

# A follow up audit of pharyngeal pouch surgery using endoscopic stapling

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**Abstract** The aim of this study is to assess patient satisfaction, success at controlling symptoms and conversion rates to open surgery in patients undergoing pharyngeal pouch surgery using an endoscopic stapler in a second cycle of audit. The design consisted of a review of patient records augmented by an electronic search of operation codes in the hospitals' theatre records. The setting was in Worcester Royal Hospital, BUPA Southbank Hospital and Hereford Hospital, UK. Participants include all patients with pharyngeal pouches undergoing endoscopic pharyngeal pouch repair by the senior author between July 2002 and July 2007. The total number of participants was 31. All patients were undergoing treatment for the first time. The main outcome measures were pre- and postoperative symptom prevalence, conversion rates to open surgery, patient satisfaction. Endoscopic pharyngeal pouch surgery was successful in the vast majority of cases, with 97% of patients being satisfied with the result. The conversion rate to open surgery was 9.7%. These figures are improved from the last round of audit. In conclusion, endoscopic surgery to treat pharyngeal pouches is safe, effective and patient selection is improving. A modified method of endoscopy using a Negus scope rather than a Baldwin scope has allowed more patients to be treated via endoscopic methods. Open surgery is still required in some patients.

**Keywords** Pharyngeal pouch · Endoscopic stapling · Patient satisfaction

## Introduction

Pharyngeal pouches were first described in 1764 by Ludlow, a surgeon from Bristol. The first paper, containing remarkably accurate details of symptoms and anatomy, was published in 1769 [1]. This description was further developed by Zenker [2], such that some clinicians refer to the lesion as “Zenker's diverticulum”. There are various types of pharyngeal pouch with differing aetiologies. All pouches originate in the hypopharynx [3]. Lateral pouches are uncommon and can be congenital or acquired. Congenital pouches are thought to be due to a branchial cleft remnant opening into the pharynx and are usually unilateral. There is some argument about the aetiology of acquired pouches, with some authorities considering the basic defect to be a congenital weakness. Others feel that the potential weakness is present in all individuals and that the variable is raised intra-pharyngeal pressure leading to pouch formation. Pouches are more common in men than in women. Occupational risk factors exist in those who play wind instruments and blowing glass [4].

Symptoms of pharyngeal pouches are variable and include a sensation of a lump in the throat, sticking of food and increasing dysphagia. Undigested food may also be regurgitated from the pouch and similarly regurgitation of air trapped in the pouch can cause audible borborygmi. Recurrent episodes of pneumonia can occur if there is aspiration secondary to persistent regurgitation.

Treatment options are divided into open and endoscopic techniques. Open techniques require a surgical incision and dissection through the neck to the oesophageal wall and

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therefore carry with them risks of infection and vocal cord paralysis secondary to recurrent laryngeal nerve injury. The hospital stay is usually longer than with endoscopic techniques. For this reason, endoscopic techniques are more common, but open techniques are still widely practiced [5].

Mosher [6] described the first endoscopic technique and used scissors to divide the diverticulum. This procedure was modified by Dohlman [7], who used endoscopic diathermy to divide the diverticulum in over 100 cases during the 1950s and 1960s. He reported a recurrence rate of 7% with no deaths or serious complications. A similar procedure using the CO<sub>2</sub> laser was popularised in the 1980s [8], and remains a valuable treatment option, particularly in the treatment of small pouches. In the 1990s, a linear stapler was used by Collard et al. [9] to divide the diverticulum. Smith et al. [10] compared open repair with endoscopic stapling and found that the endoscopic option was quicker and resulted in a shorter hospital stay. These findings support the findings of van Eeden et al. [11] that also showed that patient satisfaction was greater in the endoscopically treated patients.

The senior author has treated patients with pharyngeal pouches using endoscopic stapling for 10 years. In 2003, an audit of the first 16 patients with pharyngeal pouches treated by the senior author was published [12]. In all patients, the intention was to treat using endoscopic stapling, but six required conversion to open cricomyotomy (37.5% conversion rate). A further 31 patients with pharyngeal pouches have now been treated. We have repeated the audit process used in the first 16 patients (i.e. those published in 2003) with this most recent 31 patients. This allows us to complete the audit cycle. It also enables us to measure the effectiveness of both the changes in practice and the increased procedural experience of the senior author.

## Subjects and methods

All subjects were patients operated on by the senior author at Worcester Royal Hospital, BUPA Southbank Hospital or Hereford Hospital between July 2002 and July 2007. All patients were operated on using the same technique, by the same surgeon and were followed up for at least 3 months. At the 3 month postoperative consultation, patients were specifically asked which, if any of their preoperative symptoms had persisted. Any new symptoms were also noted. They were also asked if they were satisfied with their treatment.

The audit was conducted by performing a review of patient notes. This aimed to establish:

1. preoperative symptoms,
2. postoperative symptoms,
3. the type of procedure performed,
4. if any complications arose,
5. whether or not the patient was satisfied with the outcome of their surgery.

