Endoscopic stapling of pharyngeal pouches in patients from the Yorkshire region

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Abstract

The treatment of pharyngeal pouches by endoscopic stapling diverticulotomy has gained popularity over the last few years. We assessed the results of this technique in 44 patients by means of a clinical questionnaire and by reviewing case records. Thirty-six (82 per cent) patients commenced oral intake within 18 hours of the procedure and 37 (84 per cent) patients were discharged within 48 hours. Five patients had complications that included throat discomfort, a loose incisor tooth, shoulder pain, pharyngeal perforation and one mortality due to mediastinitis. Of the 37 patients that completed the questionnaire, nine (24 per cent) had some residual symptoms although only two (five per cent) felt that there had been no improvement at all following the stapling procedure. Thirty-five (95 per cent) of the patients stated that they would undergo the procedure again. It appears that pharyngeal pouches can be successfully treated by endoscopic stapling, with patients commencing oral intake within a few hours of surgery and having a short hospital stay. However, as there can be serious complications, we recommend that the procedure be performed by an experienced surgeon.

Key words: Zenker's Diverticulum; Surgery, Endoscopic

Introduction

Pharyngeal pouch surgery has long been associated with complications that include potentially fatal mediastinitis. Patient morbidity is significant, partly due to the surgery itself, but also due to the fact that the majority of these patients are often elderly and frequently have general medical problems. The treatment of pharyngeal pouches is surgical and the approach may be external or endoscopic.

Mosher\(^1\) is widely credited with the first endoscopic treatment of pharyngeal pouches in which he used scissors to divide the hypopharyngeal bar of tissue which separates the pouch from the upper oesophagus. Unfortunately his seventh case died from mediastinitis and he stopped performing the procedure. Endoscopic treatment was popularized again by Dohlman in 1960 who reported good results in 100 cases. He also introduced a double-lipped hypopharyngoscope which enabled clear visualization of the common septum between the pouch and upper oesophagus which he divided using a diathermy knife.\(^2\) Modifications of Dohlman's procedure include utilization of an operating microscope and a carbon dioxide or KTP laser.\(^3,4\)

Endoscopic stapling diverticulotomy using a linear transecting and stapling device was introduced in 1992 by Newbegin in the UK\(^5\) and Collard in Belgium.\(^6\) It was proposed that the relative simplicity of this technique along with the short anaesthetic time and hospital stay made it an ideal way of treating frail, elderly patients with a pharyngeal pouch. The technique has rapidly gained popularity and endoscopic stapling diverticulotomy is now becoming the favoured method of treating pharyngeal pouches.\(^7\) However, there are few reports of outcomes and below we report the results of this procedure from various centres in Yorkshire.

Materials and methods

All consultant otolaryngologists in the Yorkshire region were asked to provide details of any patients with pharyngeal pouches that they had treated by endoscopic stapling since 1992. The case notes of 44 patients were reviewed with particular attention given to length of hospital stay, post-operative complications and the time before the first post-operative fluid or food intake.

A clinical questionnaire was sent to 37 patients (seven patients out of the 44 had died by the time of this study). The questionnaire included general and specific questions concerning problems following pharyngeal pouch stapling as well as ascertaining if there were any residual symptoms.
TABLE I

