Chinese Journal of Cancer Research 8(3):205–208,1996.

A NEW TECHNIQUE OF ESOPHAGOGASTROSTOMY ABOVE THE AORTIC ARCH — COVERING AND SUSPENDING OF THE ANASTOMOTIC AREA WITH MEDIASTINAL PLEURAL FLAP

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The postoperative anastomotic leakage is the most severe complication and the principal cause of death after resection of esophageal carcinoma. Especially, anastomosis above the aorta arch is accompanied by high incidence of anastomotic leakage usually with fatal prognosis. The authors improved the conventional method of anastomosis by using a mediastinal pleural flap to cover and suspend the anastomotic area with excellent result. From January 1990 to April 1995, total 210 patients with esophageal carcinoma underwent surgery resection with this procedure. No anastomotic leakage or stricture developed. Only one patient died of extensive myocardial infarction with an overall mortality of 0.47%. The major merit of this procedure was that the mediastinal pleural flap could cover the area of anastomosis and sustain dragging force acting on this area, providing a better condition for the anastomosis to heal and thus reducing the possibility of anastomotic leakage.

Key words: Esophageal tumor, Surgery, Anastomosis, Leakage.

Anastomotic leakage is the most severe complication after the resection of esophageal carcinoma. Especially, anastomosis above the aortic arch is accompanied by high incidence of anastomotic leakage, usually with fatal prognosis. The authors improved the conventional method of anastomosis with an excellent result. From January 1990 to April 1995, 210 cases of esophageal carcinoma were resected and performed gastroesophagostomy above the aortic arch. Here reported as follows.

Accepted August 25, 1996

MATERIALS AND METHODS

General Data

There were 210 cases with 149 of male and 61 of female, the ratio was 2.5:1. The age ranged 28 to 68 years with the mean 52 years. Of the 210 cases, the tumor localization was 193 in the middle third thoracic esophagus, 16 in the lower third and one case with multiple primary tumors. The length of lesions was ranged 0.5–10 cm, generally 3–6 cm, taking 49% of all.

Surgical Technique

The mobilization of the esophagus and stomach is as same as the other conventional procedures, but our method of anastomosis is:

The mediastinal pleura is incised along the superior margin of the aortic arch, the anterior margin of the thoracic vertebrae and the left margin of left subclavicular artery, continuously divided up to the apex of pleural cavity, then, a long-square shape

pleura flap is made with the length about 4 cm and width about 3 cm. Care is taken to keep the pleural flap as thick as possible (Figure 1).

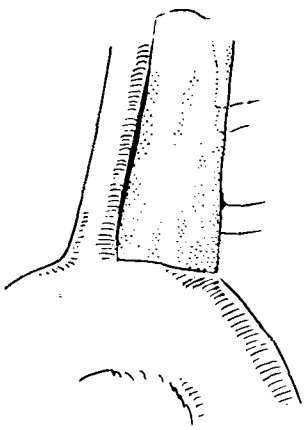

Fig. 1. The range of the pleura should be dissociated.

When the pleural flap is divided, the thoracic fascia is opened and the esophagus is drawn up to the level above the aortic arch. After finishing the former third rows as the traditional anastomotic procedure, the fourth row is omitted. Thus, without the introverting of the anastomosis, the possibility of anastomotic stricture may be reduced (Figure 2).

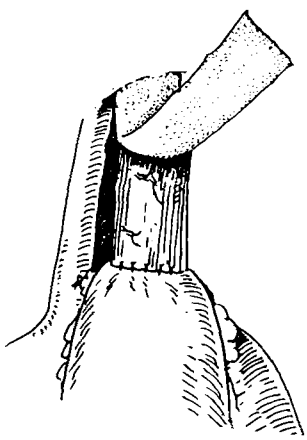

Fig. 2. The size of the dissociated pleural flap is about 4×3 cm^2.

The pleural flap is stretched with its lower margin intermittently sutured onto the gastric wall about 3–4 mm under the anastomotic orifice (Figure 3).

