

## Original Research Article

# Combined approach dilatation of complete oesophageal stenoses

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### ABSTRACT

**Background:** Upper oesophageal stenosis is a well-recognised complication in the treatment of head and neck malignancies that can result in significant morbidity. Simple strictures can be managed by antero-gradual dilatation. Combined approach dilatation can overcome more complex and even complete stenosis.

**Methods:** This was a retrospective analysis of prospectively gathered data for four patients who have had combined approach dilatation to overcome complete oesophageal stenosis. Outcomes determined using standardised swallowing outcome measurement tools.

**Results:** A functional oesophageal lumen was restored in four patients with complete oesophageal stenosis, with a demonstrable improvement in validated swallowing outcome measures.

**Conclusions:** Combined approach oesophageal dilatation can be safely and effectively utilised to overcome complete stenosis of the upper oesophagus secondary to radiotherapy/chemo-radiotherapy. Extending the indications for this procedure to post-surgical strictures is not advisable due to increased risk of serious complication.

**Keywords:** Oesophageal dilatation, Oesophageal stenosis, Squamous cell carcinoma, Dysphagia, Radiotherapy

### INTRODUCTION

Upper oesophageal stricture is a well-recognised complication of radiotherapy and chemoradiotherapy in the treatment of head and neck malignancies, particularly in the oropharyngeal subsite. It can result in significant patient morbidity and can lead to total stenosis which leads to dependence upon gastrostomy for nutrition and an inability to swallow one's own saliva.

Video fluoroscopic swallowing assessment is a useful tool for identifying strictures. However, direct endoscopic assessment of suspected strictures is essential, as the development of narrowing can represent recurrent malignant disease. Endoscopy also enables thorough evaluation of the length and diameter of the stricture and subsequent dilatation.

The majority of strictures can be successfully managed by antero-gradual endoscopic assisted dilatation with either serial Savary dilators, or balloon dilators. Complex, refractory or complete stenoses have previously been corrected through open surgical reconstructive techniques that understandably confer significant morbidity and carry high rates of complication.<sup>1</sup>

In 1998 Twisk et al, introduced the technique of combining retrograde endoscopy through gastrostomy with traditional antero-gradual endoscopy.<sup>2</sup> In two cases, one with a stricture and one with a membranous occlusion they utilised mini-laparotomy and gastrostomy to achieve retrograde access. This combined approach allowed navigation and dilatation of a complex stricture in the first case, and puncture through a radiotherapy induced total occlusion and re-establishment of a lumen in the second case.

The technique has subsequently been described in a small number of case reports and case series where it has been utilised in an attempt to overcome complex and complete radiotherapy related upper oesophageal stenoses.<sup>3-8</sup> Unfortunately limited follow up and varying methods for determining success make comparative analysis of results difficult. None of the series to date has utilised prospectively collected patient reported measures of swallowing to monitor outcomes.

## METHODS

This study was completed in the James Cook University Hospital, Middlesbrough, England. The centre serves a population of 1.4 million people and sees around 200 new head and neck cancer diagnoses each year, approximately 17 per 100,000 population, significantly higher than the national average within the United Kingdom. Swallowing outcomes are collected prospectively for all patients as part of our head and neck cancer treatment pathway as such ethical approval was not required.

### Study design

A retrospective analysis of swallowing outcomes for all patients who underwent combined approach dilatation of a complete oesophageal strictures developed following primary radiotherapy for the treatment of head and neck malignancy between 2012 and 2014. The study excluded a single patient who developed complete oesophageal stricture following salvage total laryngectomy with pec major flap reconstruction for radio-recurrent disease. Although excluded from the analysis this patient's case is discussed in order to highlight important safety aspects of this procedure.

### Procedure

Complete stenosis was identified by video fluoroscopy prior to selection for this procedure, to ensure that

fluoroscopic guidewire placement was not an option. All the patients had an established gastrostomy in place and were unable to tolerate any oral diet due to complete stenosis. Under general anaesthesia trans-oral rigid oesophagoscopy confirms and evaluates the stricture proximally. The gastrostomy site is then dilated to 15mm to allow retrograde passage of a standard flexible gastroscop into the distal oesophagus enabling simultaneous evaluation of the stricture from above and below. Two monitors are utilised such that both operators are able to see the endoscopic view. Trans-illumination and tactile impression are utilised to optimise positioning before biopsy forceps are applied distally to open the stenosis by biting down onto rigid suction catheter advanced from the proximal end. A guide wire is then introduced from below and utilised to direct serial dilatation using Savary dilators. The rigid oesophagoscope is then advance to evaluate the oesophageal wall before placement of a 14Ch Ryles tube which acts as a stent for 3 weeks. This is removed in clinic and oral intake is gradually reintroduced. Repeat rigid oesophagoscopy is performed at 6 weeks enabling re-evaluation and further dilatation if required. Trial of oral diet is encouraged at discharge following the first dilatation although the presence of the Ryles tube often made this challenging for the patients.

