Management of benign oesophageal strictures in children

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Abstract Managing oesophageal strictures, whether benign or malignant has always been a challenging task for ENT Surgeons, Endoscopists, Cardio-thoracic surgeons and Gastro-enterologists. Although various newer technological developments have helped in better management of malignant strictures, it is the benign strictures that are still being managed by conventional means with gum-elastic bougies and other dilatation techniques. Children are not immune to benign strictures, rather corrosive strictures, congenital webs and membranes etc. are much more common in the paediatric age group. We present the technical details and our experience in managing benign oesophageal strictures in five children by endoscopic balloon dilatation.

Keywords Benign oesophageal strictures · Endoscopic balloon dilatation

Introduction

Dysphagia in children is a serious problem. Inadequate dietary intake due to this may lead to chronic malnutrition and other related problems. Prompt and thorough evaluation of a child with dysphagia and its management is therefore very important to prevent complications and long-term sequelae.

Accidental ingestion of corrosive agents leads to serious upper aero digestive and oesophageal injuries in children. The natural curiosity of children, to put things in the mouth, their tendency to taste everything and the availability of chemicals in and around the house creates an ideal environment for corrosive oesophageal injuries. Majority of cases of corrosive strictures are caused by ingestion of alkalis, as because these agents are most commonly available and used as household cleaning agents and detergents. In a small number of cases, caustic burns and oesophageal strictures are due to acids and substances such as Lysol (Phenol based) and bleach (Sodium hypo chlorite).

The treatment of oesophageal strictures aims to relieve dysphagia and to prevent recurrent oesophageal narrowing. Although adult strictures are still being managed by bougienage in many centres, newer dilatation methods are now available for better management of various benign strictures particularly in children where the traditional methods may be very traumatic. Endoscopic balloon dilatation, a new non-surgical treatment modality gives a new hope in the in children.

The reason for taking up this study in the paediatric age group was the fact that we have very little information regarding safety and efficacy of bougienage in children.

Moreover, we all know that even in the best possible hands the mortality associated with surgery may be to the extent of 20% with high complication rate. Therefore endoscopic balloon dilatation is the better choice and surgery is considered only where dilatation fails.

In the present study, five children presenting with dysphagia due to benign oesophageal strictures were managed

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by endoscopic balloon dilatation. Relief of dysphagia and improvement of general health was assessed; recurrence, number of dilatation sessions and complications were recorded and costs estimated.

Material and methods

Five children (3 males and 2 females between 4 and 12 years of age) underwent endoscopic balloon dilatation for benign oesophageal stricture at Swagat Endolaparoscopic Surgical Research Institute, Guwahati in the period between March 2002 to May 2005. The cause of stricture was established on the basis of detailed history as obtained from the patient or parents. Out of five patients, four had corrosive strictures and one had a congenital web. Dysphagia was the predominant symptom and on physical examination, marked weight loss was noted in all. A four year old male patient who not only had corrosive stricture in the oesophagus but also severe burn scar involving lips and oral cavity had been on feeding jejunostomy before being referred to this Institute for further treatment (Fig. 1).

After a thorough Ear, Nose, Throat and General examination, all patients underwent a complete routine investigation with Ba-swallow X-Ray of the oesophagus which showed fibrotic stricture with no mucosal irregularity (Fig. 2). We did not perform a routine preliminary upper G. I. endoscopy in our cases as because that needed general anaesthesia and endoscopy was postponed till a final decision regarding treatment was taken. Parents were informed about possible complications that might result from the treatment and a written consent form was signed before the procedure.

The basic requirement for endoscopic balloon dilatation is a complete endoscopic set up with a forward viewing endoscope, a mobile c-arm, various sizes of balloon dilators - preferably TTS (through the scope) with 60 c.c. Inflation device and .038-inch stiff guide wire. Controlled Radial Expansion Balloon dilators (CRE) of Microvasive Boston Scientific Corporation varying from 6mm to 20 mm in diameter and 8 cm long were used during the study.

Procedure

After induction of general anaesthesia, preliminary endoscopy was done with the patient in left lateral position, taking care of the tongue and the mouth (Fig. 3). The site, length and number of strictures were determined by contrast radiography and endoscopy. The stricture length varied from 3cm to 5 cm, with an average of 4 cm. The stricture was then negotiated with .038-inch guide wire or tip of TTS balloon dilator (Fig. 4). The balloon was inflated with equal amount of air and saline to the desired diameter (Fig. 5). For children below 5 years a balloon with a outer diameter of 10–12 mm was used, which could be achieved with inflation pressure varying from 3 ATMs to 8 ATMs (10mm-3ATM, 11mm-5ATM, 12mm-9ATMs), and for

children above 5 years of age, the adult type CRE balloon of 15–18 mm diameter was used, where maximum outer inflation diameter of 15 mm was used for dilatation with 3 ATMs pressure measured by pressure gauge. Some amount of contrast material was also instilled inside the balloon prior to air inflation for better visualization on I.I.T.V. Correct positioning of the balloon was confirmed fluoroscopically. When the stricture was dilated, the fully dilated balloon was maintained for approximately 60 seconds. Once the dilatation was completed, the balloon was deflated and withdrawn along with the scope.

The balloon was inflated until elimination of the stricture waist was seen fluoroscopically (Fig. 6). If the waist did not disappear we repeated dilatation again in the same sitting. We stopped dilatation when there was sudden fall in pressure in the pressure gauge. Some amount of blood seen on the surface of the balloon indicates adequate dilatation. Dilatation was considered adequate if the oesophageal

Fig. 1 Photograph showing caustic burn scars involving lips and neck

Fig. 2 Barium swallow oesophagogram showing fibrotic stricture

Fig. 3 Positioning of the patient during endoscopy

Fig. 4 The stricture being negotiated with tip of T T S balloon dilator

Fig. 5 The stricture being dilated with inflated balloon

lumen could be dilated up to 11mm diameter in patients below 5 years of age, and upto 15 mm in patients above 5 years (Fig. 7).

