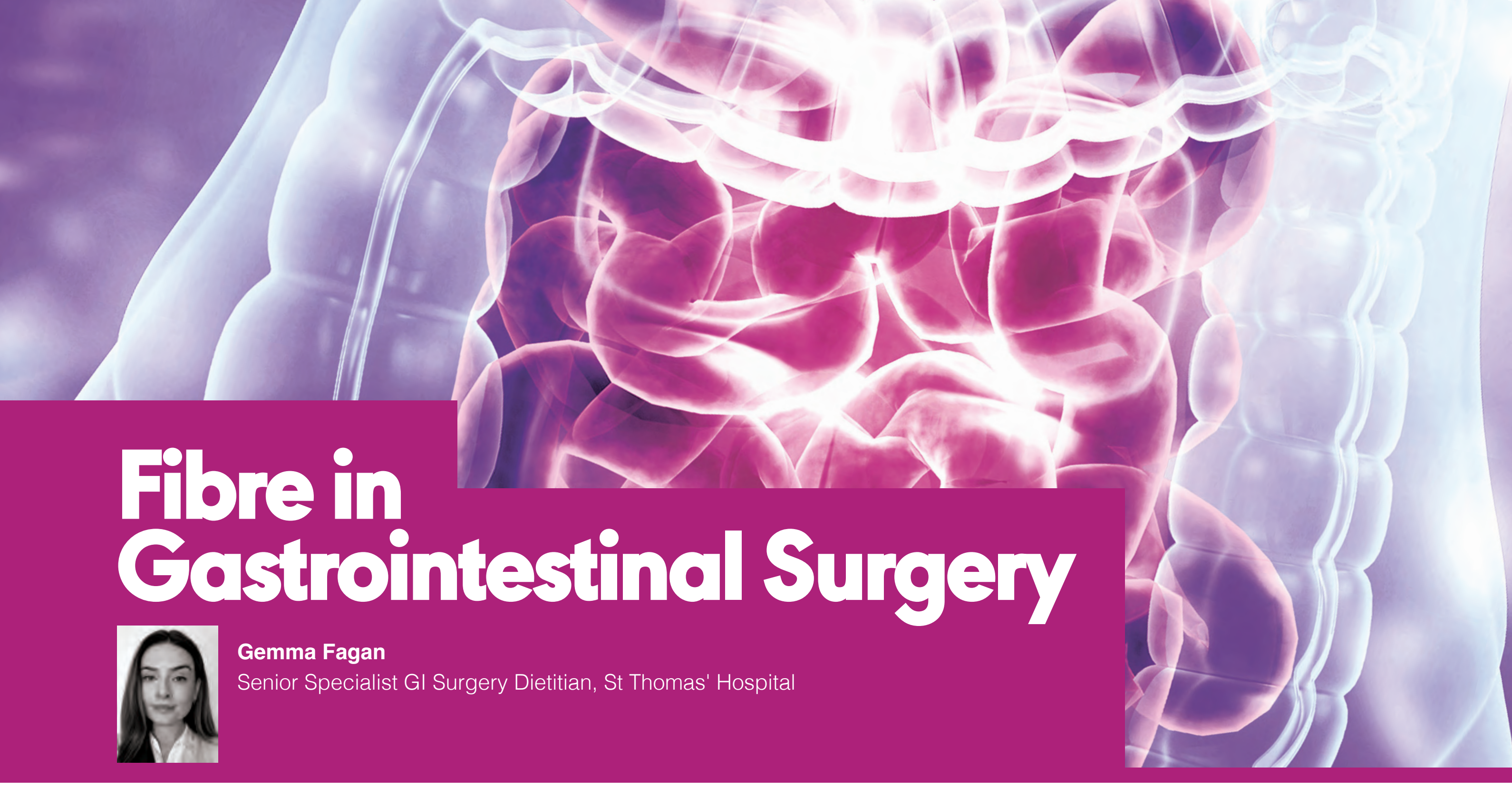

Fibre in Gastrointestinal Surgery

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Dietary fibre – defined as carbohydrates derived from plants that are resistant to digestion or absorption in the small intestine – is widely recognised as an essential component of a healthy diet. Its benefits in the general population are well established and include improvements in glycaemic control and lipid metabolism, enhanced colonic function, and positive alteration of the gut microbiome. Public awareness of fibre has also increased in recent years, with trends such as 'fibre-maxxing' reflecting growing interest in optimising gut health and metabolic outcomes. Fibre intake has further been associated with reduced inflammatory and oxidative stress, processes linked to cancer risk and premature mortality.[1]

