A Simple and Safe Anti-Reflux Technique for Laparoscopic Proximal Gastrectomy using the Oblique Anastomosis plus Single Flap Valvuloplasty (OSF).

• Liming Wang*, Bolun Song and Yinggang Chen.

• Department of Gastrointestinal Surgery, National Cancer Center/National Clinical Research Center for Cancer/Cancer Hospital & Shenzhen Hospital, China

Objective To investigate the feasibility of oblique overlap anastomosis plus single flap valvuloplasty (OSF) for anti-reflux reconstruction after laparoscopic proximal gastrectomy.

Methods The C-shaped seromuscular flap (2.5 × 3.5 cm), which was 2 cm from the top of the remnant gastric, was extracorporeally created on the anterior wall of the remnant stomach. The stomach was opened approximately 1cm above the lower edge of the mucosal flap. Four supporting stitches were sutured around the hole and the right wall of the esophageal stump was incised with a support suture to prevent the linear stapler from entering the submucosa. Liner stapler was inclined to the left side of the esophagus at an angle of about 30 degrees to the longitudinal axis of the esophagus for oblique anastomosis between the dorsal side of the esophagus and the anterior stomach and then esophagogastrostomy was performed with the length of anastomosis was 4 cm. Entry hole was suture with 3 stitches and then the linear stapler was used for closing the entry hole. Finally, the seromuscular flap was closed using barbed sutures.

Results There were 12 males and 8 females. The average age was (68.2±6.8) years, the BMI was (21.88±6.2) kg/m² and the mean tumor size was 2.2±0.4cm. The median operative time was 255 (225-428) minutes, the time for OSF reconstruction was 112 (76-140) minutes, and the blood loss was 50 (20-400) ml. The pathological stage was 0-I in 12 cases and II-III in 8 cases. The patients were fed on the 4th day (4-7 days) and discharged from hospital on the 7th day (6-9 days) after surgery. No patient had gastroesophageal reflux symptoms of grade B and above. None of the patients required long-term anti-reflux medicine.

Fig.1

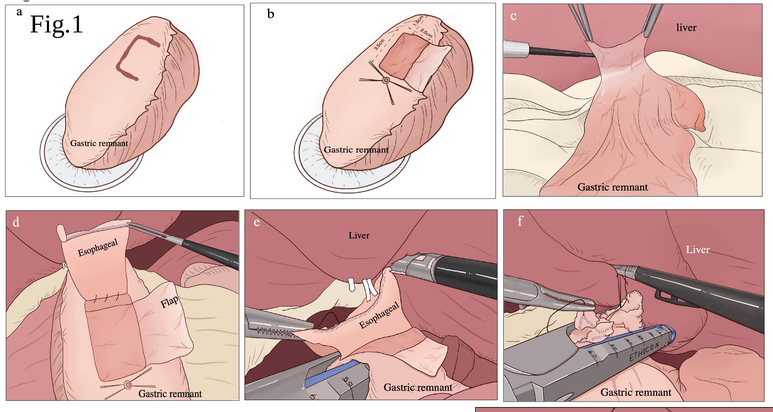


Fig.1a: The C-shaped seromuscular flap (2.5 × 3.5 cm), which was 1.5 cm from the top, was extracorporeally created on the anterior wall of the remnant gastric.

Fig. 1b: The stomach was opened approximately 1cm above the lower edge of the mucosal "window." 4 support sutures were stitched around the hole.

Fig. 1c: The layer between the seromuscular and the submucosa was freed by electrocautery.

Fig. 1d: Using barbed sutures to stitch the posterior wall of the esophagus with the stomach. The whole layer of the esophageal wall was cut to the right side of the stump of the esophagus, and the nasogastric tube was stay in the abdominal cavity as a guide during anastomosis.

Fig. 1e: Liner stapler was inclined to the left side of the esophagus with 30 degrees to the longitudinal axis of the esophagus to perform oblique anastomosis between the dorsal side of the esophagus and the anterior stomach.

Fig. 1f: The linear stapler was used for closing the entry hole, as well as at the esophagus stump was severed.

