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Gastric pull-up by eversion stripping of oesophagus

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Abstract
Gastric pull-up is a reliable method of one-stage reconstruction following total laryngopharyngoesophagectomy (TLPE). However, the technique of blunt finger dissection for extrapleural extraction of the oesophagus is liable to produce chest complications like pneumothorax. We report a series of 45 patients who underwent gastric pull-up using the technique of oesophageal extraction by stripping which produced virtually no thoracic complications. This simple technique has greatly reduced morbidity associated with gastric pull-up.

Key words: Laryngectomy; Pharyngectomy; Oesophagectomy; Gastric pull-up

Introduction

Gastric transposition and pharyngogastric anastomosis, first described by Ong and Lee (1960), has become a reliable and widely used method of reconstructing the defect resulting from total laryngopharyngoesophagectomy. Ong and Lee, in 1960, described oesophageal extraction by the transthoracic route. Le Quesne and Ranger (1966) reported gastric pull-up by extra-pleural oesophageal extraction by blunt finger dissection. This became the technique employed by almost all authors thereafter.

When we started doing gastric pull-up in our institution in 1985, the technique we employed was that described initially by Le Quesne and Ranger in 1966. Our first three cases developed chest complications: two patients developed pneumothorax, one of whom also developed chylothorax and the third patient had pleural effusion. The patient with chylothorax underwent thorecotomy and attempted ligation of the thoracic duct, which proved unsuccessful. He died post-operatively due to a persistent massive chyle leak. The incidence of chest complications and the resultant morbidity was unacceptable and this prompted us to take a second look at the technique of blunt finger dissection for extraction of the oesophagus. Stimulated by the report of oesophageal extraction by stripping by Akiyama *et al.* (1975), one of us (N.R.) devised a modification of this technique which we started using for enbloc total laryngopharyngoesophagectomy from 1986 onwards. This has now become the standard technique employed by us for 'gastric pull-up'.

We performed 45 operations utilizing this technique. The technique and its complications are reported.

Materials

From 1986 to 1992, 45 patients with advanced hypopharyngeal and cervical oesophageal cancer underwent the gastric pull-up operation utilizing the technique of upward eversion stripping of the oesophagus in ENT Unit-I of Kasturba Medical College Hospital, Manipal, India. There were 28 male patients and 17 female: 22 of these patients also underwent simultaneous neck dissection, one of these being bilateral. Twenty-seven patients received post-operative radiotherapy. Seven patients underwent salvage surgery.

Technique

The operation is begun by exploring the neck. After operability is confirmed the abdominal team starts mobilizing the stomach. While mobilizing the stomach, special care is taken to preserve the right gastro-epiploic vein. This can easily get torn while dissecting and separating the transverse colon and hepatic flexure from the front of the C-loop of the duodenum and the head of the pancreas. The abdominal oeosphagus is mobilized, phreno-oesophageal ligaments divided and the oesophageal hiatus dissected to completely free the abdominal oesophagus. The oesophageal hiatus is widened by incising the fibres of the right crus of the diaphragm anteriorly and to the left, taking special care to avoid opening into the left pleural cavity. The vagi are divided. Once the cervical dissection is completed, an incision is made on the left side of the cervical oesophagus. A Myer's vein stripper, with the largest head screwed-on, is introduced through this into the oesophagus and passed down (Figure 1). This is delivered through a transverse incision at the gastroesophageal junction. The stripper head is changed to a medium-sized one. A stout silk suture is tied tightly around the lower end of the oesophagus thereby securing the stripper. The oesophagus is now transected completely at the gastroesophageal junction and the opening in the stomach at the oesophagogastric junction closed (Figure 2).

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FIG. 1
Vein stripper being introduced through an incision on the left side of the cervical oesophagus.