<table>
<thead>
<tr>
<th>Age</th>
<th>Sex</th>
<th>Complication</th>
<th>Time to post-op fluids</th>
<th>Length of hospital stay (days)</th>
<th>Outcome</th>
</tr>
</thead>
<tbody>
<tr>
<td>78</td>
<td>F</td>
<td>Heartburn, dysphagia</td>
<td>7 days</td>
<td>13</td>
<td>Resolved after 10 days</td>
</tr>
<tr>
<td>61</td>
<td>F</td>
<td>Pharyngeal perforation</td>
<td>5 days</td>
<td>6</td>
<td>Healed with conservative treatment</td>
</tr>
<tr>
<td>61</td>
<td>M</td>
<td>Loose upper incisor</td>
<td>4 hours</td>
<td>1</td>
<td>Treated by own dentist</td>
</tr>
<tr>
<td>81</td>
<td>F</td>
<td>Throat discomfort</td>
<td>1 day</td>
<td>2</td>
<td>Settled over 24 hours</td>
</tr>
<tr>
<td>60</td>
<td>M</td>
<td>Mediastinitis</td>
<td>See text for details</td>
<td>See text for details</td>
<td>Death</td>
</tr>
<tr>
<td>67</td>
<td>F</td>
<td>Musculoskeletal back pain</td>
<td>1 day</td>
<td>4</td>
<td>Settled within 4 days</td>
</tr>
<tr>
<td>75</td>
<td>F</td>
<td>Musculoskeletal back pain</td>
<td>6 days</td>
<td>7</td>
<td>Treated as perforation; normal contrast swallow at 5 days</td>
</tr>
<tr>
<td>91</td>
<td>M</td>
<td>Urinary retention, catheterization ( \Rightarrow ) infection</td>
<td>12 hours</td>
<td>3</td>
<td>Treated with antibiotics</td>
</tr>
<tr>
<td>76</td>
<td>F</td>
<td>Shoulder pain, ? cervical spine irritation</td>
<td>1 day</td>
<td>2</td>
<td>Settled after 24 hours</td>
</tr>
<tr>
<td>81</td>
<td>M</td>
<td>Angina</td>
<td>1 day</td>
<td>5</td>
<td>Previous history of ischaemic heart disease</td>
</tr>
</tbody>
</table>

Results

There were 20 females with a mean age at the time of stapling of 83 years (range 61–91 years) and 24 males with a mean age of 74 years (range 46–99 years). The mean time of follow-up was 19 months (range two to 43 months).

All of the procedures were performed by a consultant ENT surgeon or a higher surgical trainee under direct supervision. Ten patients had complications following surgery although only five of these were specifically attributable to the surgery itself. These included heartburn, pharyngeal perforation, a loose tooth, throat discomfort and mediastinitis. The remaining five complications would have occurred regardless of the type of procedure used to treat the pouch. Details of the complications are listed in Table I.

There was one death in a 60-year-old male who underwent an uneventful stapling with such a good initial recovery that he was discharged the following morning eating and drinking. However, after 48 hours he returned to the hospital with clinical evidence of a pharyngeal perforation. Pharyngoscopy revealed a large pharyngeal perforation which was repaired with a pectoralis major flap. Unfortunately his condition deteriorated and he died of mediastinitis despite maximum medical support.

The time that elapsed between the procedure and the first intake of ‘free fluids’ or ‘soft diet’ was clearly documented in the nursing notes and was: less than six hours in 23/44 (52 per cent), six to 12 hours in three out of 44 (seven per cent), 12–18 hours in 12/44 (27 per cent) and >24 hours in six out of 44 (14 per cent). Of the 12 cases that were kept nil by mouth for >12 hours, 10 were according to instructions given by the surgeon, one had some throat discomfort and one patient had shoulder pain overnight. The reasons for keeping the six patients nil by mouth for > one day included: two with musculoskeletal back pain (both had a negative gastrografin swallow), one with shoulder pain, one with angina, one with heartburn and dysphagia and one with pouch perforation which resolved with conservative treatment after five days.

The length of hospital stay varied: one patient (2.3 per cent) was operated on as a day case, 30/44 (68 per cent) stayed for one night, seven out of 44 (16 per cent) stayed for two days and six out of 44 (14 per cent) stayed for > two days. It was also evident that those surgeons who had a practice of keeping the patient nil by mouth overnight following stapling had changed their practice over the last one to two years and were allowing free fluids once the patient had recovered from anaesthesia.

