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HEAD AND NECK

Endoscopic or external approach revision surgery for pharyngeal pouch following primary endoscopic stapling: which is the favoured approach?

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Abstract This study aimed to assess outcomes of revision endoscopic stapling and external excision of pharyngeal pouch. A 5-year prospective study was performed on all patients requiring revision pouch surgery following primary endoscopic stapling. Data were collected retrospectively. Eighteen patients underwent revision pouch surgery. In seven patients, pouch size was down-graded from 3 to 2, and these were stapled endoscopically. Two leaks resulted. Eleven patients with grade 1 or 3 pouches underwent external excision of pouch, with no post-operative complications. As per results external excision of pouch is safe for grade 1 and 3 pouches. It avoids risking redundant mucosa and recurrence of symptoms which can complicate stapling and enables a myotomy to be performed to reduce cricopharyngeal hypertonicity. The highest predictable success is with grade 2 pouches, whose size is amenable to adequate endoscopic stapling. However, the "staple over staple" effect of revision stapling leads to unpredictable fibrosis, which can contribute to risk of perforation.

Keywords Pharyngeal pouch · Revision surgery · Endoscopic stapling · External excision

Introduction

Endoscopic stapling of pharyngeal pouch was first reported in 1993 [1, 2]. It has since become a well-accepted procedure for the treatment of pharyngeal pouch, due to its brief operating time, low risk of morbidity, quick resumption of oral intake and short post-operative stay [3]. This makes it a particularly attractive procedure for elderly patients, in whom pouches are more common (2/100,000/year in UK) [4]. Despite the risk of recurrence, the incidence of persistent or recurrent dysphagia following this procedure is low (< 6 %) [5], and hence the reported incidence of revision procedures is also small. Of studies in the literature pertaining to revision pouch surgery, the majority of procedures are performed endoscopically, and very few external procedures are described [5–8]. The current study is a sequel to our previous study on the UK's largest series of primary endoscopic pharyngeal pouch staplings, in which the revision surgery rate was 18 % [9]. Our institution is a regional referral centre for revision pharyngeal pouch surgery, and this study examines our experience over a 5-year period with this procedure, utilising both endoscopic and external approaches.

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Materials and methods

Data collection

A prospective study was performed over the 5-year period from 2004 to 2009 on all patients whose pouches had previously been stapled endoscopically, and who underwent revision pharyngeal pouch surgery in our institution, either though an endoscopic stapling or external approach procedure.

Pre-operative selection

Patients who had undergone primary endoscopic stapling of pharyngeal pouch were typically followed up in our

clinic for 24 months following surgery. Patients with persistent or recurrent dysphagia and/or regurgitation underwent a barium swallow to rule out other causes of dysphagia other than those attributable to the pouch. They were offered revision surgery based on the severity of their symptoms.

Surgical procedure

The pharyngeal pouch was initially identified under general anaesthesia and inspected with a Negus pharyngoscope. A Weerda distending diverticuloscope was then used to visualise the cricopharyngeal bar, and provide access to the pouch and upper oesophagus. An attempt at endoscopic stapling was made in all patients, and this was performed with an Endopath® ATB35 ETS-Linear Cutter stapling device (Ethicon Endo-Surgery). For those patients in whom endoscopic stapling was not technically possible, an external approach was utilised. For this, the pouch was packed with Bismuth-Iodoform Paraffin Paste (BIPP®) impregnated ribbon gauze. An external cervical approach was typically performed through the left side of the neck. The superior belly of omohyoid and middle thyroid vein were divided and ligated, and the recurrent laryngeal nerve was identified. After contralateral rotation of the larynx, the pouch was identified and excised, after application of a clamp across its neck. A cricopharyngeal myotomy was also performed. A fine-bore nasogastric feeding tube was routinely inserted for the external approach, under direct vision. The defect was closed in two layers with dissolvable sutures. A suction drain was placed in the surgical bed for 48 h, and the wound closed.

Post-operative care

Patients were observed for 12 h post-operatively to assess for signs of perforation, namely pyrexia, neck/back pain and surgical emphysema. Patients whose pouches were stapled without complication were commenced on oral fluids. If observations remained satisfactory, soft diet was introduced on the evening of surgery. Patients who underwent excision of the pouch through an external approach were fed through their nasogastric tube. A water-soluble contrast (Gastrografin) study was performed on day 7. Provided there was no radiological or clinical evidence of a leak, oral fluids followed by soft diet were then instituted.

Ethical considerations

Informed consent was obtained from all patients prior to the procedure. As this is a retrospective review of case notes, no ethical intervention was necessary.