In contrast, fibre introduction is often approached cautiously in patients who have undergone gastrointestinal (GI) surgery, particularly when enteral nutrition is required. Surgical intervention can disrupt GI motility, digestion, absorption and fluid balance, raising concerns around the tolerance of fibre-containing enteral feeds. These effects may be compounded by postoperative complications such as intestinal inflammation, adhesions, enterocutaneous fistulae, or high output stomas, which can further alter transit and absorptive capacity, necessitating cautious or temporary restriction of fibre. Importantly, the impact of surgery on GI function varies according to the anatomical site and type of procedure. **Table 1** provides a pragmatic overview of common gastrointestinal surgical procedures and their anticipated effects on gut function and fibre tolerance, based on established physiological principles and routine clinical observations.

Table 1: Gastrointestinal surgical procedures and their impact on gut function and fibre tolerance

Surgery	Potential impact on gut function and digestion	Clinical features/ presentation	Potential implications for fibre use
Upper GI resections (e.g. oesophagectomy, total or subtototal gastrectomy, pancreaticoduodenectomy)	Reduced reservoir capacity Impaired coordination of gastric emptying (rapid or delayed transit) Impaired coordination of enzyme mixing	Early satiety Reflux Dumping symptoms Postprandial discomfort	Reduced tolerance of large volumes, potential exacerbation of early satiety/fullness
Small bowel resection	Reduced absorptive capacity Accelerated intestinal transit Bile acid malabsorption	Diarrhoea Steatorrhoea High stoma output	May increase gas and output
Jejunostomy or ileostomy formation	Loss of colonic water and electrolyte reabsorption Loss of fibre fermentation	High output Dehydration Electrolyte imbalance	May increase obstruction risk
Colonic resection/colonic anastomosis	Reduced fermentation capacity Reduced production of short-chain fatty acids	Loose stools Urgency Altered bowel habit	Fibre tolerance may be reduced

Clinical practice continues to reflect this cautious approach, particularly in the early postoperative period. However, evolving evidence suggests that fibre-containing enteral formulas may be safe in selected surgical populations and may offer benefits in GI function and symptom management. This divergence between traditional practice and emerging data has created uncertainty for clinicians responsible for nutrition support in surgical patients.

This article provides a practical overview of fibre use in the enterally fed GI surgery patient, bringing together current evidence, potential benefits, and real-world considerations around fibre-containing enteral feeds, illustrated through a clinical case study. For the purpose of this article, GI surgery refers to procedures involving the oesophagus, stomach, small intestine or colon, where anatomical and functional changes directly influence digestion, absorption, and tolerance of dietary fibre.

Current evidence: Fibre in gastrointestinal surgery

Current guidance and evidence suggest that fibre-containing enteral formulas can be used safely in selected surgical patients and may reduce GI side effects, particularly diarrhoea. The European Society for Clinical Nutrition and Metabolism (ESPEN) guidelines on clinical nutrition in surgery note that fibre-enriched enteral feeds are generally well tolerated and have been associated with a reduced incidence of diarrhoea across several clinical settings.[2]

Over the past two decades, three systematic reviews have examined the effects of fibre-enriched compared with fibre-free enteral feeds on GI side effects, particularly diarrhoea and constipation.[3-5] In a systematic review and meta-analysis, Elia *et al.* reported reductions in both diarrhoea and constipation with fibre-enriched formulas, while Zaman *et al.* similarly demonstrated a statistically significant reduction in diarrhoea incidence.[3, 4] However, these reviews included heterogenous patient populations. Although surgical patients were represented, surgery type was not specified, and subgroup analyses comparing GI surgery patients with non-surgical cohorts were not performed, limiting the applicability to findings to GI surgery populations specifically.

