

# ENDOSCOPIC STAPLING OF A PHARYNGEAL POUCH

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Pharyngeal pouch or Zenker's diverticulum presents to the otolaryngologist with symptoms of dysphagia. The condition is more frequently seen in Northern Europe, especially in the United Kingdom, than elsewhere in the world. Surgical management is the procedure of choice and is directed at the cricopharyngeus muscle by either an external or an internal approach. The endoscopic division of the pharyngeal pouch wall with a mechanical stapling device has become increasingly popular. Compared to open excision, the endoscopic technique offers reduced operative time, fewer complications, early resumption of oral intake with no nasogastric tube, and a short inpatient stay. We report a series of 18 patients seen in the ENT department at the Royal Lancaster Infirmary from July 1999 to the present date. It is noted that the aetiology and natural history of the condition remains poorly understood.

## INTRODUCTION

A pharyngeal pouch is believed to arise as a result of cricopharyngeus muscle (the upper oesophageal sphincter muscle) dysfunction. A functional increase in the muscle tone and the resulting increase in the intraluminal pressure in the pharynx forces the mucosal lining through Killians dehiscence (dehiscence of the muscles of the inferior constrictor) in the posterior wall of the hypopharynx. The clinical presentation may vary in severity. It is often seen in elderly patients who develop progressive dysphagia, regurgitation of food, coughing and throat discomfort.

Treatment for the symptomatic pharyngeal pouch is surgical. It is aimed at dividing the cricopharyngeal muscle (part of the inferior constrictor) and obliterating the pharyngeal wall defect by resection, inversion, or division of the pouch wall<sup>(1-2)</sup>. The surgical options can be divided into two main groups: the open external approach, and the endoscopic. The former includes a cricopharyngeal muscle myotomy with pouch excision via a lateral neck incision. This is accomplished by dissection and removal of the pouch and division of the cricopharyngeus muscle fibres under direct vision. This inevitably causes a defect in the integrity of the pharynx which must be closed, a task which is difficult to achieve in the very confined space between the laryngeal skeleton anteriorly and the vertebral column posteriorly. Post-operatively it is essential to place a drain for the external wound to avoid haematoma formation and a nasogastric tube to protect the suture line internally, preventing leak, infection or fistula formation.

Reported complication rates using the external technique are 29 to 38%<sup>2</sup>. These complications include pharyngeal fistula, surgical emphysema, and recurrent laryngeal nerve palsy<sup>(3,4)</sup>, all of which are avoided by the endoscopic stapling technique.

In recent years the endoscopic stapling method has largely replaced open excision as the treatment of choice<sup>(2)</sup>. The endoscopic approach was first described by Mosher in 1917 and was popularized by Dohlman<sup>(3)</sup>. The present-day endoscopic technique is carried out through a specially designed double-bladed distending pharyngoscope (Weerda). The cricopharyngeal muscle is isolated in the lumen of the pharynx between the two blades of the speculum. Electrocautery and laser have been used in the past to divide the muscle but modern stapling devices have replaced these older techniques<sup>(1)</sup>. With this procedure the general anaesthetic is shorter, the inpatient stay is decreased and the risk of infection and mediastinitis is reduced<sup>(2)</sup>. The main complication of the endoscopic technique arises from difficulty in introducing the speculum; indeed this may make this technique impossible in certain subjects. Damage to the dentition may occur due to trauma from the speculum.

Recently published literature highlights the advantages of endoscopic stapling of pharyngeal pouch<sup>(1-2)</sup>. The follow-up period is consistently short and below 12 months in most reports. Longterm assessment of this treatment modality has still to be published<sup>(4)</sup>. The external approach should not be considered completely superseded, however; a place may still be found for it in the rare eventuality of finding an early carcinoma within a pouch<sup>(5)</sup> or in the occasional patient with access severely restricted by circumstances in the mouth.

## DIAGNOSIS

Diagnosis is by barium swallow. It is important to define the size of the pouch as this will affect the treatment (see below). Many pouches are quite large at the time of diagnosis and yet the history of dysphagia is short. A small pouch may cause greater dysphagia than a large pouch. This suggests that dysfunction of the cricopharyngeal sphincter due to cerebrovascular disease and bulbar ischaemia may be important in the onset of symptoms in some cases and may be as important as the presence of the pouch itself. In such cases division of the cricopharyngeus may provide only partial relief of symptoms.

