Modified Technique of Stapled Esophagojejunostomy Without a Purse-String Suture

Ramakrishnan Ayloor Seshadri ·
Siddappa K. Thammaiah · Venkatesh Vaidhyalingam

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Abstract Placement of a purse-string suture during a stapled esophagojejunostomy following total gastrectomy is a technically demanding and time consuming procedure. Improper placement of the purse-string suture can lead to anastomotic breakdown with its associated complications. We describe a technique of stapled esophagojejunostomy without using a purse-string suture. We used this technique in 35 patients including 4 patients who underwent an extended total gastrectomy. We encountered a difficulty only in one patient due to malfunction of the stapler. None of the patients had an anastomotic leak. The modified technique of stapled esophagojejunostomy without a purse-string suture makes the procedure more easy, safe and simple.

Keywords Gastric cancer · Total gastrectomy · Esophagojejunostomy · Anastomosis · Purse-string suture · Stapler

Introduction

Esophagojejunostomy following a total gastrectomy is now routinely performed using mechanical circular stapling devices, which requires placement of a purse-string suture (PSS) on the lower cut end of the esophagus to wrap it snugly around the neck of the anvil. This is a time-

consuming and technically demanding procedure in the narrow and deep operative field at the diaphragmatic hiatus with the esophagus threatening to retract into the lower mediastinum [1]. There is a tendency for the esophageal mucosal cut edge to retract, resulting in non-inclusion of the esophageal mucosa in the PSS. Further, the process of inserting the detachable anvil of the stapler into the narrow esophageal lumen can cause the mucosa to tear [2]. The surgeon is thus confronted with the risk of anastomotic breakdown and leak. Various ingenious methods have been previously reported to overcome these difficulties [3–11]. We hereby describe a modified method of stapled esophagojejunostomy without using a PSS.

Technique

After mobilizing the stomach, the abdominal esophagus is mobilized upto the hiatus. An SDH 25 Proximate® ILS circular stapler (Ethicon Endo-Surgery, Inc., Cincinnati, OH, USA) is used for anastomosis. The plastic ancilliary trocar is inserted into the anvil and a 2–0 prolene suture is passed through the eye of the trocar and tied over (Fig. 1a). A right-angled clamp is applied at the gastro-esophageal junction if the tumor is limited to the stomach or 1 cm above the clinically palpable tumor if the tumor involves the gastro-esophageal junction. A small transverse incision is made on the anterior wall of esophagus 1 cm above the clamp (Fig. 1b). The anvil attached to the trocar is inserted into the esophagus through this esophagotomy and pushed up (Fig. 1c). The prolene suture is passed inside-out through the anterior wall of the esophagus 1 cm above the incision, giving adequate clearance from the tumor (Fig. 1d). The esophagus is stapled just below the exit point of the suture using a TX-30 G Proximate® linear stapler (Ethicon Endo-Surgery, Inc., Cincinnati, OH, USA)

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R. A. Seshadri (✉) · S. K. Thammaiah · V. Vaidhyalingam
Department of Surgical Oncology, Cancer Institute (WIA),
No.18, Sardar Patel road,
Chennai 600036, India
e-mail: ram_a_s@yahoo.com

Fig. 1 **a** A prolene suture is tied around the eye of the ancillary trocar (arrow), **b**: An esophagotomy is made on the anterior wall of the esophagus, **c**: The anvil is inserted into the proximal esophagus, **d**: The prolene suture is passed inside-out through the esophageal wall

(Fig. 2a) and the esophagus is divided below the staple line to deliver the specimen (Fig. 2b). The prolene suture is then

pulled out till the trocar impinges on the stapled esophageal stump. A small incision is made on the esophagus at this

Fig. 2 **a, b** The esophagus is stapled and transected just below the point of exit of the prolene suture, **c**: The suture along with the trocar is pulled till the head of the anvil impacts against the esophageal stump, **d**: The trocar is removed and the anastomosis is completed

site and the trocar is pulled out until the anvil head fits snugly just above the stump (Fig. 2c). The trocar is then removed, the stapler gun is introduced through the open end of a Roux-en-Y loop of jejunum, and the anastomosis is performed in the usual manner (Fig. 2d).

Results

Between January 2007 and August 2010, we have used this no purse-string technique for esophagojejunal anastomosis following total gastrectomy in 35 patients. This included 31 patients with adenocarcinoma of the proximal stomach and four patients with adenocarcinoma of the esophago-gastric junction (Siewert's Type I tumors) who required extended total gastrectomy with a transhiatal lower mediastinal esophagojejunal anastomosis. We encountered a difficulty in the anastomosis in only one patient due to malfunction of the stapler while dividing the esophagus and had to subsequently insert a PSS manually around the anvil. None of the patients had a postoperative anastomotic complication or mortality.

Discussion

Various techniques have been described to overcome the difficulty of placing the PSS, including methods to facilitate easy placement of manual PSS [3] and use of mechanical purse-string instruments [4]. Surgical improvisations to completely avoid a PSS (the true “no purse-string” method) have been reported previously, like placing a simple ligature [5] or a plastic belt [6] around the bowel to approximate it against the neck of the anvil instead of a PSS. Legaspi et al [7] reported a technique where the anvil tied to a suture was inserted into the esophagus through an esophagotomy or gastrotomy, but allowed the suture to protrude through the same enterotomy and stapled the esophagus below the anvil. A potential problem in this technique is the possibility of inadvertently cutting the suture while transecting the esophagus. To overcome this problem, Adam et al described a similar technique but used a needle to protect the suture while transecting the esophagus [8]. Another modification involved passing the anvil attached to an oropharyngeal tube perorally and retrieving the tube followed by the tip of the anvil through the esophageal stump [9]. However, there is a potential for dislodgement of the anvil from the tube, especially when it passes through the cricopharynx. Cebrian et al [10] described a technique quite similar to ours, but inserted the anvil through a gastrotomy. This technique, however, cannot be applied to tumors which approach or involve the gastro-esophageal junction. The

advantage of our technique is that it can be used for an anastomosis in the lower mediastinum after extended total gastrectomy without the need for a thoracotomy. This is facilitated by enlarging the hiatus and widely retracting it. The insertion of the anvil into the esophageal stump is also simplified without injuring the esophagus, and a tight fit of the esophagus around the neck of the anvil is obtained leading to a safe anastomosis. A similar technique for esophago-jejunal anastomosis after laparoscopic-assisted total gastrectomy has been described recently [11]. Another recent innovation is the OrVil™, a transoral anvil delivery system which has a pre-tilted anvil fixed to an oropharyngeal tube that can be inserted through the mouth and retrieved through the esophageal stump. Hirahara et al reported the use of the ORVIL stapler for esophagojejunal anastomosis after laparoscopic total gastrectomy [12].

Conclusion

The modified technique of stapled esophagojejunostomy without a purse-string suture makes the procedure more easy, safe and simple.

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