Technical Note

A simple method for tension-free Billroth I anastomosis after gastrectomy for gastric cancer

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Abstract: Billroth I anastomosis (B-I) is a popular reconstructive procedure performed after distal gastrectomy for the treatment of gastric cancer. Herein we introduce a new and simple technique to minimize tension after Billroth I for gastric cancer.

Keywords: Billroth I anastomosis (B-I); gastrectomy; gastric cancer; gastro-phrenic ligament

Introduction

Billroth I anastomosis (B-I), or gastroduodenostomy, is a popular reconstructive procedure performed after a distal gastrectomy for the treatment of gastric cancer. The advantages of B-I include simplicity, the maintenance of physiological food passage, and the retention of iron metabolism after distal gastrectomy (1,2). Because tension at the anastomotic site is a major cause of post-operative leaking, most of surgeons perform Kocher's maneuver to decrease tension after B-I. However, sometimes Kocher's maneuver alone does not adequately decrease the tension. Herein we introduce a new, simple technique to minimize tension after B-I for gastric cancer.

Methods

The B-I was performed by the modified double stapling technique, which we previously reported (3). With a 15 cm upper midline incision, total omentectomy and lymph node dissection were conducted. After transecting the duodenum, B-I was performed with CDH 29 (Ethicon, Inc. Cincinnati, OH) through the 3–4 cm length entry hole in the stomach. Then the stomach was transected by a linear stapler (GIA 100, Auto Suture Co., Norwalk, CT) with 3 to 5 cm of proximal margin, thus completing the B-I.

To decrease tension between duodenum and remnant stomach (the anastomotic site), the Kocher's maneuver was performed. To achieve minimized tension in the anastomosis site, the gastro-phrenic ligament, located contralateral of where Kocher's maneuver was performed, was incised at the left edge of the fundus of the stomach. The stomach was mobilized in the right distal direction (Figure 1). We have called it Noh's maneuver.

Discussion

B-I, Billroth II, and Roux-en-Y reconstructions are commonly performed after distal gastrectomy for gastric cancer, but it remains unclear which reconstructive method is best (4,5). Thus, many surgeons perform B-I because of its previously mentioned advantages (1,2). Anastomosis leak is a complication that surgeons wish to avoid, and tension at the anastomotic site is one of the primary causes for this leak. A traditional approach for decreasing tension after B-I for gastric cancer is Kocher's maneuver. The effect of mobilizing the duodenum is a decrease in tension when the patient stands upright because of the effect of gravity. The Noh's maneuver adds further mobilization of the fundus by dividing the gastro-phrenic ligament and releasing tension, making the stomach to drop not only toward duodenum but also in the direction of gravity. Thus, this new and simple method
can further minimize the tension at the anastomotic site.

Dividing the gastro-phrenic ligament is easy to perform and requires very little time, but there are cautionary notes. Surgeons should be careful not to injure the inferior phrenic vessels around gastro-phrenic ligament. Inferior phrenic vessels are some of the major vessels to supply the remnant stomach after distal gastrectomy. Thus, injuring these vessels would cause ischemia of the remnant stomach. Also some worry about the gastro-esophageal reflux. However, in our experience of over 60 cases of B-I in the past 6 months, we have performed the Noh’s maneuver to transect the gastro-phrenic ligament after distal gastrectomy in gastric cancer patients, and we have had no incidence of inferior phrenic vessel injury and no patients were suffered from gastro-esophageal reflux.

We developed the Noh’s maneuver to further reduce tension after B-I reconstruction and Kocher’s maneuver, thus reducing the patient’s risk of anastomosis leak. We believe the Noh’s maneuver will be helpful to surgeons who perform B-I after distal gastrectomy.

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Footnote

Conflicts of Interest: The authors have no conflicts of interest to declare.

References