## PRESENT SERIES

Data on all patients who were treated for a pharyngeal pouch from July 1999 were collected retrospectively. The information collected included preoperative symptoms, operative details and postoperative management. Twelve patients had endoscopic stapling. This was performed under general anaesthesia with endotracheal intubation. Weerda's distending diverticuloscope (Figure 1) was introduced to display the dividing septum between the blades of the speculum.

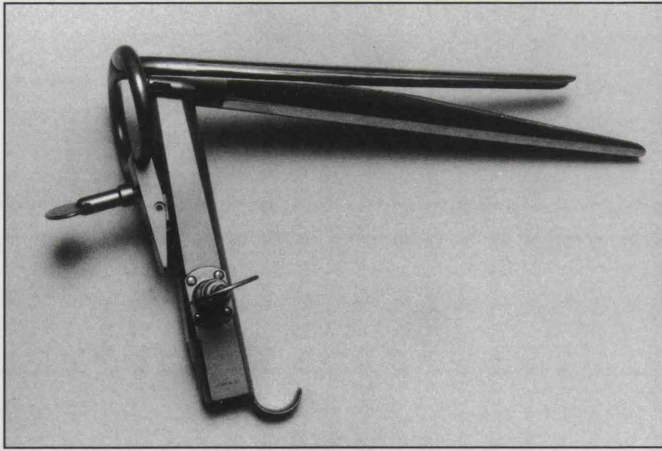


Figure 1 Weerda's distending diverticuloscope

The speculum is suspended with a laryngoscope holder to release both hands. An endoscopic stapling gun (Figure 2) is introduced and advanced till the common septum containing the cricopharyngeus muscle lies between the two jaws. The gun is then operated. This results in the division of the septum with simultaneous sealing of each of the two edges of the septum with a double row of staples. It may occasionally be necessary in a very large pouch to apply a second stapling. Neither a nasogastric tube nor prophylactic antibiotics is used routinely.



Figure 2 Endoscopic stapling gun

Post-operatively, patients are observed closely for any rise in pulse or temperature, and for the presence of chest pain or surgical emphysema. Oral fluids are allowed within six hours, building up to a soft diet by the first post-operative day. Patients are usually discharged on the second post-operative day and are advised to stay on a soft diet for a week.

## RESULTS

Eleven male and seven female patients with pharyngeal pouch were seen. The age distribution is shown in the table below.

50 to 60 yrs	2
61 to 70 yrs	5
71 to 80 yrs	7
81 to 90 yrs	4

Table Age of patients

Symptoms in order of frequency were dysphagia (14), regurgitation (7) and sensation of food sticking in the throat (7). Other symptoms included weight loss (4), overspill (3), cough (3) and choking feeling (2). Three patients had

symptoms for less than a year and four patients for about two years. The majority of patients (11/18) had longstanding complaints (>2 years) and had progressively worsening symptoms.

The barium swallow (Figures 3 and 4) showed a small pouch in five patients, a moderately-sized pouch in eight, and five had a large pouch. In addition four patients had a hiatus hernia and five patients had reflux.

In total, 12 patients underwent a stapling procedure. The septum was stapled once in all but two of the patients, when it was used twice. None had a nasogastric tube postoperatively and all commenced a liquid diet six hours postoperatively. All the patients had semi-solid food 24 hours after surgery and pain control was achieved with paracetamol. Problems were encountered in only two patients – one patient suffered a broken tooth and one had a secondary haemorrhage 48 hours postoperatively which settled spontaneously. Follow-up was between six months to two years. Eight patients said that their swallowing was completely normal at follow-up and four patients thought that they were much better but not perfect. None of the patients thought that their swallowing was worse.