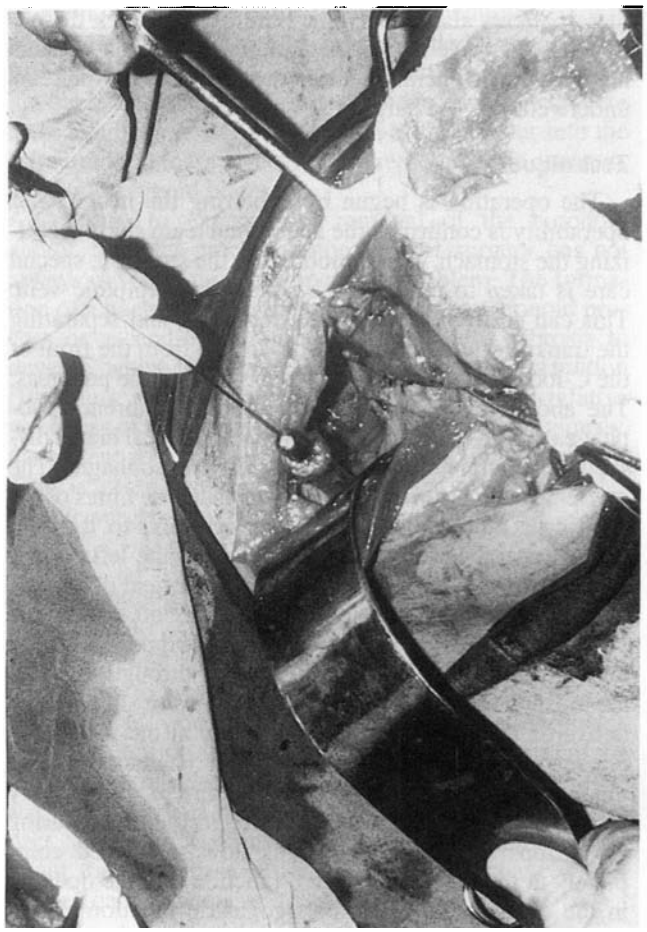

FIG. 2
The stripper secured within the transected lower end of the oesophagus. The closed cardiac end of the stomach is seen on its right.

At this stage the neck surgeon pulls up the stripper with a steady traction, whereupon the oesophagus becomes invaginated into itself at its lower end and gets stripped up. At about the middle some increase in resistance is felt, but the oesophagus continues to come up smoothly and, finally, emerges out through the incision in the cervical oesophagus with its mucosa on the outside (eversion; Figure 3). There is usually some brisk bleeding from the posterior mediastinum, but never severe. The stripping up of the oesophagus usually takes about one minute. The endotracheal tube cuff need not be deflated while doing this. The vein stripper is released off the oesophagus and passed down the posterior mediastinum once again into the abdomen. The stripper with its head is fixed to the summit of the fundus of the stomach by a stout No. 1 silk suture (Figure 4). The stripper is once again pulled up steadily, carrying with it the stomach, which can simultaneously be coaxed up by the abdominal surgeon. Care has to be taken to see that the stomach does not get twisted. Once the stomach is delivered into the neck (Figure 5), the fundus is incised and the pharyngogastric anastomosis effected.

Results

Of the 45 patients in whom this technique was employed for gastric pull-up, in only one patient did it fail. In this case there was excessive bleeding from the posterior mediastinum after oesophageal extraction. It was noticed that part of the muscle coat of the oesophagus was left behind. Immediate thoracotomy was done. The remnants of theoesophagus were excised and this controlled the bleeding. However, the patient expired on the third post-operative day.

There was only one case of pleural damage leading to pneumothorax. However, this occurred not during oeso-