Results

Eighteen patients underwent revision surgery for pharyngeal pouch (Fig. 1) at a median of 9 months (range 6–18 months) from the time of original stapling. The patients were a mixture of local recurrences as well as regional referrals. The male - female ratio was 2:1, with a mean age of 62 years (range 41–70 years). Three of these patients had exhibited recurrence of symptoms relating to their pouch within 6 months of primary endoscopic stapling, and these patients had a small pouch (van Overbeek grade 1). In the 15 patients with a large pouch (van Overbeek grade 3), the time to recurrence of symptoms was more than 6 months. In our experience of over 100 stapling cases throughout the last decade, typically no patients with a van Overbeek grade 2 pouch had recurrence of symptoms to warrant revision surgery. Therefore the only apparent grades at primary surgery were 1 and 3. However, on review of the barium swallow prior to, and assessment of the pouch at the time of, revision surgery, the size of seven pouches had been down-graded from 3 to 2. This is because the creation of a larger conduit by division of the common party wall between pouch and oesophagus at the time of primary endoscopic surgery makes the size of the pouch (measured from pouch apex to residual oesophageal mucosa) appear smaller on barium swallow.

Revision endoscopic stapling was performed in seven patients who had a recurrent pouch whose size was van Overbeek grade 2 (Fig. 2). The mean length of stay for patients in this group was 2 days (range 1–16 days). Two patients developed a leak on the first post-operative day, due to perforation at the distal part of the staple line. They were both transferred to Intensive Care for antibiotics, nasogastric feeding and organ support. Their mediastinitis resolved within 14 days in both cases. Five patients achieved oral intake of soft diet at 12 h, the remaining two by 24 h. Three of the seven patients in this revision stapling group remained symptomatic at follow-up, despite normal contrast flow studies.

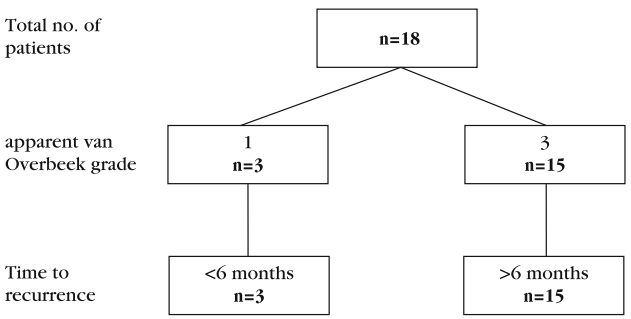

Fig. 1 Size of original pouch and time to recurrence of symptoms amongst 18 patients whose pouches were primarily stapled endoscopically

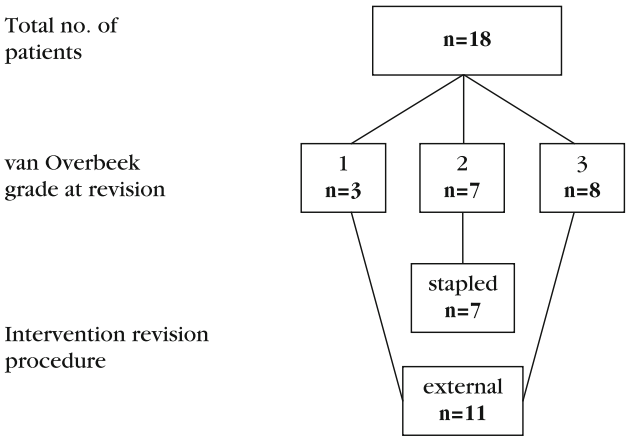

Fig. 2 Size of pouch at time of revision, and method of revision surgery utilised in these 18 patients

Eleven patients underwent external excision of pouch. In eight patients, this was van Overbeek grade 3, in whom it was thought that revision endoscopic stapling would result in redundant mucosa which would contribute to further recurrence of symptoms. In the remaining three patients, the pouch was too small (grade 1) to enable the stapling gun to engage adequately in the cricopharyngeal muscle, so an external approach was employed. The mean post-operative length of stay of patients in this group was 7 days. There were no post-operative complications in this group.

Discussion

Theories on the pathogenesis of the pharyngeal pouch (Zenker's diverticulum) have focused on structural or functional abnormalities of the cricopharyngeal muscle, which result in abnormal pressures in the pharyngo-oesophageal segment [10]. Intrinsic weakness of Killian's dehiscence, lying between the cricopharyngeal and thyropharyngeal muscles, exacerbates the formation of the pouch. The cricopharyngeal muscle is therefore the target of surgical intervention, and can be addressed through a variety of procedures including diverticulectomy, diverticulopexy, diverticular invagination, cricopharyngeal myotomy and endoscopic diverticulotomy [8]. Alternatively, the pouch can be excised through an external approach.

