

RECONSTRUCTION OF GASTROINTESTINAL CONTINUITY BY THE GASTRIC PULL-UP METHOD FOLLOWING EN BLOC PHARYNGO-LARYNGO-ESOPHAGECTOMY

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SUMMARY :

Purpose : Resection of a considerable segment of the esophagus requires subsequent reconstruction of the continuity, generally by using flaps of various organs or tissues. In this study, the technical aspects of gastric pull-up reconstruction for providing the gastrointestinal continuity after pharyngo-laryngo-esophagectomy (PLE) are described. **Methods :** Fourteen patients underwent PLE, followed by gastric pull-up reconstruction. This procedure involved complete mobilization of the stomach in the form of a tube, so that the pylorus reached the level of the diaphragmatic hiatus. The vascular supply relied wholly on the right gastroepiploic artery. Following blunt dissection through the posterior mediastinum, total esophagectomy was performed and anastomosis was accomplished between the gastric fundus and the base of the mouth. **Results :** No complications attributable directly to the surgical method used were noted. The leading associated complications were cardiac arrhythmia and pulmonary complications. **Conclusion :** According to our preliminary results, gastric pull-up reconstruction appears to be a safe and efficient method in the reconstruction of laryngeal, hypopharyngeal and cervical esophageal carcinomas after radical resections. On the other hand, the method should be considered cautiously if serious cardiac and/or pulmonary baseline diseases exist.

Key Words: Gastric Pull-Up, Esophagus, Reconstruction.

INTRODUCTION

Various methods of radical resections have been applied to pharyngeal, laryngeal and cervical esophageal carcinomas in order to provide the continuity of the gastrointestinal system. Resection of a considerable segment of the esophagus requires subsequent reconstruction of the continuity, generally by using flaps of various organs or tissues. These methods are expected to provide the oral intake for appropriate nutrition while not influencing the life standard negatively,

thus mortality and morbidity will be low. The deltopectoral or myocutaneous grafts, gastric pull-up, colonic flaps, or jejunal free flaps are the identified options. Cervical skin grafts are not widely applied because these procedures include multiple steps, and complications such as stricture and fistulization are unacceptably common (1). The deltopectoral skin flap application with two steps (2) has resulted in a high rate of complications and flap necrosis (3). Similar complications have occurred with the pectoralis major flap (4-6). Gastric pull-up method has recently become more

popular because of the low possibility of stricture and the need for a single anastomosis. In parallel with the development of microsurgery techniques in recent years, jejunal free flap reconstruction is being proposed as an alternative method against gastric pull-up, although the surgical technique is more complicated, by definition (7-9). Of these various techniques, gastric pull-up retains its place as the first reconstructive method of choice.

In this common study of the General Surgery and Otorhinolaryngology teams between 1992-1998, the technical aspects of the gastric pull-up are described for providing the gastrointestinal continuity after pharyngo-laryngo-esophagectomy (PLE), and the results are discussed.

PATIENTS AND METHODS

The study included 14 patients (9 male, 5 female) who underwent PLE followed by gastric pull-up reconstruction. The otorhinolaryngology team applied pharyngo-laryngectomy and radical or modified neck dissections after agreeing upon the resectability of the tumor.

Gastric pull-up technique. As the otorhinolaryngology team operated on the neck, the general surgery team began laparotomy with upper abdominal midline incision. Following an extensive Kocher maneuver, the right gastric artery and the right gastroepiploic vascular arc were preserved and the stomach was mobilized so that the pylorus reached the diaphragmatic level (10-12). Whenever this extensive mobilization was inadequate, the right gastric artery was also ligated and divided. The diaphragmatic crura and vagal trunks were cut after division of the left gastric artery and vein, and the esophagus was mobilized from the mediastinum by blunt finger dissection. After the mediastinal dissection was completed, upper thoracic esophagus was mobilized under the guidance of cervical esophagus. In some cases, several applications of GIA stapler (Auto Suture, CT, USA) were performed along the lesser curvature, so as to provide a gastric tube of greater mobility. The stomach was pulled up to the base of the mouth through the posterior mediastinal way, and anastomosis was accomplished with a single layer of 3/0 vicryl Gambie sutures between the gastric fundus and the base of the mouth (Fig. 1), (Fig. 2). This was preceded by division of the esophagogastric junction by the application of the stapler. Therefore, the single anastomosis was of

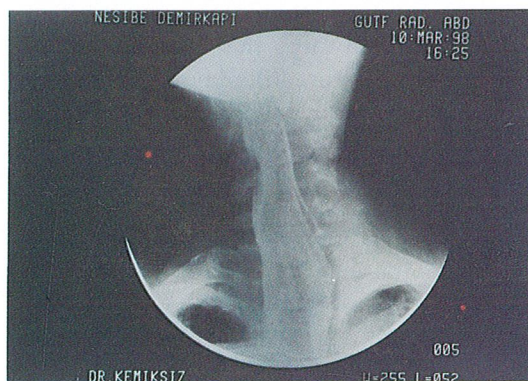


Fig. 1 : Postoperative contrast film demonstrates the high anastomosis made between the fundus of stomach and pharynx at the base of the mouth.