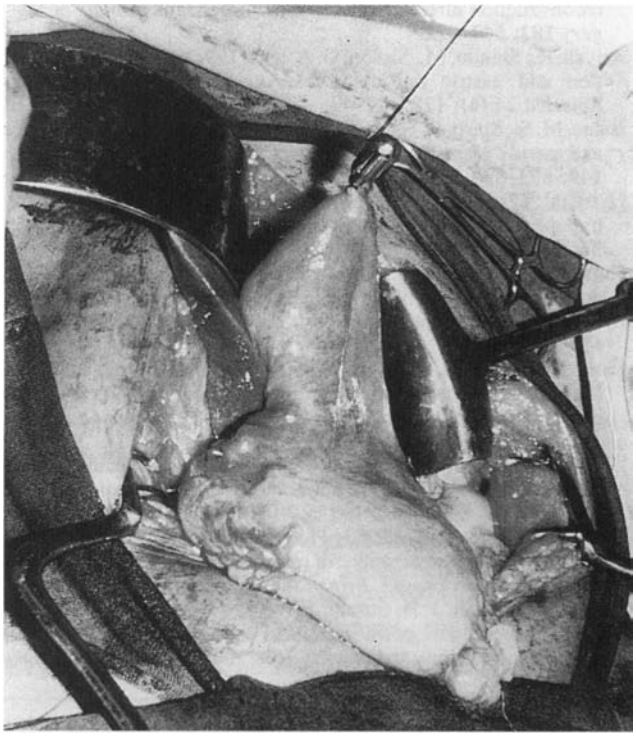

FIG. 3
The oesophagus being stripped up and emerging through the opening in its cervical portion, inside out.

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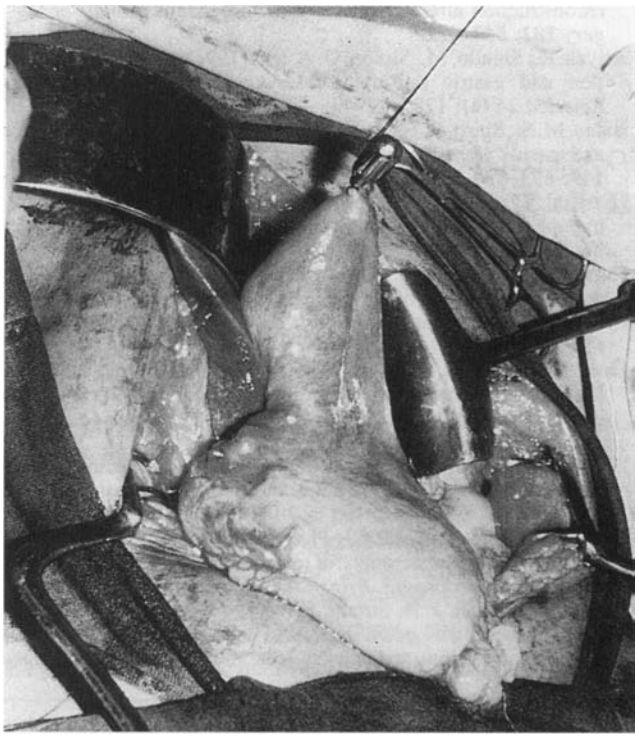

FIG. 4
The stripper attached to the gastric fundus being used to pull the stomach up.

phageal extraction by stripping, but while dissecting and widening the oesophageal hiatus, when the left pleural cavity was entered inadvertently.

Only one patient developed pleural effusion. This was a massive right-sided pleural effusion which developed 20 days after surgery, by which time the patient had resumed oral feeds. This subsided after two pleural aspirations. The cause could not be determined.