Endoscopic stapling is favoured as a primary modality treatment for pharyngeal pouch due to its decreased morbidity, short operation and post-operative stay, and effective relief of symptoms [7]. It has a lower recurrence rate (up to 18 %) [8, 9] and lower rate of complications compared with diathermy or laser [11, 12]. The success of endoscopic stapling is dependent on how completely the diverticular septum is divided [13], but a larger division risks perforation.

Several factors are known to predispose to recurrence of pouch following primary endoscopic stapling. These include size of pouch. Although a large pouch (van Overbeek grade 3) may not always be stapled adequately, and the ensuing redundant mucosa may cause persistence or recurrence of symptoms [7, 8], symptomatic improvement is generally better following primary stapling of larger pouches [14]. Similarly, for a grade 1 pouch, the stapling gun is often unable to achieve an adequate bite of the common wall, and this can lead to pouch recurrence. The presence of staples and granulation tissue from the original procedure will also have an adverse effect. Conversely, if the gun is placed very far into the pouch, there is an increased risk of oesophageal perforation [5]. Complications are therefore more common with smaller pouches [14].

It has been suggested that number of staples used may be a predictor for recurrence, the fewer the number of rows, the greater the risk, due to inadequate division of the common wall [5]. However, it has been shown that patients who underwent stapling with multiple rows had a higher post-operative leak rate than those who were stapled with a single row [15]. Patients with multiple rows also had a longer post-operative length of stay and a slower return to oral intake. There was no difference in recurrence rate or patient satisfaction between the two groups. It is customary for an Endopath® ATB35 ETS-Linear Cutter stapling device (Ethicon Endo-Surgery) to be used in our institution. This fires three paired rows of staples. To explain why the grade 2 pouches at revision were symptomatic, we believe that the "staple over staple" effect leads to unpredictable scarring and granulation tissue, which generates fibrosis of the prevertebral fascial plane posterior to the pouch. Hence, despite the apparent technical success of the procedure, patients remain dysphagic.

A potential contributing factor for recurrence which has been described was a piece of retention suture from an original endoscopic stapling procedure, found in the common wall mucosa at the time of revision surgery. This was thought to have invoked a foreign body reaction which contributed to stenosis found at the time of revision [8]. There is no correlation noted between performing a myotomy at primary excision of pouch, and recurrence [8].

In our series of 18 patients, we recommend an external approach in patients with small pouches undergoing revision surgery. For reasons stated above, endoscopic stapling of a grade 1 pouch may potentially fail. An external approach enables a cricopharyngeal myotomy to be performed to relieve cricophayrngeal hypertonicity. It is our practice to excise the pouch as well as perform a myotomy, but some authors would argue that myotomy alone is

sufficient for small pouches [16]. Although we only performed excision of pouch for three grade 1 pouches, 11 external approaches were performed in total for revision cases, and there were no complications. We attribute this favourable outcome to meticulous dissection in a bloodless field. One study showed that the percentage of totally asymptomatic patients was significantly higher after open than endoscopic procedures, regardless of the size of the pouch [17]. This held true particularly for pouches less than 3 cm in size.

We advocate that external excision is a safe procedure for grade 1 and 3 pouches. For large pouches, this approach avoids risking redundant mucosa and recurrence of symptoms which could ensue stapling. Interestingly, however, the two cases of perforation we experienced were with grade 2 pouches, and we attribute this to the "staple over staple" effect. It is noteworthy that none of our revision cases was deemed to be grade 2 at presentation. This implies that the risk of recurrence is less in medium-sized pouches, as adequate stapling can be achieved and there is less redundant mucosa remaining.

It is our philosophy that recurrent grade 1 pouches can be safely revised by utilising an external approach. This is not over-treatment of such small pouches, but merely a procedure which reduces the potential hazards of endoscopic stapling, namely perforation. A recurrent pouch typically sits at a lower level than its original position, meaning that any perforation from endoscopic stapling will risk potentially catastrophic mediastinitis rather than effects which are limited to the neck. For reasons already mentioned, endoscopic stapling of recurrent grade 1 pouches is technically more difficult due to cricopharyngeal hypertonicity [18], inadequate engagement of the stapler in the pouch, and the "staple over staple" effect, with risks of perforation and unpredictable scarring. It could be argued that alternative endoscopic means such as laser or diathermy could avoid these problems and may be used instead for such small revision pouches, but in our institution our expertise is in endoscopic stapling for all primary pouches. We are therefore less inclined to embark upon alternative endoscopic techniques for revision pouches in cases where an endoscopic approach is indicated.

Conflict of interest No sponsorship was obtained for this research, so none of the authors have any financial interest to declare.

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