

Reply to: What Causes Late Perforation of the Jejunum-Jejunal Anastomosis After Roux-en-Y Gastric Bypass Surgery?

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Dear Editor, we carefully read the comments of the authors Goitein [1] and Kassir et al. [2] regarding our article “What Causes Late Perforation of the Jejunum-Jejunal Anastomosis after Roux-en-Y Gastric Bypass Surgery?” [3] and want to thank for their interest and appreciate their feedback.

Although the incidence is low, jejunum-jejunal anastomosis (JJ) perforation remains a leading cause of morbidity after Roux-en-Y gastric bypass, and the interest in long-term side effects of the JJ-anastomosis is increasing.

There are various surgical (e.g., stenosis) and non-surgical causes for complications of the JJ, but the causes remain speculative. However, there is preliminary evidence from other studies for potential and partially multifactorial reasons.

Stomal ulcer involving the small intestinal mucosa is more common (1–16%), and acid hypersecretion, *Helicobacter pylori*, and non-steroidal anti-inflammatory drugs (NSAIDs) due to ischemic perfusion [4] account for the large majority of cases of peptic ulcer disease even in the more distal parts of the small intestine [5].

We agree that the surgical technique by which the JJ is performed represents the most important factor to prevent complications. Furthermore, Stenberg et al. reported that the closure of the mesenteric defects might be associated with increased risk of early small bowel obstruction caused by

kinking of the JJ [6], and stenosis due to exogenous or endogenous reasons remains a substantial aspect in the pathogenesis. J-J intussusception as a rare cause has also taken into consideration [7].

The concept behind a safe bowel anastomosis remains lasting; at best, the bowel ends must have a good blood supply, lack tension, and should be anastomosed with high precision at the antimesenteric side.

In recent years, however, evidence has shown particular anastomotic techniques to be advantageous in specific settings. Nowadays, side-to-side anastomosis (functional end-to-end) is commonly performed in laparoscopic bariatric surgery due to its straightforwardness. In the short-term, there is no clear advantage of a specific anastomotic configuration over others. However, side-to-side anastomoses have been criticized for being anti-physiologic and for the long-term risk of a blind loop. Blind loops result in delayed emptying of the JJ pouch which predisposes to bacterial overgrowth followed by inflammatory changes of the intestinal wall. The likelihood of enlargement of the blind loop and the risk of developing a cul-de-sac tends even years after surgery is an established fact [8–10] and is rather common seen during revision surgery. Symptoms related to bacterial overgrowth can present with a wide spectrum of morbidities such as bloating, diarrhea, vitamin deficiencies, ulcerations, bleeding, and even consecutive perforation may occur. It is recommended to leave the bowel stump as short as possible, even if that does not necessarily prevent the loop from enlarging in the long term. Any dysbalance of the complex intestinal microbiome due to bacterial overgrowth or rearrangement of the microbial composition induced by RYGB might have potential health

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risks. In our case, *Aeromonas hydrophilia* and *Klebsiella oxytoca* may have caused tissue damage, but the relevance of these microbiological findings is difficult to interpret. “There are also early indications that adaptations/changes of the JJ causes long term side effects as pain, postprandial symptoms and prospective approaches are needed to alleviate these symptoms.”

In conclusion, ulcerations and associated perforations of the small intestine (apart from duodenal ulcer) are uncommon. Due to that fact the causes remain hypothetical, further diagnostic workup (histopathology, procedural imaging) of the JJ anastomosis must be evaluated. Blind loop syndrome along with its related morbidities is probably underrated; further investigation is needed to specify the actual extent of the problem, and the side-to-side anastomoses will be more bear in mind as part of the growing use in the laparoscopic era.

Compliance with Ethical Standards

Conflict of Interest Statement The authors declare that they have no conflict of interest.

Statement of Informed Consent This statement does not apply.

Statement of Human Rights All procedures performed in the study involving human participants were in accordance with the ethical standards of the institutional research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.

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