Oesophageal strictures: new indication for intra-aortic balloon pumps?

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Received 4 July 2001; received in revised form 25 September 2001; accepted 27 September 2001

Abstract

Oesophageal strictures regardless of aetiology are a difficult and challenging problem facing the oesophageal surgeon. Various methods and techniques have been described and are routinely used in clinical practice with varying rates of efficacy and complications. We describe here a novel graded atraumatic technique for the management of oesophageal strictures using intra-aortic balloon pumps.

Keywords: Oesophagus; Stricture; Dilatation; Intra-aortic balloon pump

1. Introduction

Benign oesophageal strictures are the most frequent complication of reflux oesophagitis and the most common cause of non-malignant induced dysphagia [1]. The two next most common causes are ingestion of corrosive substances and postsurgical strictures [2]. Other infrequent causes include fungal, bacterial or viral infection, radiation fibrosis and granulomatous disease of the oesophagus. Postoperative stricture formation after repair of oesophageal atresia with or without accompanying tracheoesophageal fistula occurs in 20–50% of patients undergoing primary repair [3].

The treatment of benign oesophageal strictures remains controversial with arguments for and against rigid dilators or balloon dilators and also between the various types of rigid dilators. The incidence of complications associated with instrumentation of the oesophagus varies between 0.018% and 11% in different reports depending on the procedure and instrument employed. Nashef et al. [4] reported an overall incidence of perforation of 0.76% in a series of 1831 endoscopic procedures with Maloney bougies fairing better (0.38%) than other bougies (3.8%). Balloon dilatation has also been reported [5] to have similar efficacy and complications in the management of benign strictures to that of rigid dilators. We report here on our experience with a new method for dilatation of oesophageal strictures.

2. Materials and methods

2.1. Patients

Four patients with recurrent benign oesophageal strictures on our interval dilatation programme who preferred dilatation to major oesophageal reconstructive surgery were selected for management with this new technique. Informed consent was obtained from all the patients (two males and two females with a mean age of 47 ± 20 years). The causes of the strictures were: postoperative stenosis following Collis gastroplasty and Belsey mark IV hiatus hernia repair for reflux caused by scleroderma in one patient, following two hiatus hernia repairs for reflux in the second and at the site of repair of tracheo-oesophageal fistula in the other two.

2.2. Technique

The patient is anaesthetised using standard anaesthetic protocol with endotracheal intubation. A rigid oesophoscope is introduced into the upper oesophagus and a flexible scope is then passed through the rigid oesophoscope and is advanced to the level of the stricture. A contrast agent (Niopam) is then injected and an image intensifier confirms the level of the stricture as compared with the preoperative images (Fig. 1A). The guide wire of the intra-aortic balloon pump is then passed down through the side channel of the flexible scope. The wire is passed through the stricture and...
into the stomach under both direct vision through the eyepiece of the scope and screening with the image intensifier. The flexible scope is then removed and the wire tip is confirmed to remain in the stomach with screening. The guide wire has to be long enough to go through the whole length of the balloon and remain in the stomach. The intra-aortic balloon pump is then threaded over the guide wire and the position is confirmed by screening. The balloon is placed with the stricture located at the middle of the balloon. The balloon inflation is commenced with low pressure and this is increased gradually to maximum inflation pressure (Fig. 1B). The balloon is then left to dilate the stricture for 5–10 min at a rate of 100 inflation/min. Contrast is once again introduced at the end of the procedure to confirm satisfactory dilatation of the stricture and to detect any evidence of perforation. The flexible endoscope is then passed into the oesophagus and the mucosa is inspected. The patients were kept in hospital overnight and if asymptomatic a formal barium study was performed 2–3 weeks postoperatively (Fig. 1C).

3. Results

There was no morbidity or mortality associated with the procedure at a mean follow-up of 24.1 ± 5.3 months. At oesophagoscopy following the procedure slight blistering of the mucosa was observed in all the patients with blood streaking of the mucosa noted in only one. There was no evidence of splitting detected in the oesophagus. The four patients reported improvement of their symptoms with relief of dysphagia immediately following the dilatation. Also the
interval between dilatations increased by a mean of $5.7 \pm 2.8$ versus $3.1 \pm 3.3$ months when dilated with Hurst–Maloney dilators.

4. Discussion

It has been our practice to use Hurst–Maloney dilators for these patients, however because of the nature of these strictures, the progressive shortening of the interval between dilatations and increased risk of complications, we had to consider alternative methods. Conventional methods in these highly selected cases were hazardous because of the anatomy caused by multiple previous surgery. Stents could not be employed because of proximity of the obstruction to the larynx or to the oesoghago–gastric junction where displacement occurs frequently and where previous myotomy been carried out with presence of not just a large defect in the oesophageal muscle at the lower end but also multiple diverticula which are commonly seen in the case of previous reflux surgery. The intra-aortic balloon pump was a logical solution as it offers a wide range of sizes, gradual increase in pressure inside the balloon with a safety device of the pump to stop ballooning if the pressure inside the balloon, due to resistance of the stricture, becomes excessive. This provides a feed back mechanism not available with any of the rigid dilators or the balloon dilators.

The cost of using intra-aortic balloon pumps may be prohibitive (£425 = 595 euro in our unit), however in complicated cases with high risk of perforation this could be easily justified. The current risk of infection transmission and the absence of manufacturer’s guarantee to allow the reuse of balloons caused us to use these balloons for a single time. However, the introduction of reusable balloons specifically designed for oesophageal dilatation would significantly reduce the cost of this procedure.

Although no complications were observed in these four patients, there is obviously the need for a large population study which is underway to determine the safety and efficacy of balloon pumps for oesophageal strictures before moving on to a randomised trial comparing it with the currently established methods.

References