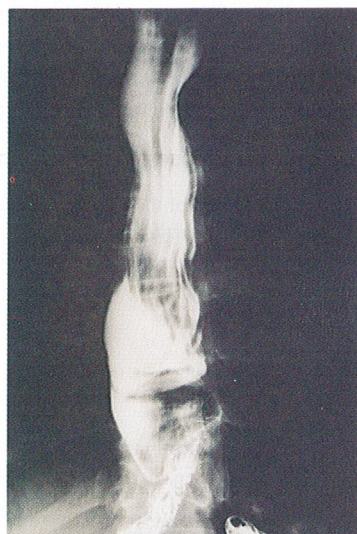


Fig. 2 : The pylorus is lifted to the level of the diaphragmatic hiatus and the gastric tube is pulled-up behind the posterior mediastinum.

the esophagoneogastrostomy type. The neck was closed after placing two vacuum drains and the abdomen was closed, utilizing a single sump drain. Pyloroplasty or pyloromyotomy was applied only if there was a scar on the pylorus resulting from ulcer. The spleen was preserved in all patients.

Antibioprophylaxis was performed with ceftriaxone + ornidazole, and no antibiotics were administered postoperatively, unless these or other antibiotics were indicated by clinical and

microbiological data (none in this study group). In all patients, low molecular weight heparins were started perioperatively and continued for at least 7 days, postoperatively. The patients were nourished by TPN for 7-10 days preoperatively, regardless of the nutritional status. Hyperalimentary nutrition was maintained by the enteral route postoperatively for 10 days. This was accomplished by placing intraoperatively a nasoenteric feeding tube distal to the duodenum. Contrast radiograms were obtained on the 9th postoperative day. Following radiologic confirmation of anastomotic integrity plus clinical well-being, oral intake was started on the 10th postoperative day. Postoperative 4000 cGy radiotherapy was applied to the patients who had hypopharyngeal ca.

RESULTS

The mean age of the 14 patients (9 male, 5 female) in the research group was 61 (49-74) years. The tumor locations of these patients are shown in Table 1. In this study group, most of the patients (10/14) had pyriform or postericoid carcinomas, while upper esophageal cancer existed in 4 patients.

The surgical interferences applied to tumors in

Table 1 : The tumor locations of the patients who underwent PLE + gastric pull-up reconstruction.

Pyriform	4
Postericoid	6
Cervical esophagus	4

these locations are shown in Table 2. According to the extent of the tumors on either side of the neck, radical or modified radical neck dissections were carried out (data not discussed). The operation time in total was 460 +/- 140 minutes (mean +/- SEM), and tended to become shorter as we gained

Table 2 : The surgical interferences applied to tumors in the study group.

Operations performed	No. of patients
PLE + right RND + left MRND	7
PLE + right MRND + left RND	3
PLE + bilateral MRND	2
PLE + bilateral RND	2

PLE: pharyngo-laryngo-esophagectomy, RND: radical neck dissection, MRND: modified radical neck dissection

experience with the technique. No passage problems were noted in any of the patients, postoperatively. All 14 patients complained from regurgitation of various severity following the start of oral intake.

The early complications are shown in Table 3. Total mortality was found to be 14.3% (2/14) One patient died on the 5th day of the post-operative period following the sudden development of pneumothorax while he still received ventilatory support. The other death occurred on the 35th postoperative day again suddenly and without an identifiable cause (autopsy not performed). Cardiac rhythm disorders were observed in almost all of the gastric pull-up patients, especially perioperatively. This required lidocaine and/or propafenon administration. No major abdominal or neck infections were observed. One minor leak and other infrequent cases of pneumothorax or hemothorax were easily managed conservatively. All survivors underwent endoscopic control of the anastomotic site on the third postoperative month. Asymptomatic minor narrowing was noted in three patients (25 %) and dilated once by bouginoge.

DISCUSSION

Table 3 : Postoperative early complications.

