

## Gastrointestinal surgeries outcomes from the gut microbiota perspective

Masoud Keikha<sup>1</sup>

1. Department of Microbiology and Virology, School of Medicine, Iranshahr University of Medical Sciences, Iranshahr, Iran.

### Abstract

The gut microflora comprise a heterogenous population of microorganism that colonized through the human gastrointestinal tract. There are several evidence regarding disturbance of gut microbiota and susceptibility to gastrointestinal diseases. Furthermore, it has been confirmed that gut microbiota composition could influence the gastrointestinal surgeries outcomes. In this relation, there is a new apporach as microbial-based medicine that improve the GI surgeries outcomes. In the present review, the current literatures regarding this issue has been discussed to determine the effectivness of microbial-based medicine as well as their challenges regarding the favourable GI-based surgeries.

**Keywords:** Gut microbiota, Surgery, Gastrointestinal Disease, Colorectal Cancer

## Introduction

Gastrointestinal (GI) surgeries, such as gastrectomy, sleeve gastrectomy, Roux-en-Y gastric bypass (RYGB) surgery, and colorectal resections, are effective invasive interventions that provide clinical benefits in the reduction of serious unfavorable outcomes in GI-based diseases such as inflammatory bowel disease (IBD), metabolic syndrome, obesity, and malignancies. Postoperative infections, on the other hand, continue to be substantial problems related to health care costs. There is evidence that the risk of postoperative infections is higher in GI-based surgeries than in other surgical procedures [1]. Furthermore, recovery from GI surgery is a complex situation that is influenced by a variety of impulsive complication occurrences [2]. Surgeons should be aware of interesting findings highlighting the essential role of gut bacteria in GI surgery outcomes. The purpose of this letter was to highlight the primary GI-based postoperative issues that predisposed the recovery of GI surgeries from the perspective of gut microbiota.

## Results Discussion

The gut microbiota is a community of commensal microorganisms that populates the GI lumen and other mucosal membranes. The normal microflora is coevolved in the host and is associated with human health through maturation of immune system responses, ingested nutrients, and the maintenance of the epithelial mucosal barrier [3]; However, factors that contribute to gut microbiota perturbation would be a cause of normal hemostasis as well as opportunistic infections. GI surgery may disrupt the evolution of the gut microbiota. In this context, the readiness for GI-based procedures such as fasting, mechanical colon cleansing, and antibiotic intervention is clearly linked to the richness of the gut microbiota [4]. Furthermore, surgical resections in cancer patients disturb the gut microbiota through GI tract reconstruction. As a result, disturbed gut microbiota is complicating the recovery of GI surgery results via postoperative complications [5].

Given the impact of GI surgery preparation on gut microbiota, antibiotic prophylaxis used to prepare for GI surgery may lead to compositional alterations in gut microbiota. In this regard, oral antibiotics as well as chemo-radiotherapies alter the gut microbiota, which provides optimal conditions for increasing the relative abundance of opportunistic pathogens [6-7]. Furthermore, bowel preparations, notably meals before GI surgery, cause bacterial phenotypic shifts through the GI lumen. The clinical relevance of surgical resections in relation to intestinal reconstruction has been revealed in laparoscopic RYGB surgeries, which contribute to a considerable increase in the relative abundance of pathogenic bacteria such as *Escherichia coli*, *Streptococcus*, *Haemophilus*, *Veillonella*, and *Acidaminococcus* [8-9]. The gut microbiome has a substantial impact on GI surgery results. Oral antibiotics can alter the gut microbiota without requiring mechanical bowel preparation. This can increase the percentage of bacterial pathogens in the feces of colorectal cancer (CRC) patients after surgery, such as *Pseudomonas aeruginosa*, *Staphylococcus aureus*, and *Enterococcus* spp. [10]. These bacteria can cause surgical site infections if the normal gut microflora is disturbed by inappropriate antibiotic prophylaxis. A meta-analysis showed that administering probiotics to patients before and after GI surgery can lower the risk of surgical site infection [11]. Because the gut microbiota affects the healing of intestinal anastomoses, factors that diminish the diversity of the gut microbiota can hinder the healing process of intestinal wounds [12].

One of the unavoidable side effects of GI surgery is GI dysmotility, which the gut microbiota also controls. As previously stated, intestinal microbiota play an important role in GI physiopathology. *Firmicutes* and *Proteobacteria* bacterial richness was shown to be higher in CRC patients with ileus than in CRC patients without ileus [13-14]. A comparable meta-analysis demonstrated the therapeutic benefit of probiotics in GI motility recovery, particularly postoperative ileus (POI), in cancer patients having GI surgery [15].

The gut microbiota has a significant impact on GI-based procedures and cancer recurrence, both of which are still concerns [16]. There is clinical evidence that postoperative disruption of the gut microbiota is connected with cancer risk and recurrence, notably in gastric bypass. Alterations in gut microbiota following bowel reconstruction affect bile acid metabolism, and increased colonocyte exposure to secondary bile acid may raise the risk of cancer after RYGB [17-18].

## Conclusions

In conclusion, we've gathered evidence to support the role of gut microbiota alterations in postoperative complications associated with GI surgeries. There are various gaps and constraints that need to be addressed in order to understand how gut microbiota influence recovery following gastrointestinal surgery. GI surgeons should be mindful of the impact of gut microbiota disruption on the results of GI surgeries. We hypothesized that concentrating on gut microbiota preservation could lead to a unique treatment method for improving recovery from GI surgery. There is an urgent need for global efforts to estimate gut microbiota maintenance and its effects on postoperative complications.

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