

## Modified pharyngogastrostomy by a stapler technique

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### Abstract

Pharyngolaryngoesophagectomy is the gold standard treatment for the majority of larynx, pharynx and cervical esophagus advanced tumours. Reconstruction of these pharyngoesophageal defects is complex, and implicates additional time, morbidity and mortality to the procedure. Gastric pull up and pharyngogastrostomy with hand sewing technique is the commonest way of doing it. The authors describe a modified technique to execute it using a stapler device.

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### Introduction

Pharyngolaryngoesophagectomy is the gold standard treatment for the majority of larynx, pharynx and cervical esophagus advanced tumours. There have been important decreases in surgical morbidity and mortality for these extensive surgeries in the last decades, but reconstruction of pharyngoesophageal defects are complex, and implicate additional time, morbidity and mortality to the procedure. Gastric pull up and pharyngogastrostomy is the usual type of restoration after laryngopharyngectomy with total esophagectomy, and hand sewing is the commonest way of performing this anastomosis. The authors describe a modified technique to execute it using a stapler device.

### Surgical technique

After surgical removal of larynx, pharynx and esophagus, the stomach is prepared to ascend and recreate the digestive conduit. The gastric tube is prepared in standard gastroplasty, with the ligation of the left gastric artery, left gastroepiploic artery, and short splenic vessels. It is important to spare the right gastroepiploic artery and the vascular supply along the greater curvature. After stretching the stomach as far as

possible, the organ is divided parallel and about 3 cm from the great curvature line, with the use of a linear stapler. The seromuscular layer is closed with continuous suture until it is approximately 4 cm to the end, where will be carried out the pharyngogastrostomy. The gastric tube is mobilized for placement in the neck through a retrosternal or a posterior mediastinal route (Fig. 1). Subsequently, the distal extremity of the stomach is opened, a purse string suture is accomplished (manual or with a purse string instrument). It is essential to use a large circular stapler device to avoid anastomosis stricture, once the lumen is wide. We recommend as a minimum a 29 mm circumference. After the anvil placement at the stomach, the purse string suture is tied.

The pharynx is then prepared. The mucosa/submucosa layers are slightly separated from muscular by sharp dissection. Then the anterior and posterior walls are approximated, initiating at the laterals, with separated suture, until approximately 2 cm from meeting at the middle (Fig. 2), and a purse string suture is made. At this point a disposable circular stapler (29 mm or more) is introduced transorally down into the operative field. The trocar tip of the main instrument is advanced through the opening in the middle, and the purse string suture is tied. The anvil is inserted into the main instrument (Fig. 3), the ends are brought together and the stapler device is fired. Then the abundant pharynx musculature is approximated to cover the suture and

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Figure 1. The gastric tube prepared in standard gastroplasty.

anastomosis. The end-to-end anastomosis is completed (Fig. 4).

### Results

In this initial experience we have used this technique in five patients with comparable results to the usual one. The mean operative time was reduced about 60 min and no additional complication was observed, including no anastomotic leakage or stenosis. Fluoroscopy study at the 10th day after operation, as performed in all our cases, showed a smooth course of contrast with swallowing, and resumed diet after. In the post-operative course the immediate results showed adequate swallowing function and good nutritional recovery. Long term results, such as swallowing function, stenosis incidence or food intake, showed no differences put side by side to the habitual technique. The patients were accompanied for a median time of 12 months. The supplementary cost due to the need of the instrument



Figure 2. The anterior and posterior walls are approximated, initiating at the laterals, with separated suture, until approximately 2 cm from meeting at the middle, and a purse string suture is made.



Figure 3. The disposable circular stapler is introduced transorally down into the operative field. The trocar tip of the main instrument is advanced through the opening in the middle, and the purse string suture is tied. The anvil is inserted into the main instrument, the ends are brought together.



Figure 4. The pharynx musculature is approximated to cover the suture and anastomosis. The end-to-end anastomosis is completed.

(stapler) was compensated by less operative and anesthetic time.

## Discussion

Patients with tumours from the larynx, pharynx and cervical esophagus are in the majority short living, mainly due to tumour aggressiveness which are associated with elevated treatment complications and risks. Many attempts have been made toward a conservative management, but the surgical resection is still the gold standard. Reconstruction after pharyngolaryngoesophagectomy is a complex procedure that requires specific skills and experience, with additional time and morbidity.

There are two more frequently utilized techniques for doing it. Microsurgical intestinal free flap and gastric ‘pull up’ (whole stomach or gastric tube). The intestinal free flap is a good alternative when there is a specialized team and only the cervical esophagus is removed.<sup>3</sup> We rather to use the stomach since it gives an earlier recover of oral feeding, less leakages or flaps losses. There are though no differences in the number of overall complications.<sup>3</sup>

Among gastric conduits we have a preference to make a gastric tube instead of using the whole stomach. We consider that the gastric tube can reach the tongue base without tension with no significant damage in the vascular supply, avoiding leakages and consequently cervical or mediastinal sepsis. The route to ascend the gastric tube can be the retrosternal or posterior mediastine. We prefer the last one as it permits less leakage occurrence.

Pharyngogastrostomy is a critical point after these extensive surgeries. When resection of larynx, pharynx and total esophagus are made accompanied by cervical node dissections, in patients plenty of comorbidities and desnourishment, the anastomosis results can be more than a technical challenge, but of life importance.

Automatic stapling devices have become popular. The stapling technique employed in colorectal and gastric surgery has reduced operative time and even leakage incidence.<sup>1,2</sup> It has allowed more anus preservation in low rectal surgery and in some especial situations even larynx preservation in cervical esophageal tumours.<sup>4</sup> However, reports on the application of instrumental anastomosis for reconstruction of the digestive conduit after pharyngolaryngoesophagectomy are few.<sup>4,5</sup>

Usually, the anastomosis is performed by hand sewn suture, with two rolls of separated points, along the whole circumference of the anastomosis, which demands a careful and time-consuming technique.

In our method, the anastomosis between the remnant pharynx mucosa and gastric tube is easily performed in the neck, with reduced reconstructive time (60 min less) and no additional morbidity. No complications were observed in respect to the reconstructive technique, which includes no anastomotic leakage or stenosis, in this initial experience. We have used in every case a 29 mm stapler device once in our experience in esophagojejunostomy, after total gastrectomy, we have noted a few cases of stenosis occurrence, which demanded endoscopic dilatation, in addition that the gastric tube is not a limitation to use larger instruments. The immediate results showed early recover of oral feeding, good quality swallowing function and satisfactory nutritional recovery. These results indicate that this new technique is as safer as the manual, with no additional complications or mortality, faster, easy to perform and to teach.

The main reasons that may bring this alternative technique a role in these difficult reconstructions, as has happen in other complex situations as in low rectum tumour restoration, esophagojejunostomies, and even in the cervical esophagogastronomies, are that they proved to be secure, faster, with homogeneous results, less dependents to the

surgeons experiences, and that they can be done easily with comparable early and late results, with no extra complications.

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