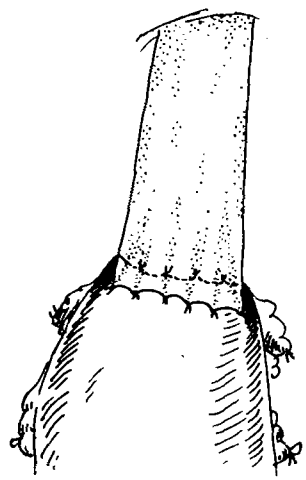

Fig. 3. The stretched pleural flap with its lower margin sutured to the gastric wall below the anastomotic orifice.

Set a long 4# thread as the scarf-string suture. This maneuver should be emphasized: (1) Site of suture in gastric wall is about 2.5 cm distal to anastomotic orifice, the same distance between the first row and anastomotic orifice. Distance between the two suture should be kept not too adjacent, in case that the esophagus above anastomosis be wrapped excessively tight after ligated. (2) The suture on esophagus must pass through the pleural flap, then is the esophageal muscular layer (do not through mucosal layer) and again the pleura flap. Thus, capacity of antidrawing of the suture can be promoted. Adopting of this procedure, the esophageal muscular layer can avoid being torn away and the pleural flap can also be covered on anastomotic orifice tightly (Figure 4).

After the anastomosis, esophagus is wrapped by gastric fundus proximal to anastomotic orifice about 2.5 cm. The anastomotic orifice is suspended by the pleural flap tightly up to the apex of the pleural cavity Then, all the tension and gravity acted on the anastomosis are undertaken by the pleural flap (Figure

5). Then, a suitable shrinking suture of the stomach may reduce the compression on the lung due to the extension of the thoracic stomach.

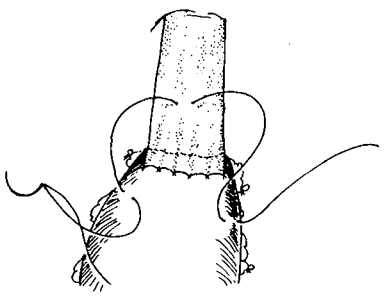

Fig. 4. A long 4# thread lacated, like the scarf-string suture.

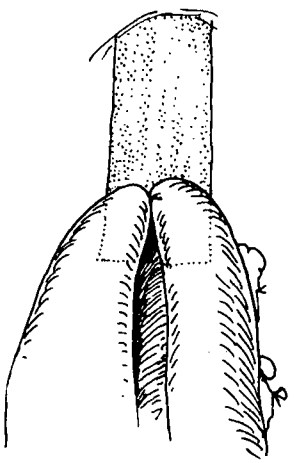

Fig. 5. Anastomosis finished.

Measurement of Drawnforce for Pleural Flap

Method: After pleural flap was made, its distal end was tied with a 10# thread, the other end of the thread connected with a spring scale, then, draw the spring scale until pleural flap was torn away, simultaneously drawing force was displayed in the spring scale,. In the group, 8 cases was measured (5 men, 3 women, the largest force was 15.19N (1 N=102 g) and the least, 12.74N, on average of 13.72N). After cardiac carcinoma operation, the drawing force of the fresh specimen also was measured: Set a 4# thread to the residual margin of stomach at the distance about 3 mm to the edge, then, drawing spring scale until the tissue was torn out, the force was 22.54N in male and 21.30N in female. With the same method, the result of the esophageal end was 9.90N for male and 8.80N for female. At the 4th to 5th postoperative day, because of tissue edema, the endurance to drawing force became farther lower.

Design of the Procedure

The authors once met a patient, 42 years old, who suffered from esophageal carcinoma in middle third. On the fifth postoperative day, chest X-ray examination did not display pneumothorax and effusion. Because of the well general patient state, he wanted to return ward on feet. After being refused by doctor, he sat on the wheelchair suddenly. On that day the patient felt chest pain and dyspnea, the typical symptoms of the anastomotic leakage appeared. Reoperation found that gastric wall was congestion and edema with a plenty of contents in stomach with the weight about 1 kg. It was also found that the third row of suture had torn down from the distal end of the esophagus and all suture threads had left on gastric margin during checking up the gastric orifice. According to experimental study, endurance to pressure of anastomotic orifice was lowest on the 3–5 postoperative day, a slight pressure may let anastomotic orifice split open. Based on those findings the authors supposed if dividing a mediastinal pleural flap, suture its distal end on the gastric wall under anastomotic orifice. This pleural flap then could not only cover the area of anastomosis, but also bear the dragging force acted on this area. This brought about our own anastomosis method.