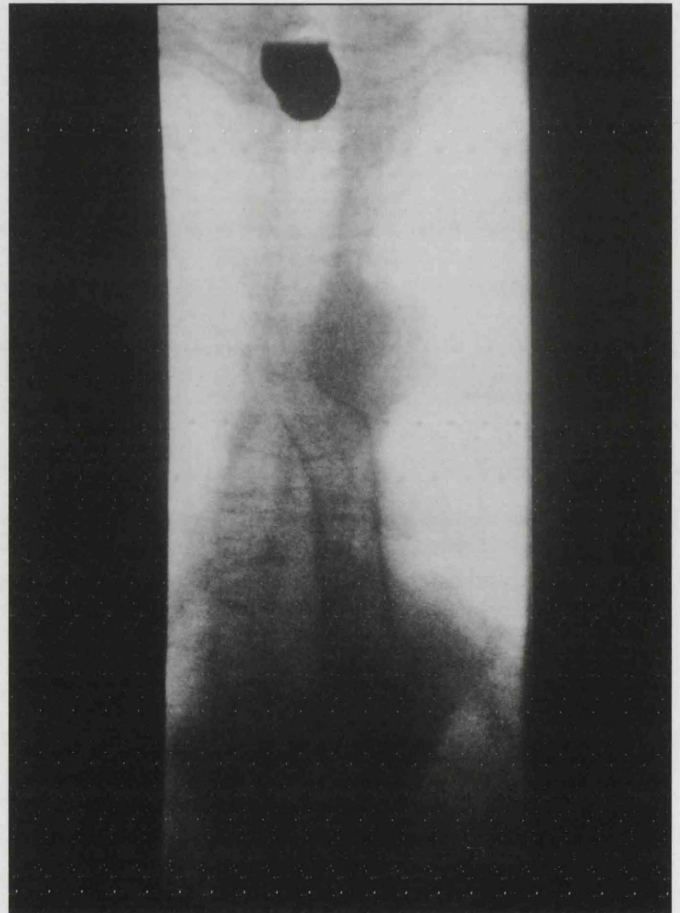


Figure 3 Barium swallow: anteroposterior view showing a fluid level in the pharyngeal pouch after the barium in the esophagus has cleared

## LITERATURE REVIEW

The first description of a pharyngeal pouch was in 1769, by Ludlow<sup>(5)</sup>, who discovered an abnormal dilatation of the posterior pharyngeal wall on postmortem in a patient who had complained of dysphagia during life. In 1877, Zenker and von Zeimssen<sup>(6)</sup> reviewed five cases of their own and clarified the then uncertain nature of a disease defined by Ludlow as a 'preternatural dilatation of a bag formed in the pharynx'.