Complications	no. of patients
Major leak	-
Minor leak	1
Stenosis	-
Pneumothorax	3 *
Hemothorax	1
Pulmonary embolism	1 (?) **
Pneumonia	6
Arrhythmia	13
Hypoparathyroidism	3
Abdominal hemorrhage	-
Abdominal /neck wound infection	-
Exitus	2

* : one patient died following pneumothorax

** : possible cause of a sudden death

Hypopharyngeal and cervical esophageal carcinomas show frequent metastases to the surrounding tissues and regional lymph nodes in

comparison with the thoracic esophageal carcinomas, and they result in 75% early recurrence and 5 year survival with a rate of 25% (13, 14). In addition to these bad recurrence and survival rates after the resection of these tumors, the difficulty in restoring continuity between the base of the mouth and thoracic esophagus increases mortality and may be an additional cause of mortality. Skin flaps and myocutaneous flaps advised for the reconstruction of the resultant defect are generally not recommended because they are multi-stage operations lasting too long and have high incidences of fistula and stricture (2). Moreover, for oral nutrition of the patients, 2-3 months are required postoperatively, causing additional morbidity (13). If there is no TPN chance or if TPN complications develop, gastrostomy or feeding jejunostomy is needed for this patient group. The additional morbidities of these procedures are then added to the picture. Skin flaps and myocutaneous flaps also cause serious cosmetic defects.

More recent reconstructive methods include colon interposition and jejunal free flaps. Colon interposition requires complete dissection and mobilization of a segment of the colon, and by definition, the relevant colonic mesentery also needs to be transposed. This may cause circulation disorders resulting from tension and/or pressure in the mediastinal, subcutaneous, or retrosternal tunnel. There are other objections such as the low thickness of the colonic wall or anastomotic ulcer, and an additional colo-colic anastomosis is inevitably added to the procedure in the abdomen (11, 14, 15). Jejunal free flap requires a refined technique (microsurgery) for the application of vascular anastomosis (8). Jejunal flap provides a perfect homogenization between the mouth base and esophagus. It is suggested as an ideal method especially for the cases with a former stomach operation. However, the rate of stenosis in jejunal flaps is higher than in the gastric pull-up method. Jejunal free flap operation has been reported to last longer than gastric pull-up. There are three anastomoses in jejunal flap but only one in gastric pull-up. Especially in patients to whom preoperative radiotherapy is applied, it has been stated that the vascular anastomosis risk is higher.

Although we have some experience with all of the above-cited techniques, we lack the necessary numbers to compare them with one another.

Besides, our initial results have led us to prefer the gastric pull-up method, so the number of patients in this group of reconstruction is incomparably high. Gastric pull-up method has been identified as the easiest and lowest risk method as it requires a single anastomosis at the base of the mouth, which is readily accessible (10-12). The technique requires some skill and experience in gastric surgery. Extensive mobilization of the stomach is needed, so that the pylorus reaches the level of the hiatus. Due to the rich vascular supply of the stomach, this mobilization has never caused vascular problems in our cases. Whenever this mobilization proves to be inadequate, the right gastric artery is also divided, and the vascular supply of the stomach then relies wholly on the right gastroepiploic artery and vein. In more than half of our cases (8/14), multiple stapler applications on the lesser curvature site were needed in order to elongate the mobilized segment in the form of a gastric tube. The dissection through the mediastinum is made in a completely blind manner, as in blunt esophagectomy. Following total replacement of the esophagus and the gastric flap into the neck, total esophagectomy is done and pharyngo-gastrostomy is accomplished. This technique also obviates the need for an anastomosis in the mediastinum, which may be disastrous in anastomotic failure.

The major drawbacks with the gastric pull-up method are postoperative respiratory problems, cardiac arrhythmia, loss of weight, and serious regurgitation (16). It cannot be applied to the patients who had a previous stomach operation. The most important late complication is regurgitation, which occurs in all patients when lying on their backs. Also, we observed perioperative cardiac arrhythmia in almost all of our patients. Six patients (3%) developed pneumonia. These cardiac and pulmonary disorders are thought to develop because of the pressure of the gastric tissue placed in the posterior mediastinum. Weight loss to some extent was again a consistent finding in all patients due to the loss of gastric reservoir. The patients were warned about the possibility of regurgitation, and they were encouraged to take regular meals and not to lie on their backs for 2-3 hours after oral intake. Persistent symptoms were treated by antacids and/or sucralfate. The lack of stricture complication is probably due to the fact that anastomosis was made to the base of the mouth and not to the esophagus.

According to our preliminary results, gastric pull-up reconstruction appears to be a safe and efficient method in the reconstruction of laryngeal, hypopharyngeal and cervical esophageal carcinomas after radical resections. In our study, cardiac and pulmonary complications in the gastric pull-up group occurred frequently. Nevertheless, no serious complications directly related to the surgical technique were encountered. In this respect, we believe that gastric pull-up reconstruction should be considered as one of the leading methods of choice in such cases. For patients who have cardiac and/or pulmonary reserve at limit values, other methods of reconstruction, such as free flap jejunum, should be considered.

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