

Surgical Management of Severe Peptic Esophageal Stricture in Children

Abdulrahman Al-Bassam, FRCSEd

Department of Surgery, Pediatric Surgery Division, Riyadh, Kingdom of Saudi Arabia
Corresponding Author: Dr. Abdulrahman Al-Bassam, FRCSEd, P.O. Box 86572, Riyadh 11632
Kingdom of Saudi Arabia

Tel: +966 1 467 1575/1576, Fax: +966 1 467 94 93, E-mail: abassam@ksu.edu.sa

KEY WORDS:

Gastroesophageal reflux; Esophageal stricture; Peptic stricture; Children

ABBREVIATIONS:

Gastroesophageal Reflux (GER)

ABSTRACT

Background/Aims: In spite of the well-established treatment of gastroesophageal reflux in children, the surgical management of peptic esophageal stricture remains controversial. Previous studies adopted various treatment protocols and included strictures with various degrees of severity. In this study, we selectively reviewed children with severe peptic strictures treated with a specific treatment protocol of preoperative esophageal dilatation, Nissen's fundoplication and postoperative dilatation.

Methodology: We reviewed medical records of all patients with severe peptic esophageal stricture treated by the above-mentioned protocol at King Khalid University Hospital, Riyadh between 1995 and 2000. Data collected included the following: presenting symptoms, methods of diagnosis and the outcome of therapy.

Results: Ten consecutive patients who were treated for severe reflux esophageal strictures were included. Their age at surgery ranged between 2 to 12 years (mean, 5.6 years). All patients had a trial of medical

treatment which failed to give any improvement of symptoms. Subsequently, all patients underwent a protocol of preoperative esophageal dilatation, Nissen's fundoplication and finally postoperative dilatation. Two patients had esophageal perforations: one by the flexible endoscope during the preoperative assessment and the other during preoperative dilatation. There were no mortalities. Eight patients showed marked improvement in their clinical symptoms and complete resolution of strictures radiologically and the remaining two showed significant improvement clinically and radiologically. The average follow-up period was 3 years (range, 1-5 years).

Conclusions: We conclude that preoperative dilatation, Nissen's fundoplication, and postoperative dilatation is an effective approach to treat severe pediatric peptic esophageal strictures. Other aggressive approaches described in the literature such as resection and/or replacement of the stricture are rarely indicated even for the most severe strictures.

INTRODUCTION

Gastroesophageal reflux (GER) is the most common cause of a benign esophageal stricture in children. In spite of the well-established treatment of GER in children, the surgical treatment of peptic esophageal stricture remains controversial (1). Different modalities of treatment have been tried including medical therapy, antireflux surgery alone, repeated dilatation, resection, and interposition. We reviewed our experience in the surgical management of children with severe peptic esophageal strictures utilizing a protocol of preoperative dilatation, Nissen's fundoplication and postoperative dilatation.

METHODOLOGY

The medical records of all children with severe peptic esophageal strictures treated with dilatation and Nissen's fundoplication between 1995 and 2000 at King Khalid University, Riyadh, Saudi Arabia were reviewed. The child was considered to have a severe stricture only if the following 3 criteria were present: clinically, there is dysphagia to fluid diet, the stricture is too tight to allow passage of the pediatric esophagoscope, and the stricture is longer than 4cm as seen in

the esophagogram. Data collected included the following: presenting symptoms, methods of diagnosis and the outcome of therapy. The same management protocol was applied to all patients and included: 1) Establishing the diagnosis of reflux stricture and excluding other causes of strictures. 2) A trial of medical therapy for six weeks using antacids, Cisapride, Ranitine or Omeprazole aimed to relieve GER symptoms, control of esophagitis and improve the nutritional status. 3) Preoperative dilatation using Savary-Gillard dilators performed under general anesthesia until adequate size esophagus was obtained and subsequent oral fluid intake was possible. 4) Nissen's fundoplication with or without intraoperative dilatation and gastrostomy tube insertion as indicated. 5) Postoperative dilatation was started 6-8 weeks after Nissen's Fundoplication with an interval of 2-3 weeks between dilatations until the stricture resolves clinically and radiologically.