To address this limitation, Eleftheriadis and Davies published a systematic review in 2022, examining whether fibre-enriched enteral feeds were associated with increased complications in patients receiving enteral nutrition following GI surgery.[5] Three randomised controlled trials (RCTs) were included (n = 251), although only one study focused on a GI surgical population directly relevant to this article: patients undergoing distal gastrectomy.[6] In this Chinese study (n = 120), participants received either a fibre-supplemented formula, a fibre and probiotic supplemented formula, or a fibre-free formula via nasojejunal tube for seven days postoperatively, aiming to meet targets of 30 kcal/kg/day. The lowest incidence of diarrhoea (5%) was observed in the fibre-and probiotic-supplemented group, while diarrhoea was most prevalent in those receiving the fibre-free formula, with a statistically significant difference between fibre-containing and fibre-free feeds.

More recently, additional studies have continued to explore fibre-containing enteral feeds in hospitalised patients.[7, 8] However, heterogeneity remains a limitation, with one study including mixed patient populations without subgroup analysis for GI surgical patients.[7] A more directly relevant RCT by Han *et al.* evaluated 526 adults undergoing elective GI surgery.[8] Participants in the intervention group received an enteral formula enriched with soluble fibre (1.5 g partially hydrolysed guar gum [PHGG] per 100 ml), compared with isocaloric fibre-free formula. Nutrition support was provided orally or via tube feeding for five days postoperatively, with individualised regimens targeting 25 kcal/kg/day. Diarrhoea incidence was the primary outcome, with secondary outcomes including GI tolerance, body weight change and quality of life. Patients receiving the PHGG formula experienced significantly lower rates of diarrhoea and abdominal distension, with no differences observed for constipation, nausea or vomiting. These findings suggest that PHGG may be a safe and well-tolerated fibre source in GI surgical patients, although the influence of other factors affecting GI symptoms, such as feed rates and postoperative complications, were not explored. Additionally, surgical indication was reported for fewer than half of participants.

Overall, available evidence supports the safety of fibre-containing enteral feeds in selected GI surgical patients, while highlighting ongoing uncertainty regarding optimal fibre type, timing and patient selection. Ongoing research reflects continued interest in refining these questions, including a recently published Phase II study protocol evaluating a fibre-containing enteral formula in patients undergoing minimally invasive oesophagectomy for oesophageal cancer.[9]

Possible benefits of fibre use in GI surgery patients

Studies reviewed for the purpose of this article have primarily demonstrated short-term benefits of fibre-containing enteral feeds in reducing diarrhoea during the immediate postoperative period in GI surgery patients. However, broader evidence from non-surgical populations provides insight into additional mechanisms by which fibre may confer benefit following GI surgery, offering biological plausibility for its use beyond symptom control.

Dietary fibre influences glucose and lipid metabolism through mechanisms including increasing luminal viscosity, delayed carbohydrate absorption, and moderating post-prandial glycaemic responses. In the general population, higher fibre intake is consistently associated with improved insulin sensitivity, lower serum cholesterol levels and reduced systemic inflammation.[1] While direct evidence in GI surgical cohorts is limited, postoperative patients frequently experience metabolic stress, altered dietary intake, and disrupted glucose regulation. In stable patients, cautious reintroduction of fibre may therefore offer metabolic benefits alongside GI benefits.[10]

In addition, fibre may contribute to improved GI function through effects on intestinal transit and stool consistency. In selected patients, including those with ileostomies, certain fibre types may help improve output consistency, volume and reduce symptom burden. However, tolerance is highly dependent on individual anatomy, timing of introduction, and fibre characteristics.

Fibre content and types in enteral feeds

Dietary fibre has traditionally been categorised according to solubility; however, solubility alone is now recognised as a poor predictor of fibre behaviour within the GI tract. Different fibres possess distinct physiochemical characteristics, such as viscosity and fermentability, which more accurately influence their physiological effects and tolerance.[11] During digestion, fibre behaviour is further influenced by gastrointestinal pH, individual variation and the complex composition of enteral formulas, which often contain blends of different fibre types.

Contemporary frameworks therefore emphasise viscosity and fermentability as more clinically relevant characteristics. Viscosity refers to a fibre's ability to thicken or form gels when hydrated. Viscous fibres, including pectins, gums, beta-glucans and psyllium, can slow gastric emptying, modulate small intestinal transit, and reduce the rate of nutrient diffusion and absorption. These properties underpin many recognised benefits of fibre, including improved postprandial glycaemic control, reductions in serum cholesterol, and effects on stool consistency and transit. Importantly, the degree of viscosity varies substantially between fibre types and is influenced by fibre structure, molecular weight, and interactions with digestive secretions.