### Swallowing outcomes

Outcomes were determined using standardised outcome measurement tools. The normalcy of diet section of the performance status scale for head and neck cancer (PSS-HN) provides a scaled categorical assessment of the consistency of a patient's swallow, see (Table 1).<sup>9</sup> The functional oral intake scale (FOIS) adds an assessment of dependency upon gastrostomy feeding. A score of one implies total dependency upon gastrostomy, a score of seven implies totally oral intake, see (Table 1).<sup>10</sup> The small size of this data set makes statistical analysis of the results inappropriate.

**Table 1: Patient demographics.**

| S. no. | Age | Sex | Primary cancer     | Stage   | Primary radiotherapy | Adjuvant chemotherapy | Surgery |
|--------|-----|-----|--------------------|---------|----------------------|-----------------------|---------|
| 1      | 54  | M   | SCC left tonsil    | T1N2bM0 | 65Gy in 30#          | Yes (cisplatin)       | No      |
| 2      | 51  | F   | SCC left tonsil    | T3N2bM0 | 65Gy in 30#          | Yes (cisplatin)       | No      |
| 3      | 68  | M   | SCC piriform fossa | T4N1M0  | 65Gy in 30#          | No                    | No      |
| 4      | 64  | M   | SCC oropharyngeal  | T4N2bM0 | 65Gy in 30#          | Yes (cisplatin)       | No      |

## RESULTS

Four patients had combined approach dilatation of complete oesophageal strictures between 2012 and 2014, see (Table 2). All developed strictures following primary radiotherapy for head and neck malignancy, three patients had also received cisplatin adjuvant chemotherapy. Patients have been followed up for an average of 40 months, with a minimum of 33 months. The final post-dilatation PSS-HN and FOIS scores were recorded on

average 14 months following the combined approach dilatation. An average of 3 further dilatations were performed after lumen patency was re-established by combined approach dilatation. Table 3, shows the outcome measurement scores for all the patients pre- and post-combined approach dilatation. Before dilatation all the patients were completely dependent upon gastrostomy for nutrition, one of the patients was taking occasional sips of fluid for comfort. The median pre-dilatation PSS-HN score was 0 and FOIS score was 1.

**Table 2: PSS-HN score.**

| Variables                       | %   |
|---------------------------------|-----|
| Full diet (no restrictions)     | 100 |
| Full diet (liquid assist)       | 90  |
| All meat                        | 80  |
| Raw carrots/celery              | 70  |
| Dry bread/crackers              | 60  |
| Soft chewable food              | 50  |
| Soft foods requiring no chewing | 40  |
| Pureed foods                    | 30  |
| Warm liquids                    | 20  |
| Cold liquids                    | 10  |
| No oral intake                  | 0   |

The first procedure was complicated by minor oesophageal perforation with development of limited surgical emphysema in the immediate post-operative period. This was managed conservatively with antibiotic

prophylaxis and the patient made full recovery and went on to have further successful dilatation as planned.

**Table 3: FOIS score.**

| Variables   | % |
|---|---|
| Nothing by mouth (NPO)  | 1 |
| Tube dependent with minimal attempts of food or liquid  | 2 |
| Tube dependent with consistent intake of liquid or food   | 3 |
| Total oral diet of a single consistency   | 4 |
| Total oral diet of a single consistency   | 5 |
| Total oral diet with multiple consistencies but requiring special preparation or compensations              | 6 |
| Total oral diet with multiple consistencies without special preparation, but with specific food limitations | 7 |

**Table 4: Outcome measurements using PSS-HN and FOIS.**

| No.           | Pre-dilatation |        |      | Post-combined approach dilatation |        |      | Further dilatations | Following final dilatation |        |      |             |
|---------------|----------------|--------|------|-----------------------------------|--------|------|---------------------|----------------------------|--------|------|-------------|
|               | PEG dependant  | PSS-HN | FOIS | PEG dependant                     | PSS-HN | FOIS |                     | PEG dependant              | PSS-HN | FOIS | PEG removed |
| 1             | Y              | 0      | 1    | Y                                 | 20     | 2    | 3                   | N                          | 50     | 5    | N           |
| 2             | Y              | 20     | 2    | Y                                 | 20     | 2    | 3                   | N                          | 90     | 7    | Y           |
| 3             | Y              | 0      | 1    | Y                                 | 50     | 3    | 4                   | N                          | 50     | 7    | Y           |
| 4             | Y              | 0      | 1    | Y                                 | 20     | 2    | 2                   | N                          | 90     | 7    | Y           |
| <b>Median</b> |                | 0      | 1    |                                   | 20     | 2    | 3                   |                            | 50     | 7    |             |

He is now no longer dependent on gastrostomy for nutrition but continues to use his gastrostomy for medications, PSS-HN 50 and FOIS 5. The second procedure was uncomplicated but a valuable lesson was learnt. A naso-gastric tube was not sited at the end of this procedure and the patient required an early repeat dilatation to prevent re-stenosis.