TABLE II

<table>
<thead>
<tr>
<th>Question</th>
<th>No. of patients (Total = 37)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have you had any problems since the stapling of your pharyngeal pouch?</td>
<td>5 ‘yes’</td>
</tr>
<tr>
<td>Do you have any problems swallowing?</td>
<td>4 occasionally to solids</td>
</tr>
<tr>
<td>Do you have problems with regurgitation of food or fluids?</td>
<td>2 regularly (1 on a liquidized diet)</td>
</tr>
<tr>
<td>Do you eat slower than normal?</td>
<td>6 occasionally</td>
</tr>
<tr>
<td>Have you lost any weight since the operation?</td>
<td>3 regularly to solids</td>
</tr>
<tr>
<td>7 ‘yes’</td>
<td>8 gained weight</td>
</tr>
<tr>
<td>Do you have any gurgling noises in the neck?</td>
<td>29 no change</td>
</tr>
<tr>
<td>Do you cough or choke whilst eating or drinking?</td>
<td>1</td>
</tr>
<tr>
<td>Do you have excess mucous in the back of your throat?</td>
<td>2 occasionally</td>
</tr>
<tr>
<td>Are you pleased overall with the operation?</td>
<td>1</td>
</tr>
<tr>
<td>With hindsight, would you undergo the operation again?</td>
<td>35 ‘yes’/2 ‘no’</td>
</tr>
<tr>
<td>Would you recommend it to other patients?</td>
<td>35 ‘yes’/2 ‘no’</td>
</tr>
</tbody>
</table>
Results of the questionnaire are shown in Table II. Nine patients in total had some residual symptoms. Of the patients that still complained of occasional symptoms all but one felt that their dysphagia and regurgitation had improved following stapling. Of the seven patients that ate slowly, five felt that this was due to habit rather than necessity.

There was a recurrence of symptoms in four (nine per cent) of the patients within six months. Three of the patients underwent further stapling and two of these remain symptom free at follow-up periods of 12 and 24 months respectively. However, one patient remains symptomatic and is considering a third stapling procedure. The fourth patient is awaiting further stapling.

Discussion

Ludlow\(^8\) first described a pharyngeal pouch in 1769 but it was not until 1877 that Friedrich Albert Zenker\(^9\) described the disease in detail. Pharyngeal pouches (‘Zenker’s diverticula’) are herniations of pharyngeal mucosa through Killian’s dehiscence, an area of weakness between the oblique and horizontal fibres of the inferior constrictor muscle. The pathogenesis of pharyngeal pouches remains unclear although most surgeons agree that the cricopharyngeal sphincter plays an important role in the formation of these pulsion diverticula. It has been suggested that a combination of a large area of Killian’s dehiscence, oesophageal muscular incoordination and an increased cricopharyngeal tone all play a part in the formation of pharyngeal pouches.\(^3,10\)

Typical symptoms include dysphagia, regurgitation, borborygmi, mucus in the throat and foetor ex ore.\(^11\) As the size of the pouch increases there may be overspill of pouch contents leading to aspiration pneumonia and significant dysphagia leading to malnutrition and weight loss. Pharyngeal pouches are readily diagnosed on barium swallow. It is essential to perform a thorough examination of the lower oesophagus and stomach to exclude any distal obstruction in patients with a pharyngeal pouch, especially in young patients. This point is well illustrated by a 40-year-old patient who complained of dysphagia and was found to have a pharyngeal pouch at endoscopy that was excised. However he remained symptomatic and was subsequently found to have a lower oesophageal carcinoma (anonymous, personal communication). Presumably, the lower oesophageal obstruction had resulted in high pressures being exerted on Killian’s dehiscence with a pulsion diverticulum developing.

The majority of pouches protrude to the left and this has been suggested to have a relation to the handedness of the patient\(^12\) although we feel that it is probably due to the fact that the oesophagus lies slightly to the left of the midline. It is for this reason that in external pharyngeal pouch surgery surgeons have traditionally stated that the approach should be from the left side. However in our practice we use a right-sided incision. This is because we have always found the pouch to be easily identifiable as it originates in the midline posteriorly and also it minimizes the risk of damage to the thoracic duct. In addition there is a theoretical risk of a cerebrovascular accident due to possible dislodgement of atheromatous plaques during retraction on the carotid vessels. Therefore as the majority of people are right hand dominant it would seem to be sensible to retract on the right carotid vessels as a right-sided cerebral infarct would lead to less disability.