RESULTS

Of the 210 patients, there was no anastomotic leakage and near stricture, only one died of acute extensive myocardial infarction on the 2nd post-operative day with the mortality rate of 0.47%. Other complications are local empyema (1 case), bronchial asthma (1 case). The asthmatic case was a female, aged 60 years, on the third day after operation, bronchial asthma broke out, a lot of antispasmodic had

been given but symptoms did not be controlled, then tracheotomy and high frequency ventilation was performed. In order to save the patient's life, we were compelled to put a plenty of hormone, dexamethasone 50 mg a day, hydrocortisone 400 mg a day intravenous instillation for four days, then the patient's state was becoming better gradually, and healed. After the resection of the esophageal carcinoma, in case of anastomotic leakage, taking hormone should be very caution. In this patient hormone was obliged to use, but in view of the above, this anastomotic method was proved scientific and safe.

DISCUSSION

The postoperative anastomotic leakage is the most severe complication and the principal cause of death after resection of esophageal carcinoma. At present, incidence of anastomotic leakage is about 1.8–22% in abroad and 2.6–6.4% in China.[1] Lorentz et al.[2] reported 730 cases (including bypass) with 182 cases of anastomotic leakage occurred and the incidence of leakage was 24.9%. Of the 531 resected cases, there were 97 anastomotic leakage (incidence, 18.3%). There were 14 anastomotic leakage (20.3%) of the 69 cases with the esophagogastrostomy above the aortic arch through left thoracostomy. The mortality rate of anastomotic leakage is very high, about 33.2–66.7% in China. Chasseray et al.[3] reported that the mortality rate of anastomotic leakage was 58% after intrathoracic anastomosis. Weng et al.[4] reported that of the all postoperative death causes, the anastomotic leakage was take about 40%. Especially, anastomosis above the aortic arch has a high risk of leakage, because the anastomotic technique is more difficult. Once patient suffers from anastomotic leakage, the thoracic infectious symptoms are extremely severe usually. In the same period, 1517 same operations were performed in our hospital, except for 210 cases performed by the authors, in the left 1307 cases there were 32 cases of anastomotic leakage, the incidence was 2.4%. Of which, 8 cases were died, the leakage mortality rate was 25%.

The causes of anastomotic leakage are very complicated, the principal causes are tension, ischemia or infection of anastomotic area, the existing of negative pressure of thoracic cavity and the lack of the serosa layer for the esophagus, and so on. Thus we consider a scientific reasonable anastomotic method and skilled anastomotic art should be the key points for decreasing the incidence of anastomotic leakage. All of the archives in the past on anastomotic leakage only considered the tension acted on the anastomotic area to be the principal cause of anastomotic leakage, they only thought over that the tension formed in operation because of the insufficiently dissociating of the tissue. While they did not think that at sitting or erecting position, gastric gravity itself played dragging force to anastomotic orifice. Endurance of the esophagus to dragging force is rather poor for the lack of serosa layer. Zhang et al.[5] reported that anastomotic orifice was very weak on the 3–5 postoperative day, therefore, a very important cause of anastomotic leakage may be the dragging force on anastomotic orifice formed by the gastric gravity itself and the congestion and edema of the gastric wall.

As stated above, the major merits of this procedure is that the mediastinal pleural flap could cover the anastomotic area and sustain all the dragging force includes the gastric gravity, provide a better environment for the anastomosis to heal. Thus the possibility of the anastomotic leakage should be reduced obviously so long as the local area has been thoroughly disinfected before the mediastinal pleura flap is covered on the anastomotic area.

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