Fig.2

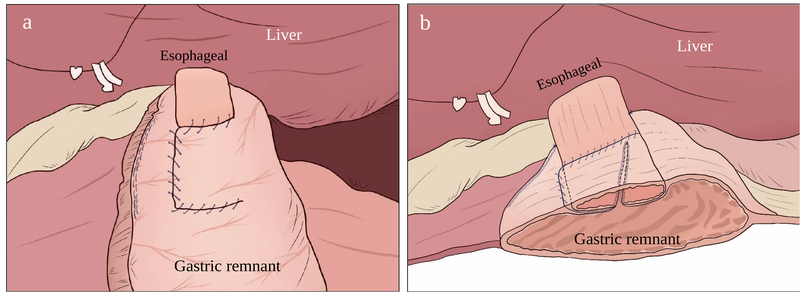


Fig.2a: The seromuscular flap was closed using barbed sutures.
2b: The anti-reflux mechanism of OSF method: 1. Reconstruction of gastric fundus; 2. Anastomosis was strengthened by single muscle flap to reconstruct the lower esophageal high-pressure zone; 3. Reconstruction of his angle with oblique anastomosis; 4. The dorsal mucosa and submucosa of the esophagus were thin and soft. When the pressure in the stomach increases, the flap valve was formed to push the anterior wall of the esophagus to close the lower esophagus.

Fig.3

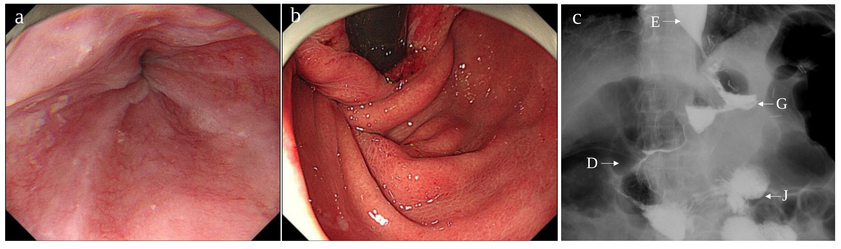


Fig. 3a: No reflux esophagitis was observed on endoscopic examination. Endoscopic views of the anastomosis at the esophagogastric junction at 3 months after surgery.
3b: There was no hiatal hernia of the cardia. The shape of the reconstructed gastric fundus was in better condition.
3c: The gastrointestinal angiography was performed to observe the smoothness of the anastomosis (E: esophageal; G: gastric; D: duodenum; J: jejunum).

Table1 Clinicopathological characteristics of the OSF patients

Characteristics	n=20
Gender	
Male	12
Female	8
Age, years	68.2±6.8
BMI(kg/m2)	21.88±6.2
ASA-PS	
1	13
2	7
Resection margin, cm	
Proximal margin, cm	2.8±1.2
Distal margin, cm	5.3±2.1
Tumor size, cm	2.2±0.4
pathologic T classification	
0-2	12
3-4	8
pathologic N classification	
0-1	15
2	5
Pathologic stage	
0-I	12
II-III	8

BMI body mass index, ASA-PS American Society of Anesthesiologists physical status, OSF Oblique anastomosis plus Single Flap valvuloplasty

Table 2 Surgical outcomes of the OSF patients

OSF	n=20
Operative time, min	286.2±44.2
median (min)	255 (225-428)
Anastomosis time, min	100.4±13.2
median (min)	112 (76-140)
Estimated blood loss, ml	112.5±22.3
median (ml)	50 (20-400)
Food intake, POD	4.3±1.0
median, POD	4
Discharge, POD	8.1±1.2
median, POD	7
Early complications(CD≥ 1)	4
Early complications(CD≥ 2)	0
Anastomosis leakage	0
Anastomosis stenosis	0
Intra-abdominal abscess	0
Later complications	1
Anastomosis stenosis	1
Bowel obstruction	0
Adjuvant chemotherapy	8
Reflux esophagitis	
No	18
Grade A	2
Grade B-C	0
Anti-reflux medicine	0
Weight loss after 3 months	
>10%	2
5-10%	10
0-5%	8

CD Clavien- Dindo classification, POD post operative day, OSF Oblique anastomosis plus Single Flap valvuloplasty

Conclusions The Oblique anastomosis plus Single Flap valvuloplasty (OSF) is a safe and feasible anti-reflux technique for Siewert type II esophagogastric junction adenocarcinoma.

COI Disclosure Information
Wang liming
I have no financial relationships to disclose.