The principle of endoscopic treatment of pharyngeal pouches is to divide the septum that separates the pouch from the upper oesophagus thereby restoring continuity between the pouch and oesophagus. Division of the muscular septum results in a cricopharyngeal myotomy which is an essential part of the treatment of pharyngeal pouches. Until recently surgeons had utilized either a laser or diathermy to divide the muscular septum but these procedures carry a risk of perforation as it can be difficult to judge how much of the septum to divide. Using a stapling technique has several theoretical advantages over the use of diathermy or laser, including reduced risk of fistula formation or mediastinitis as the divided edges are sealed by the staples, there is less bleeding from the edges, less risk of thermal damage to the recurrent laryngeal nerve, reduced operating time, reduced length of hospital stay, reduced post-operative discomfort, better cost effectiveness and straightforward revision surgery.\(^13\)

There is occasionally technical difficulty in cases where the pouch is too small to admit the stapling device and these patients may require external cricopharyngeal myotomy. There were three such cases which we excluded from this study. All three underwent subsequent cricopharyngeal myotomy with good results. We routinely obtain consent from such patients pre-operatively for possible cricopharyngeal myotomy in case we find that the pouch is too small for endoscopic stapling at the time of surgery. Patients with cervical spine problems or temporomandibular joint problems may also not be suitable for endoscopic pouch surgery as it may be impossible to position the endoscope correctly.

External surgery essentially involves approaching the cricopharyngeus muscle via a lateral cervical approach, identifying the pouch and performing a cricopharyngeal myotomy. The pouch may then be inverted,\(^14\) mobilized and suspended\(^15\) or excised and closed by a traditional suturing technique or a stapling device.\(^16\) In a survey on the surgery of pharyngeal pouches it was shown that the external approach is favoured by general surgeons whereas the majority of otolaryngologists prefer the endoscopic approach and this is thought to be due to the fact that otolaryngologists are more familiar with the use of rigid oesophagogoscopes.\(^7\)

Although there have been many reports of series of pharyngeal pouch surgery the majority are of small numbers and are retrospective. Most series report goods results with both the external and endoscopic methods but with lower complication rates using endoscopy. As can be seen from our results patients can expect a short hospital stay and
can expect to commence oral intake of fluids or food only a few hours after the procedure. Although one of our patients was operated on as a day case, this is unusual as the majority of these patients are elderly and frequently have medical or social problems thereby making them unsuitable for day case surgery. There have been excellent results reported from large series done at single units such as that carried out by Wouters & Overbeek who reported a five per cent complication rate in 507 patients treated endoscopically using diathermy or laser with a 99 per cent patient satisfaction rate. They also noted that eight patients developed a stenosis using the diathermy but none of the laser group had a post-operative stenosis. In a series of 51 patients treated by endoscopic stapling, Baldwin and Toma reported only one complication of pouch perforation which responded to conservative treatment. They also noted that 84 per cent of their patients were discharged within 24 hours. Bates and Koay found no complications in a series of 14 patients with complete resolution of symptoms in 12 patients. Eleven of their patients commenced oral intake within six hours and were discharged within two days. Scher and Richtsmeier reported good results in 34 patients who underwent endoscopic stapling with an average hospital stay of 1.3 days, resumption of oral fluid intake within 24 hours in 32 cases and improvement in symptoms in 32 (89 per cent) of cases. There were five complications in their series which included two chipped teeth, one perforation, one transient vocal fold paralysis and one post-operative pyrexia.

On comparing external approach surgery with endoscopic stapling van Eden et al. found that the average post-operative stay was two days for the endoscopic group compared with four days for the external surgery group. They also reported a complication rate of five per cent in the group of patients treated by endoscopic stapling compared to a rate of 23 per cent in the group treated by external surgery. There is no doubt that the complication rate following external surgery is significant; Aggerholm and Illum reported a complication rate of 31 per cent in a series of 115 diverticulectomies that included wound infections, haematoma, fistula, mediastinitis, recurrent laryngeal nerve palsy, surgical emphysema, and cardiorespiratory problems. The recurrence rate varies considerably between 10–79 per cent for Dohlman’s procedure to between two to 33 per cent for excision and myotomy.