RESULTS

Ten patients with severe peptic esophageal strictures were treated using this protocol. There were 8 males and 2 females. Their mean age at surgery was

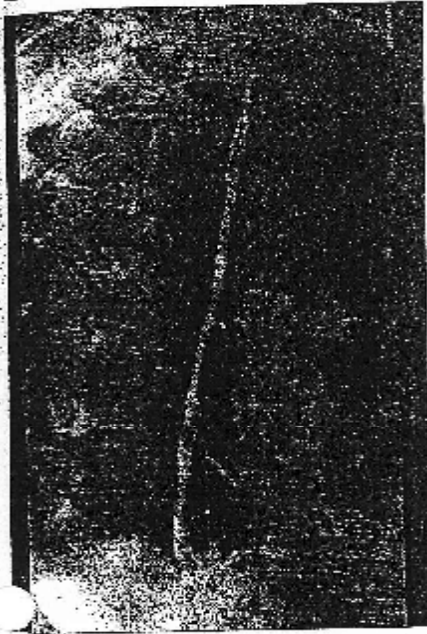


FIGURE 1
Preoperative esophagogram showing long stricture area, involving almost the whole thoracic esophagus with smooth outline.

TABLE 1 Clinical Presentation

Symptoms	No. of patients
Vomiting/Regurgitation	10
Dysphagia	10
Failure to thrive	8
Respiratory	4
Abdominal pain	3
Hematemesis	1

5.6 years (range, 2 to 12 years) and their mean age at developing the first symptoms of GER/Stricture was 8.6 months (1 to 36 months). The mean time interval between the appearance of symptoms and dysphagia was 30 months (range from 1 to 48 months). The presenting symptoms are summarized in Table 1. Eight patients had medical conditions associated with peptic esophageal strictures. These were neurological diseases in three, Down's syndrome in two, and sickle-cell trait, severe bronchial asthma, atrial septal defect and undescended testis in one patient each.

Contrast esophagogram and esophagoscopy (flexible or rigid) were the main diagnostic studies utilized and both were done in every patient. Other studies like pH monitoring, biopsy and milk scan were also used in some patients. Contrast esophagogram demonstrated a severe stricture longer than 4cm in all patients. Associate conditions diagnosed by the esophagogram included hiatus hernia in six and short esophagus in one patient. Strictures were confined to the distal half of the esophagus in all patients. The stricture length varied from 4.5-12cm (Figure 1). Preoperative esophagoscopy (flexible or rigid) was performed under general anesthesia in all patients but the esophagoscope could not be passed through the stricture in any of the cases. A biopsy from the area just above the stricture was done in 4 patients and his-

topathological examination showed esophagitis in all cases.

All patients received a trial of medical treatment for GER that lasted between 6 to 52 weeks (mean, 37 weeks) before referral to the Pediatric Surgery service.

Medical treatment alone failed to significantly improve symptoms in any of the patients. Preoperative esophageal dilatations were done over a period of 2-5 months. The mean number of dilatations performed per patient ranged from 2 to 5 (mean, 2.8 dilatations). Standard Nissen's Fundoplication was then performed through an abdominal approach. A concomitant gastroscopy tube was placed in two patients to improve the nutritional status. All patients underwent postoperative dilatations that ranged between 2-10 (mean, 4.6 dilatations per patient). Postoperative dilatations continued until clinical resolution of symptoms and radiological disappearance of the stricture (this took up to 12 months in some patients).

There was no mortality in the series. Two patients had esophageal perforations. One perforation was caused by flexible endoscope during preoperative assessment and the other one during preoperative dilatation of a long stricture. Esophageal perforation was treated by thoracotomy and repair in the first patient and conservative treatment in the latter patient with no further complications.

Follow-up ranged from one to five years with a mean of three years. In all patients, follow-up assessment included review of any residual symptoms, contrast esophagogram and endoscopic evaluation. All patients were able to swallow solids without difficulty.