In all patients, the intention was to treat using endoscopic stapling. It was not possible to carry out endoscopic stapling in all patients. The main reason for this was the patient not being able to fully extend their neck (which is necessary to insert the stapler). On occasions, a small pouch is unsuitable for stapling as there is insufficient pouch wall to allow staple insertion. The operative sequence in this series was as follows:

1. Under general anaesthesia, attempt to pass endoscope.
2. If endoscope passable, attempt to insert stapler and staple pouch.
3. If stapler cannot be inserted and staples deployed, convert to open surgery (cricomyotomy).

If endoscopic stapling was not possible, open surgery was commenced rather than converting to CO<sub>2</sub> laser as this does not overcome the problems of patients being unable to extend their neck sufficiently [3]. In addition, the incidence of pouch recurrence is lower in open techniques than using laser and the length of hospital stay is not improved [13].

During the audited period, the senior author did not perform open cricomyotomy on any patient without first attempting endoscopic stapling. This was double checked by performing a search of operating codes during the study period.

Patients treated endoscopically did not routinely receive any perioperative antibiotics and a feeding tube was not passed. Clear fluids were taken overnight and then soft diet was advised for 2 weeks following surgery. Most patients returned home the day after surgery and three patients were treated as day cases.

Patients requiring open surgery were fed via nasogastric tube until it was considered safe for clear fluids and then soft diet to be taken orally.

Once data had been collected it was collated and compared to the data from the 2003 audit. This allowed us to establish whether or not quality of treatment had improved in the last 5 years.

In order to be as ethically considerate as possible, all patients' data was kept anonymous. As stated above, all patients underwent attempted endoscopic treatment. However, if this was not successful, patients were converted to an open procedure, to ensure that their condition was satisfactorily treated. Patients were, of course consented for both procedures preoperatively.

**Results**

The study group comprised 31 patients. In all cases, the intention to treat was using endoscopic stapling.

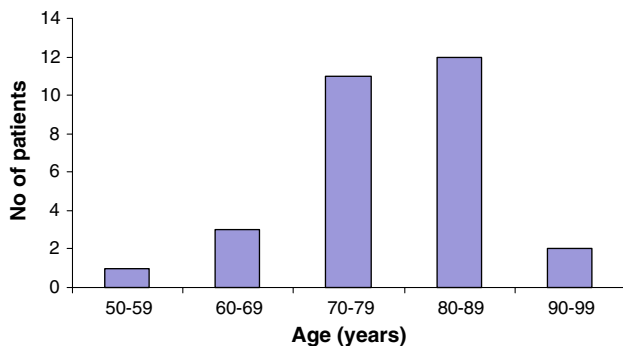
Endoscopic stapling of the pouch was attempted in all 31 patients. Of these 31 patients, 28 successfully underwent endoscopic stapling. In the three remaining patients (9.7%), conversion to open cricomyotomy was necessary (due to technical factors preventing endoscopic stapling).

The youngest patient in the group was 52 years old at the time of surgery, the oldest was 91. Mean age was 76 years old. Figure 1 demonstrates the age distribution of patients in the study.

The distribution of pre and postoperative symptoms is shown in Table 1. The symptoms included: Dysphagia, food sticking, regurgitation, weight loss, choking, cough and borborygmi. Of all patients reporting any postoperative symptoms, only 1 reported a new symptom (dry throat). All other patients with postoperative symptoms reported that they were milder in nature than preoperatively.

The data from this table is also demonstrated graphically in Fig. 2.

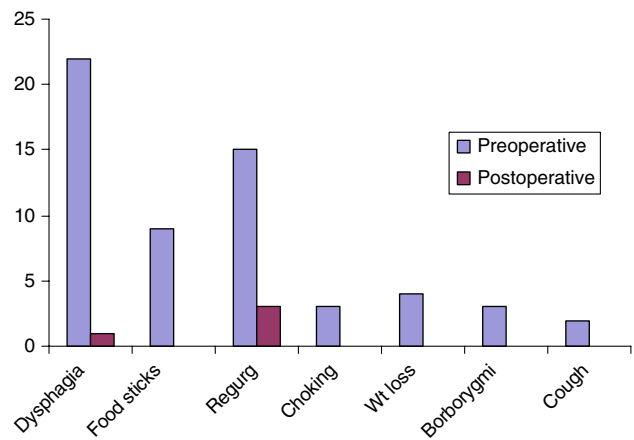
Thirty of the 31 patients (97%) reported that they were completely satisfied with the surgery. The only patient not classified as satisfied with the surgery was a patient who died 1 month postoperatively (not from postoperative complications) and thus there was not opportunity to assess their satisfaction.



**Fig. 1** Age distribution of patients in study

**Table 1** Distribution of pre- and postoperative symptoms

Symptom	Preoperative	Postoperative
Dysphagia	22/31	1/31
Food sticking	9/31	0/31
Regurgitation	15/31	3/31
Weight loss	4/31	0/31
Choking	3/31	0/31
Cough	2/31	0/31
Borborygmi	3/31	0/31



**Fig. 2** Distribution of pre- and postoperative symptoms

In the 1997–2002 series, two patients were not completely satisfied (12%): one noted some improvement in symptoms, one reported that their symptoms were worse.