There are reports of higher recurrence rates with endoscopic treatment compared to external surgery although other authors have not found a significant difference between the two approaches.

In our series four out of 44 (nine per cent) had recurrence of symptoms although this may be an underestimate as seven patients are now deceased and three patients have been followed up for less than six months. As the majority of patients are elderly some will die within a few years of disease not related to the pharyngeal pouch surgery.

Therefore the argument postulated by some surgeons that there may be a higher rate of recurrence with endoscopic techniques is probably not significant. Dohlman and others have suggested that repeated endoscopic treatment of these patients is straightforward, and we agree with other authors that endoscopic stapling is an easily repeated procedure. In the three patients that underwent repeated stapling in our series there were no surgical nor anaesthetic complications. The need for repeat stapling is guided by the patient’s symptoms.

Another concern raised by some surgeons is that as endoscopic stapling does not excise the pouch there is still a theoretical risk of the development of carcinoma in the pouch. The incidence of carcinoma in pharyngeal pouches is low; in Wouters and Van Overbeeks series of 507 patients only two (0.4 per cent) had carcinoma. However, in a recent review of their series Bradley et al. found that out of 50 pharyngeal pouch excisions two had carcinoma in situ and two had evidence of invasive squamous cell carcinoma on histological examination, only one of these four cases had been diagnosed on prior endoscopy. At surgery we routinely examine the pouch mucosa thoroughly using a Hopkins’ rod and biopsy any suspicious areas. We feel that the risk of developing a carcinoma is due to stasis in the pouch and that with successful division of the septum then this factor is corrected. If there are symptoms that are highly suggestive of carcinoma such as pain or haematemesis then we would consider pouch excision. There is no doubt that external excision of pharyngeal pouches carries a significant morbidity and mortality in elderly patients. Endoscopic techniques are to be preferred in the majority of cases and use of a linear stapling and transecting device has distinct theoretical advantages over diathermy or laser. We have demonstrated that patients undergoing endoscopic stapling diverticulotomy can generally expect a short anaesthetic time, a short delay in commencing post-operative oral intake and a short hospital stay. Recurrence rates with this technique are acceptably low, especially given the ease with which repeated stapling can be performed.

However, we have shown that there still remains a significant morbidity with the treatment of pharyngeal pouches and the procedures are far from ‘routine surgery’. In the 1996/97 NCEPOD report on head and neck surgery the advisors were surprised by a mortality of one to two per cent, the majority of deaths following open surgery. The report concluded that subspecialization within otorhinolaryngology departments would seem appropriate and that endoscopic stapling is a quicker, less invasive and safe technique. It may be that our specific complication rate of five out of 44 cases (11 per cent) reflects the fact that multiple surgeons performed the operation with each surgeon only performing a few cases per year. Koay et al. found in their survey that more than 75 per cent of surgeons who operate on pharyngeal pouches do fewer than three cases per year. The excellent results reported from large series at specialist centres further strengthens the argument for pharyngeal...
pouch surgery to be performed at a few specialist centres. It is also essential for surgeons to be thoroughly familiar with rigid endoscopy techniques when treating these patients as we feel that endoscopic stapling diverticulotomy is the preferred method of treating pharyngeal pouches.

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References
1 Mosher HP. Webs and pouches of the oesophagus, their diagnosis and treatment. Surg Gynecol Obstet 1917;25:175–87
8 Ludlow A. A case of obstructed deglutition from a preternatural dilatation of a bag formed in the pharynx. Med Obser Inq 1769;3:85–101
27 Resouly A. Pharyngeal pouch surgery. The Report of the National Confidential Enquiry into Perioperative Deaths 1996/7;32

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