Post dilatation, we allowed liquid diet after 6 hours, and a check X- Ray chest was done after 24 hours to rule out any air in the mediastinum. Ba Swallow X-Ray was done after 24 hours to give an idea about the extent of dilatation, any leakage and height of the column of barium. Patients were discharged between 2nd to 3rd day after balloon dilatation. Repeat dilatations were scheduled if symptoms of dysphagia recurred.

Results

All children had immediate relief of dysphagia, with only one complaining of chest pain after balloon dilatation who responded well to simple analgesics. Repeat dilatation was needed in four corrosive stricture cases within 3 to 22 months period with an average of 3.6 dilatation sessions (range 1 to 5). There was no major complication encountered in our series. After a successful initial dilatation follow up was done at 2 weeks, 2 months and 6 months interval. If dysphagia recurred, dilatation was repeated as often as necessary to restore an adequate oesophageal lumen. Patients with long strictures (more than 4cm) required a significantly higher number of sessions than those with smaller strictures.

Discussion

Ingestion of corrosive substances has been reported as the most common cause of benign oesophageal strictures (1% to 38% of all cases of strictures) in children in India as well as in some other parts of the world. Endoscopic sclerotherapy is another important cause of benign oesophageal stricture in young children with portal hypertension. Although achalasia is predominantly seen in the adult population, approximately 5% of cases may occur in children. Congenital oesophageal strictures consisting of membranous webs, fibromuscular and cartilaginous histopathologic types are relatively uncommon. Postoperative strictures occur in 18% to 50% of patients who have undergone repair of oesophageal atresia with or without associated tracheoesophageal fistula. Radiation injury to the oesophagus can lead to stricture development in children. Rare dermatological disease such as epidermolysis bullosa dystrophica can also result in oesophageal stricture.

In the 16th century, the people of Boujiyah – a centre of North Africa used tapered candles for dilatation of oesophageal strictures – hence the name ‘bougienage’ has been given. Later on, different types of dilators have been prepared for dilatation. Bougie dilatation is an accepted and effective treatment for benign oesophageal strictures in adults. Pereira Lima et al (1999) performed 1043 bougie dilatation sessions in 153 patients with benign oesophageal strictures and found this method to be safe and effective in

Fig. 6 Elimination of the stricture waist seen fluoroscopically

Fig. 7 Endoscopic view of the stricture after dilatation

Fig. 8 Diagram showing the principles of dilatation by bougienage and endoscopic balloon

relieving dysphagia. Similar results were obtained by Broor et al (1993) in a series of 123 adults with benign strictures. Poddar et al (2001) performed Savary-Gilliard bougie dilatation in 107 Indian children and found this procedure to be safe and effective.

Although in two large series, Broor et al (1996) had reported high success rate by bougienage in children, the main drawbacks were and will remain the high rate of recurrence and the necessity for several sessions with high rates of complications like bleeding and perforation (1.8%).

Failure to respond to dilatation may necessitate surgery in the form of oesophagectomy and reconstruction or colonic interposition. However, surgery is associated with high mortality rate (5.7% to 20%) and with high complication rate, including anastomotic leak, mediastinitis, bowel necrosis and anastomotic stricture formation. Therefore, surgery should be reserved for those in whom endoscopic dilatation is not possible and for those with complications caused by dilatation.

In the past two decades, endoscopic balloon dilatation has been used to treat benign oesophageal strictures. Dilatation with a balloon is better than with a bougie because the expansile force is applied uniformly and radially at the site of the stricture, whereas a bougie exerts a shearing axial force that results in a greater degree of trauma and thereby increases the risk of perforation (Fig. 8). Various studies have reported that this technique is especially effective for treating congenital rather than acquired oesophageal strictures in children. The single case in our small series had congenital web, which was successfully treated by a session of balloon dilatation. The patient was under follow up for a period of 2 years and there was no recurrence of dysphagia.

Yeming W. et al (2002) studied a series of 20 children who underwent balloon dilatation for oesophageal stricture and found 100% success rate in patients having congenital stricture. He achieved 70% success rate in patients having corrosive stricture with one child suffering perforation requiring urgent surgical intervention. Lan et al (2003) reported 60% to 80% success rate with balloon dilatation in patients with caustic oesophageal strictures. Mekki M et al (2001) reported a very high success rate with no complication in a small series consisting of 5 children with corrosive oesophageal stenosis. Joshua L Weintraul et al (2006) also reported high success rate (100%) by balloon dilatation in 49 children with benign oesophageal strictures.

There are several advantages of endoscopic balloon dilatation over bougienage. As is obvious, the balloon dilatation is under vision and not blind; moreover we do not need multiple insertions. There are hardly any complications, and if there are any, they can be managed immediately under vision. The only disadvantage is that a balloon is far more costly than a bougie, and it is recommended that the balloon be used only once. A majority of patients in the present study had corrosive oesophageal strictures and re-

quired multiple sessions of dilatation making the procedure more expensive.

Conclusion

Although a variety of treatment options are available to relieve dysphagia in children with benign oesophageal strictures. Although the preliminary results of a small series of 5 cases seem to be very exciting and it appears to be a safe and effective method, to draw further conclusions we would need much larger series. The necessity of an endoscopic system with facilities of fluoroscopy and the cost of accessories would always remain a prohibitive factor against the routine use and popularity of this modality of treatment. Cheaper balloons and accessories need to be designed for wider acceptance of this technique.

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