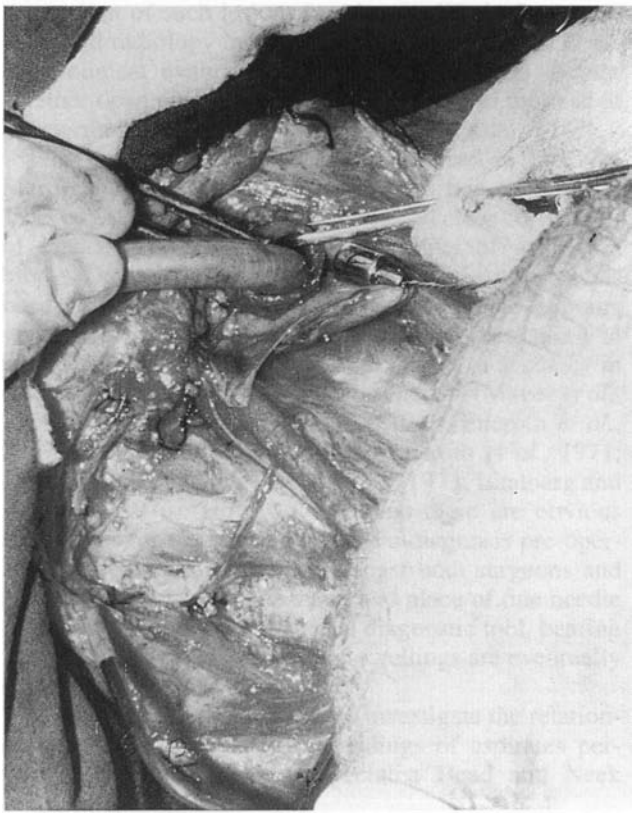

FIG. 5
The pulled-up stomach emerging in the neck.

There were no tracheal tears and no intra-operative deaths.

Out of the 38 patients who were discharged, oral feeds could not be started in two due to formation of a gastrocutaneous fistula which did not heal (5.3 per cent). Considering all the complications together neck wound infection was the most common, 11/45 having developed this (24.4 per cent) (see Table I). Seven patients died postoperatively (15.6 per cent), the most common cause being fulminant pulmonary infection. Thirteen patients (28.9 per cent) had no complications.

Discussion

The use of the stomach has become a well established method of reconstruction after total laryngopharyngoesophagectomy (TLPE). After the report by Le Quesne and Ranger in 1966, the method of extrathoracic extraction of the oesophagus by transhiatal blunt finger dissection has become the technique commonly employed for performing TLPE with 'gastric pull-up'. The resection part of this procedure has been blamed as likely to do more damage than the reconstruction (Lam *et al.*, 1989) especially while doing blunt finger dissection in the mediastinum to extract the thoracic oesophagus. Blunt finger dissection in the mediastinum to mobilize and extract the oesophagus has been reported to produce serious complications ranging from pleural effusion and pneumothorax to catastrophic tracheal tears (Harrison, 1969; Bains and Spiro, 1979; Harrison *et al.*, 1981; Spiro *et al.*, 1983; Atiyah *et al*, 1991). This adds to the morbidity of the procedure, as it is very often performed in patients who are in poor general health. However, by adopting the method of oesophageal stripping, we have virtually avoided producing operative chest complications and greatly reduced the morbidity. Thus, there has been a significant reduction in morbidity. There was only one complication directly attributable to

TABLE I
COMPLICATIONS IN 45 PATIENTS

(A) Intra-operative	
Pneumothorax (L)	1
Oesophageal tear	1
Splenic tear	1
Hypoglossal nerve damage (L)	2
Thoracic duct damage – neck	2
(B) Post-operative	
Wound infection	11
Wound disruption	5
*Gastrocutaneous fistula	5
Pneumonitis	4
Septicaemia	2
Pleural effusion	1
Burst abdomen	1
**Gastric outlet obstruction	1
Pulmonary collapse (L)	1
A R D S	1
Seroma – neck	1

*Three of these healed with conservative measures.
**Nineteen days after TLPE this patient underwent a gastrojejunostomy which relieved the obstruction.

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our method namely uncontrolled bleeding from the mediastinum due to incomplete removal of the oesophagus, necessitating thoracotomy. The sole pneumothorax in this series, as noted already, was produced during widening of the oesophageal hiatus and not during oesophageal extraction.

Akiyama *et al.* (1975) described eversion stripping as a method of 'downward extraction' of the oesophagus. They advised against its use when the level of oesophageal transection in the neck contained tumour, which it very often does in cases of advanced hypopharyngeal and cervical oesophageal cancer. We have modified this and have been successfully using it for upward extraction of the oesophagus, permitting en bloc excision of the tumour with the larynx, pharynx and oesophagus, with a significant reduction in morbidity.

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