Fermentability describes the extent to which fibre is metabolised by gut microbiota. Fermentable fibres include inulin-type fructans, galacto-oligosaccharides and resistant starch. Fermentation produces short-chain fatty acids, which support gut barrier integrity, modulate inflammation, influence motility and contribute to immune regulation. However, the rate and site of fermentation vary between fibre types and individuals. Highly fermentable fibres may increase gas production and GI symptoms, whereas slowly or poorly fermentable fibres are often better tolerated.

Taken together, these characteristics may help to explain why fibre tolerance varies widely between patients and fibre sources. In GI surgical patients receiving enteral nutrition, consideration of viscosity and fermentability rather than solubility alone may therefore be more useful when selecting fibre-containing formulas and determining timing and dose of introduction.

In practice, decisions around fibre use are often shaped by practical considerations. Fibre-containing formulas are sometimes perceived to increase the risk of feeding-tube blockage, particularly in smaller-bore tubes, although evidence supporting this concern is limited. In addition, fibre is rarely prescribed as an individualised dose, limiting clinicians' abilities to tailor intake according to patient tolerance, anatomy and clinical goals.

Clinical case study

To illustrate these principles in practice, the following case demonstrates clinical decision-making around fibre use after GI surgery.

A 62-year-old gentleman was admitted following a spontaneous oesophageal perforation requiring emergency surgical intervention. His postoperative course was complex and included insertion of a feeding jejunostomy, venting gastrostomy and formation of an oesophagostomy. Enteral nutrition was initiated via the jejunostomy once clinically stable, using a fibre-free polymeric formula on the intensive care unit. Soon after commencing enteral feeding, the patient developed frequent loose stools associated with urgency. Despite optimisation of the feeding rate and volume, exclusion of infectious causes, and review of contributing medications, diarrhoea persisted. A polymeric fibre-containing enteral formula was trialled in an attempt to improve stool consistency, followed by a fibre-free peptide-based formula when symptoms continued.

Diarrhoea resolved within three days of introducing the peptide formula, and the patient was discharged home one month later with good tolerance of enteral feeding and gradual weight gain.

At outpatient review two weeks following discharge, the patient reported constipation. Given his previous intolerance to fibre-containing feeds, fibre was reintroduced cautiously using a fibre supplement rather than changing the base formula. The supplement contained two fibre sources (polydextrose and fructooligosaccharides), in contrast to the previously trialled fibre-containing formula, which included a broader mix of fibres with varying solubility, viscosity and fermentability. Polydextrose is slowly fermented with minimal viscous effects, while fructooligosaccharides are rapidly fermentable and non-viscous, a combination that may have contributed to improved tolerance. In addition, the complementary fermentation profiles may support stool regularity and short-chain fatty acid production, while limiting excessive gas production and abdominal discomfort.[11]

The supplement was introduced gradually, starting with half a sachet daily via the jejunostomy and increasing based on tolerance. On follow-up, bowel frequency had improved to once every two days, with formed stools and no associated bloating, cramping or abdominal discomfort. The dose was subsequently increased to twice daily, resulting in a return to the patient's pre-surgical bowel habit.

Conclusion

Dietary fibre has traditionally been approached with caution in GI surgical patients due to concerns around tolerance and postoperative complications. However, emerging evidence suggests that fibre-containing enteral feeds can safely be used in selected patients and may offer meaningful benefits, particularly in reducing diarrhoea and supporting GI tolerance during recovery. Simultaneously, variability in surgical anatomy, postoperative physiology, treatment regimens, individual microbiota and fibre characteristics means that responses to fibre are not uniform. Collectively, these factors highlight the importance of careful patient selection, individualised fibre regimes, gradual introduction, and ongoing monitoring when using fibre-containing enteral feeds and/or fibre-containing supplements in GI surgical patients, rather than a blanket approach to fibre inclusion or avoidance. Consideration of fibre type, fermentability, viscosity and timing of introduction is essential, alongside close observation of GI symptoms and overall nutritional tolerance. As research in this area continues to evolve, studies focusing on specific surgical populations and clearly defined fibre formulations will be key to refining future clinical guidance.

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