**Discussion**

As treatment of pharyngeal pouches has two distinct surgical options, debate exists as to which is most acceptable. Open surgery is known to be effective and is viable in virtually all patients. However, it carries with it disadvantages including: external wound infection, recurrent laryngeal nerve injury and longer hospital stay. Endoscopic surgery for pharyngeal pouches is not suitable for all patients, but is quicker than open surgery, carries minimal risk of complications and requires a shorter inpatient stay, with the potential for day case treatment.

Some patients are not suitable for endoscopic repair. Patient factors such as an inability to extend the neck or open the mouth sufficiently may render a patient unsuitable. Pouch characteristics such as difficult positioning of the oesophageal opening or small pouch size may prevent successful endoscopic stapling. If endoscopic stapling is not viable and the pouch is small but accessible then division with the CO<sub>2</sub> laser may be a valuable option. There is concern, however, when treating a small pouch endoscopically that some of the constricting fibres of cricopharyngeus may not be divided, thus rendering the patient at risk of recurrent or continued symptoms. For this reason, if the pouch is small, the senior author prefers an open approach to ensure that all fibres of cricopharyngeus are divided under direct vision. In addition, the laser method also requires passage of an endoscope [3], thus not overcoming the problems encountered when treating a patient unable to open their mouth/extend their neck sufficiently.

As described in the introduction, this audit was initially performed on patients undergoing surgery between 1997



**Fig. 3** Baldwin pharyngoscope

and 2002 and published in 2003 [12]. In this series, the conversion rate to open cricomyotomy was 37.5%. In the second series of 31 patients (2000–2007), the conversion rate to open surgery was 9.7%. This is obviously a considerably lower rate and suggests that either patient selection for endoscopic surgery or endoscopic technique has improved or both.

The senior author has modified his technique since first cycle of this audit. Initially, the Baldwin pharyngoscope (Fig. 3) was favoured. This is a fixed ended pharyngoscope with an upper and lower bill to pass into the oesophageal and pouch openings, positioning the bar of tissue that requires dividing between the bills. When the stapling device is passed down the pharyngoscope it obscures the surgeon's view. This pharyngoscope has a side port to allow passage of a Hopkins rod and direct visualisation of the position of the stapler. The senior author felt that his failed endoscopic cases in the first series were due to difficulties in passing the rather wide Baldwin pharyngoscope.

For this reason, the Negus pharyngoscope (Fig. 4) was tried, offering a similar fixed end arrangement, but being slightly smaller. This offers a better success rate at identifying and entering the pouch endoscopically. This pharyngoscope does not have the facility to use a Hopkins rod for direct visualisation while inserting the stapling device, but the senior author feels that with the experience gained from previously inserting under direct vision, he can now adequately assess the position by feel alone.



**Fig. 4** Negus pharyngoscope

Over the last 5 years of practice, the proportion of patients satisfied with surgery has improved from 88 to 97%. This is coupled to the fact that over time, the efficacy of the procedure has increased. In the 1997–2002 series, 84.6% of symptoms were relieved. In the more recent series, this figure has been increased to 93.1%. The improvements in both symptom control and satisfaction support each other and are hopefully due to improvements in technique.

When compared with other published series, the results of this series compare favourably with regards to patient satisfaction, symptom control and conversion rates to open surgery. Lieden et al. [14] published a series of 62 patients treated for pharyngeal pouch. This series had a conversion rate to open surgery of 11.3% and a symptom relief rate of 82%. Another series by Aly et al. [15] reported a conversion rate of 12.9 and 91% patient satisfaction.

When compared with other endoscopic methods, the authors accept that comparable outcomes can be achieved. If we disregard the results in the pre antibiotic era reported by Mosher [6] and examine the studies from the post-Dohman era then there are several reports in the literature reporting high levels of patient satisfaction following endoscopic treatment of their pharyngeal pouch using electrocautery [16], CO<sub>2</sub> laser [8] and stapling devices [10–12, 14, 15]. Individual surgeons will make their choice as to the precise method of endoscopic pharyngeal pouch surgery based upon a variety of factors including their personal experience and local availability of resources. In the UK, endoscopic stapling is endorsed by National Institute for Health and Clinical Excellence (NICE) for the treatment of pharyngeal pouches [17]. However, it has been recommended to remain as a super-specialist procedure, as is the case in this series.

Novel approaches to the management of pharyngeal pouches are still being developed, and the first case series

of flexible endoscopic division of the pharyngeal pouch using clips for sealing the cut edges has recently been reported [18]. Early results seem promising with regard to symptom resolution, but whether this technique will stand the test of time remains to be seen.

## Conclusions

This study shows that over the last 10 years, the proportion of patients suitable for endoscopic pharyngeal pouch stapling has increased. Patient satisfaction and symptom control have also been improved. This has occurred concurrently with the senior author's increased experience in endoscopic technique and an alteration in the type of endoscope used.

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