The next two procedures were uncomplicated. During the final procedure the first attempt to intubate the gastrostomy was unsuccessful and a small false passage was created within the abdominal wall, this had no adverse effect but highlighted the need for care during this crucial step in the procedure and the risk of abdominal complication. The final three patients have all been able, to remove the gastrostomies on which they were previously completely dependent. The median post-dilatation PSS-HN and FOIS scores for the series were 70 and 7 respectively.

## DISCUSSION

Combined approach dilatation can be utilised to overcome complete oesophageal stenosis enabling standard dilatation techniques to restore oral nutrition. In

this series, the median PSS-HN score improved from 0 pre-dilatation to 70 post-dilatations. The FOIS improved from 1 pre-dilatation to 7 post-dilatations with all patients no longer reliant upon gastrostomy for nutrition. These results are comparable to the largest series to date described by Goguen et al, in 2010 which includes 45 patients, and reports re-instatement of oral intake in 80% of patients with 60% of patients achieving removal of gastrostomy.<sup>5</sup>

It is however, a procedure not without risk. In this series one successfully dilated patient sustained a minor perforation leading to surgical emphysema that responded to conservative management. The literature reports similar experiences with regards to complications. Lew et al. 2005 report 5 combined approach dilatations with no complications all were performed on patients who had undergone primary radiotherapy only. Langerman et al report 7 combined approach dilatations, 5 of which were for complete strictures, they describe a single complication with dehiscence of the stomach from the abdominal wall requiring limited laparotomy repair and delay of the dilatation.<sup>4</sup> Goguen et al describe 63 procedures on 45 patients with 18 complications (29%). Eight patients sustained perforation with development of free air within mediastinum, thorax or subcutaneous

tissues, 2 patients developed large oesophageal perforations all were successfully managed conservatively. A further seven patients developed problems with gastrostomy site requiring revision surgery 6 of which required 'mini' laparotomy.<sup>5</sup> Fowlkes et al, 2012 report 17 procedures on 15 patients with three major complications including a death due to air embolus and two gastrostomy issues requiring laparotomy, a further patient sustained avulsion of an incisor.<sup>11</sup> Gavriel et al report 5 dilatations with one procedure complicated by the development of perforation and subsequent mediastinitis which responded to conservative management.<sup>12</sup>

Recognising and determining the risk of complications is essential in the development of a new surgical technique. Our team tried to extend the application of this technique to overcome a complete stenosis in patient who had undergone salvage total laryngectomy with pec major flap reconstruction due to radio-recurrent disease. It is logical, that the risks of the procedure will be increased in patients who have had surgical anastomosis of the oesophagus prior to radiotherapy and stricture formation. It was offered to this patient as they were not fit for further major reconstructive surgery which would have been the primary choice for re-establishing a neopharyngeal lumen in such circumstances. Unfortunately, the procedure was complicated by the previous surgery and had to be abandoned. Three potential lumens were identified from the distal end. Despite positive tactile impression and trans-illumination, the first attempt to pass a guide wire was unsuccessful and it became difficult to maintain insufflation within the distal oesophagus alerting the team to the possibility of a tracheoesophageal perforation. Bilateral tension pneumothorax quickly developed requiring intervention with bilateral chest drains to stabilise the patient. Thankfully with conservative management he made a good recovery and was discharged home 10 days later. He declined any further intervention and therefore remains dependent upon his gastrostomy.

We believe extending the indications for this procedure to post-surgical strictures is not advisable and prior surgical anastomosis has become an absolute contra-indication within our department. However, since being able to eat and drink forms such an important part of human life it is likely that many patients will be willing to accept the risks of complication for a chance at resuming an oral diet. It is imperative that we continue to explore and determine the limits of this new technique and counsel thoroughly those patients who wish to proceed. The use of established validated patient reported outcome measures confirms that patients can achieve long term benefit and return to full oral diet. The integration and use of prospectively completed swallowing outcome measures into the routine head and neck cancer treatment pathway enables better quantification of the benefits associated with the interventions that aim to improve the quality of our patients lives. It will also facilitate

comparative analysis of data generated by different study groups. We would recommend this practice to be universally adopted by other teams caring for patients with head and neck cancers.

## CONCLUSION

In conclusion, analysis of swallowing outcomes using formal measures enables the demonstration that combined approach dilatation can be successfully utilised to re-establish oral nutrition following the development of radiotherapy induced complete oesophageal strictures. However, caution should be taken when selecting cases, attempting the procedure in the post-surgery setting is not advisable. In all cases patients must be counselled appropriately and made aware of the associated risks. Larger studies are required to explore these risks in more detail.

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