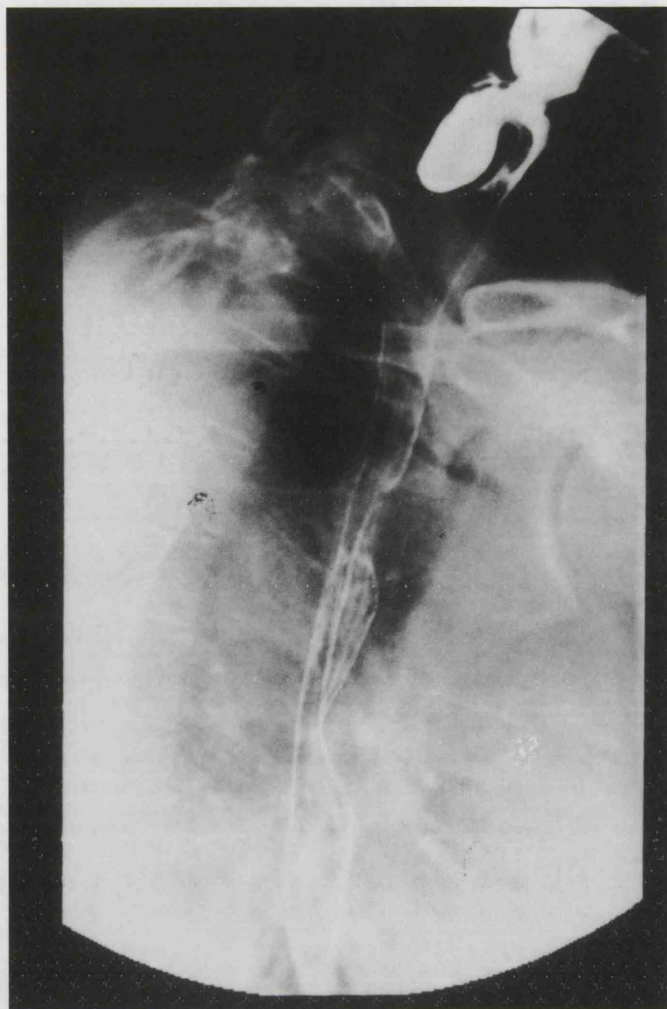


Figure 4 Barium swallow: lateral view outlining a large pharyngeal pouch

More than 200 years after Ludlow's description of pharyngoesophageal diverticula, the pathophysiology is still not clearly understood. In 1926, Jackson and Shallow first postulated that obstruction at the cricopharyngeus level elevates hypopharyngeal pressure, promoting herniation through Killian's triangle<sup>(6)</sup>. Cricopharyngeal achalasia, delayed cricopharyngeal relaxation, and functional cricopharyngeal obstruction resulting from bulbar ischaemia have been postulated as underlying diverticulum formation<sup>(3)</sup>. Manometric studies demonstrate failure of relaxation and premature contraction of the cricopharyngeus during the complex swallowing reflex. These results support the concept of a cricopharyngeal myotomy as a fundamental component in the treatment of pharyngeal pouch.

Progressive dysphagia with regurgitation of undigested food and weight loss are by far the most common symptoms. Nocturnal cough, constant clearing of the throat, a gurgling noise on swallowing and hoarseness of the voice are slightly less common. A large diverticulum is prone to retain food. Overflow can occur with intermittent reflux into the pharynx. At presentation, most patients have been symptomatic for about two years, but in others the history may be relatively acute, perhaps as brief as a month. Longstanding cases have often adapted their diet to cope with their progressive dysphagia. Some patients present with foreign body sensations giving rise to a suspicion of globus pharyngeus. Hunt described the frequent coincidence of gastro-oesophageal reflux disease with pharyngeal pouch. This was confirmed in our study where 5/18 patients had reflux and 4/18 had a hiatus hernia. Hunt thought that reflux of material with a low pH can lead to dyskinesia of the upper esophageal sphincter with consequent elevation of the muscle tone,

giving rise to the development of a pouch<sup>(7)</sup>. A number of cases are diagnosed incidentally in the course of routine flexible gastro-oesophagoscopy.

Classification is done by size as demonstrated by contrast radiology. One such system published by Lahey<sup>(5)</sup> describes three stages:

- stage 1 consists of a small posterior mucosal protrusions (the initial stage)
- stage 2 is a definite sac with the oesophagus and pharynx in one line (the intermediate stage)
- stage 3 is a large sac with the hypopharynx in line with the neck of the diverticulum and the oesophageal inlet raised high up on the anterior wall of the pouch.

More practical systems have been described which are easier to use. The system recommended by Morton and Bartley<sup>(8)</sup> describes small pouches as less than 2 cm, medium pouches as 2 to 4 cm, and large pouches as more than 4 cm. Another method used by van Overbeek and Groote<sup>(5)</sup> uses cervical vertebra bodies as a standard size, describing the pouch as small if it is equal to or less than one vertebra in size: large pouches are more than three vertebrae in size.

The only treatment available for a pharyngeal pouch is surgery<sup>(9)</sup>. Many different techniques have been described. The external approach involves approaching the cricopharyngeal muscle through the neck, identifying the pouch, and performing a cricopharyngeal myotomy. The pouch itself can be inverted<sup>(8)</sup>, excised or suspended dorsally<sup>(5)</sup>. In the case of a small or medium pouch a myotomy alone may be performed.

The endoscopic method entails a diverticulotomy and an internal cricopharyngeal myotomy, and can only be done on a large pouch, a factor which limits its application. Modifications of this method include the use of carbon dioxide and KTP lasers<sup>(10)</sup>. Present-day endoscopes and linear cutting/stapling devices have become very popular<sup>(9)</sup>. In a recent series of publications covering aspects of patient satisfaction and periods of inpatient stay, the authors concluded that endoscopic stapling should become the method of choice for the treatment of all large pharyngeal pouches<sup>(4,5,10)</sup>.

