A simple laparoscopic gastric tube construction

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Received 24 May 2010; received in revised form 17 August 2010; accepted 24 August 2010; Available online 29 September 2010

Abstract

Esophagectomy with gastric tube reconstruction remained the mainstay treatment for patients with localized esophageal cancer. Numerous methods of esophagectomy have been described. Esophagectomy was performed increasingly by minimally invasive approach due to advances in endoscopic instrumentation in recent years. We presented a novel method for totally laparoscopic stapled formation of gastric tube to facilitate gastric pull-up.

1. Introduction

The primary treatment modality for patients with localized esophageal cancer was surgery. There were several surgical approaches described in the past. Due to advances in endoscopic instrumentation, esophagectomy was performed increasingly by a minimally invasive approach, which had shown promisingly decreased perioperative morbidity and shorter length of stay compared to previous conventional esophagectomy [1,2]. The stomach was the most frequently used to substitute the esophagus to keep the gastrointestinal tract intact. Luketich described the method of laparoscopic mobilization of the stomach without minilaparotomy [1]. We designed a novel and simple method of laparoscopic stapled gastric tube construction.

2. Technique

Our description of a minimally invasive approach was composed of thoracoscopic esophageal mobilization followed by laparoscopic construction of the gastric tube and neck esophagogastrostomy anastomosis. In the first stage, the patient was positioned in the left semi-prone position for thoracoscopic mobilization of the intrathoracic portion of the esophagus and neck esophagogastrostomy anastomosis. In the second stage, the patient was turned to the supine position for laparoscopic formation of the gastric tube. In the third stage, the cervical esophagus was mobilized through an oblique skin incision of the left neck with removal of the tumor-bearing esophageal specimen, and the distal esophagus and gastric tube together along the neck incision was pulled upward. Finally, the esophagogastric anastomosis was completed from the neck incision.

During the laparoscopic stage, we stood on the patient’s right side. Five abdominal trocars were placed. The first trocar (12 mm) was placed close to the umbilicus for laparoscope. The second trocar (12 mm) is placed at the right epigastrium. Another three trocars (5 mm) are placed at the left epigastrium, right midclavicular line below the costal margin, and at the subxiphoid region, respectively. Intraperitoneal pressure was maintained at 12 mm Hg. At first, the hepatogastric ligament was divided to enter the lesser sac and the left gastric vessels were divided with a vascular linear stapler followed by exposing the right crus of esophageal hiatus. Second, the greater curvature of the stomach was mobilized from the junction of left- and right-side gastroepiploic arcade upward to the splenic hilum, then backward to the roots of the right-side gastroepiploic vessels. Then, the gastric fundus is mobilized by dividing the short gastric vessels, followed by exposure of the esophagocardiac junction.

The gastric tube was formed from the distal aspect of the lesser curvature of the stomach with application of multiple linear endostaplers (3.8 mm). The first linear endostapler fired on the angularis of the lesser curvature with good preservation of right gastric artery perfusion. The formation of the gastric tube was facilitated by the use of a linear stapler to create a gastrotomy. The second linear stapler was then fired to complete the gastric tube construction. The third linear stapler was fired to complete the neck esophagogastrostomy anastomosis. Finally, the esophagogastric anastomosis was completed from the neck incision.
of the gastric conduit (4—6 cm in diameter) in a curvilinear fashion was based on the right gastroepiploic arcade of the greater curvature of the stomach. The proximal uppermost aspect of the lesser curvature near the esophagocardiac junction was trimmed by the last linear endostapler with preservation of the connection between the esophagus and the gastric tube (Fig. 1). The lesser curvature portion of the stomach was withdrawn from the trocar incision near the umbilicus. The esophageal hiatus opening of the diaphragm was enlarged to facilitate exposure and smooth passage of the gastric tube. An oblique left neck incision was performed for construction of the esophagogastric anastomosis after removal of the esophageal specimen and gastric tube pull-up. Under laparoscopic guidance, the surgical specimen is removed through the neck incision and the gastric conduit is pulled up to the neck incision thorough the hiatus, uneventfully.

A 54-year-old man with status of locally advanced esophageal cancer has received neoadjuvant concurrent chemoradiation before operation. Minimally invasive esophagectomy, including the novel design of gastric tube formation was performed uneventfully within 7 h. He was discharged on the post-operative 8th day without any morbidity. The final pathologic stage showed pathologic complete response to concurrent chemoradiation.

3. Comment

The method of conventional gastric tube formation was to divide the cardiac part and body part of stomach, the so-called cardiectomy procedure. The gastric tube was attached again to the esophageal specimen by silk sutures or gauze-strip connection for gastric tube pull-up to the neck. Our modified gastric tube construction described above may have several potential advantages. First, when the gastric tube was pulled up by the connection of the esophagus with suutures, the esophageal muscle fibers were too fragile to stretch. Those sutures between the esophageal specimen and gastric tube may disrupt when any obstacles are encountered along the mediastinal route. We preserved the connection of esophagus and gastric tube, which was strong enough to avoid disconnection. Second, the traction force may be distributed more equally over the gastric fundus because of the straight alignment from the esophagus to the gastric cardiac portion. That could avoid any angulation between staples and decreased the possibility of gastric tube leakage. Third, this method could make the gastric tube longer. When we performed the esophagogastric anastomosis in the neck, more gastric fundus area could be preserved around the anastomotic site. The greater area of the gastric fundus might decrease the tension of esophagogastric anastomosis. Overall, we considered this simple and novel method of gastric formation could facilitate minimally invasive esophagectomy with safer staples application and easier gastric tube pull-up.

References