## DISCUSSION

The stapling technique we describe above has all the advantages of the traditional Dohlman's procedure (absence of external scar, shorter operating time, no postoperative pain, no nasogastric tube, early resumption of oral intake, shorter hospital stay and reduced risk of complications). Comparing stapling with electrocautery and laser diverticulotomy, the additional advantages are:

- as the divided edges are sealed with staples the risk of fistula formation or mediastinitis is reduced
- the risk of bleeding from the cut edges is reduced
- there is no risk of thermal injury to the recurrent laryngeal nerve.

There is no absolute contraindication to endoscopic stapling diverticulotomy provided that there is no anatomical restriction to passing the rigid pharyngoscope and the patient is able to tolerate a short anaesthesia of 10 to 20 minutes.

However, a small pouch is not suitable for this technique and in these cases it will be necessary to do either an external myotomy or a simple endoscopic dilatation. The presence of a carcinoma within the pouch will affect the treatment options profoundly and is a diagnosis which must always be carefully considered and excluded before the stapling method is adopted. Jaramillo et al<sup>(2)</sup> had five cases in their series where they failed to staple the pouch. Reasons given included prominent teeth, short mandible and in one patient an arthritic, stiffened cervical spine. In all our patients who had stapling diverticulotomy (12/18), the patients were satisfied with the postoperative swallow and were asymptomatic on follow-up. The external approach has by no means been superseded and remains a good alternative in certain circumstances.

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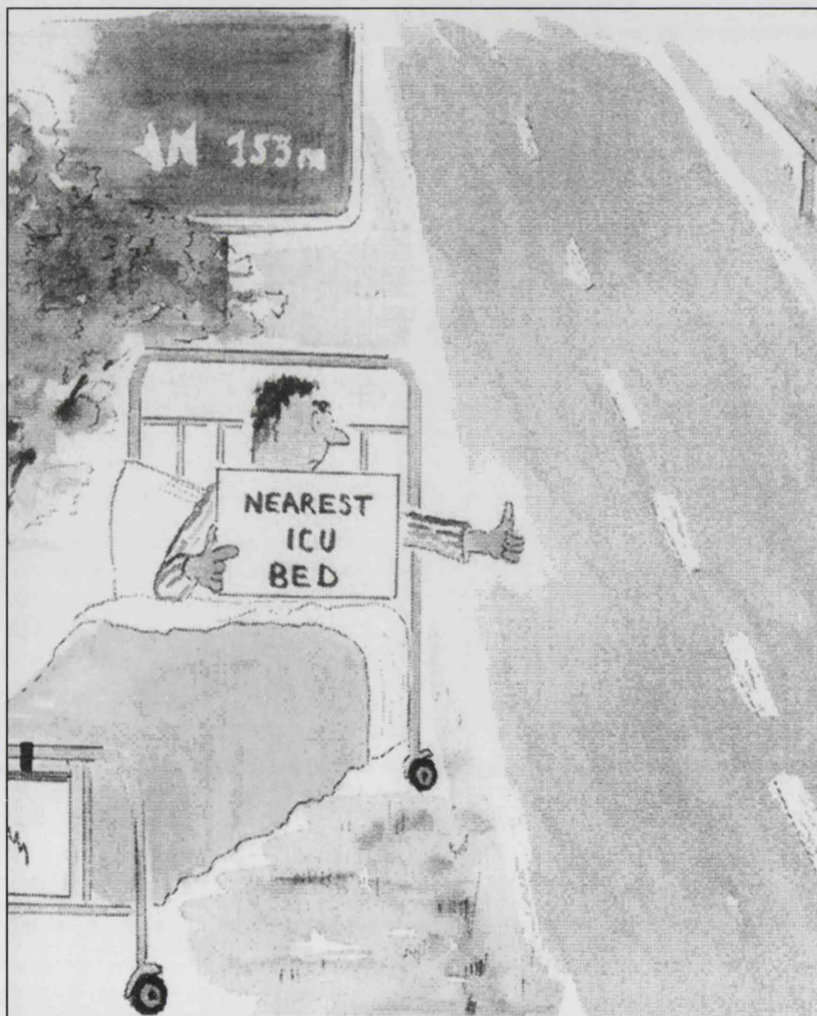
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*D Allan*