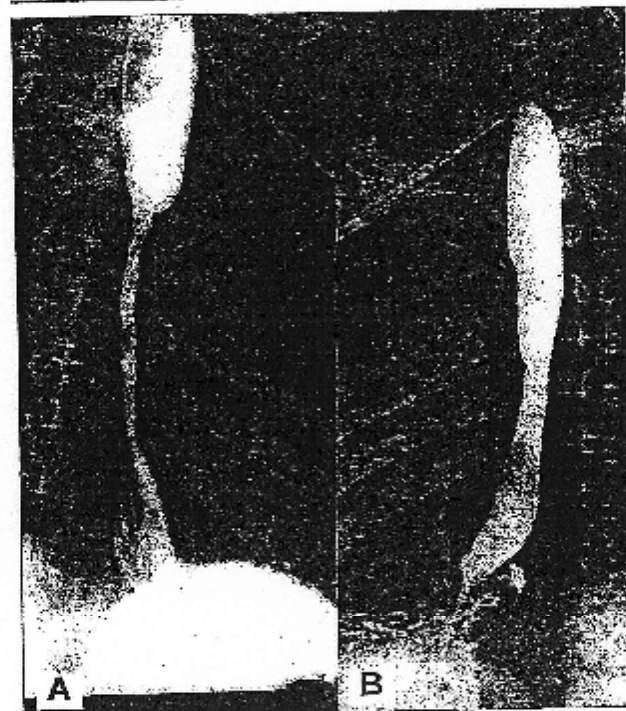


FIGURE 2 A: The initial swallow examination of this patient showed long, smooth outline stricture associated with small hiatus hernia. **B:** Follow-up esophagogram 6 months postoperatively showed significant improvement and distension of the stricture area.

TABLE 2 Reported Series using a Management Protocol of Antireflux Surgery and Dilatation (Pre- and Postoperative) in Children

Authors	No. of Patients	Mean follow-up (yr)	Outcome
Boix-ochoa <i>et al.</i> (1965)	28	-----	Good results in all patients
Monero <i>et al.</i> (1973)	28	-----	Good results in 24 patients
Hicks <i>et al.</i> (1980)	13	1	Complete resolution in 10 patients and improvement in the remaining 3 patients
O'Neil <i>et al.</i> (1982)	18	2.8	Complete resolution in 12 patients and significant improvement in the remaining six
Rode <i>et al.</i> (1992)	16	8.2	Complete resolution in 14 cases, disrupted Nissen in one patient and resection done in two
Present series	10	3	Complete resolution in 8 patients, significant improvement in the remaining two

Esophagogram and endoscopic evaluation showed complete resolution of the stricture in 8 patients and mild residual narrowing of esophagus in the remaining 2 patients (Figure 2). Minimal residual reflux was also observed in one patient.

DISCUSSION

Gastroesophageal reflux is the most common cause of benign esophageal strictures. In children, the incidence of stricture in association with GER varies from 15-40% (2,3). The rate of antireflux surgery for peptic esophageal stricture is variable in the literature and ranged from 2.5 to 50% (4). This wide variation is hard to explain but may be related to the fact that prolonged medical treatment may cause relief of symptoms and hence the treating physician may never refer the patient for the pediatric surgeon.

An esophageal stricture secondary to reflux is the end result of a process of repeated insults to the esophageal mucosa which is manifested histologically as chronic esophagitis and fibrous replacement of damaged tissue commencing in the submucosa and extends outwards (1). Why a stricture develops in some patients but not in others remains unknown. However, the most important factors are prolonged esophageal acid exposure, the variability of the mucosal defense mechanism and the noxiousness of the refluxate (5).

Esophagography and esophagoscopy are usually sufficient for the diagnosis and follow-up assessment for patients with peptic esophageal strictures. pH monitoring and endoscopic biopsy are not only difficult to perform but may also cause significant risk of perforations especially in patients with narrow long strictures. We, like others, believe that the usual tests utilized to demonstrate GER may be altered in patients with esophageal strictures because the stricture may act as a barrier to reflux high in the esophagus (2). Accordingly, careful interpretation of these tests and clinical correlation are necessary to uncover the exact cause of stricture. pH monitoring and esophageal pressure monitoring are ancillary measures that may be of help to confirm that a stricture is due to reflux and are of help as postoperative follow-up studies (3).

The management of esophageal peptic stricture is controversial. Different modalities have been tried including, medical therapy, repeated dilatation alone, antireflux surgery, preoperative dilatation before antireflux surgery followed by postoperative dilatation, resection and interposition (1,3,6-9). Comparative studies comparing different modalities of treatment are lacking (10). There is little data in the literature regarding reflux strictures in childhood and most of the experience in this field has been with adults. In adults, medical treatment of reflux-induced stricture has been reported to fail in 15-40% of patients (1,2,11). In children, the failure rate of medical treatment is higher probably because of poor compliance with long-term medical therapy. We, like others strongly believe that most peptic esophageal stricture in children will eventually require antireflux surgery (1-3,6,8). Antireflux surgery is an important part of any management protocol and has been successful in resolution of GER and associated stricture (2,7,12). The favorable results reported in the literature demonstrate that antireflux surgery and dilations is an effective approach (1-3,6-8). Mercer and Hill (7) have reported 160 adult patients with peptic esophageal stricture treated with antireflux and dilatation with good results. Boix-ochoa and Rehbein (6) had reported 54 pediatric patients with peptic esophageal strictures. Twenty-eight of them were treated with antireflux surgery and pre- and postoperative dilatation with successful results. Lastly, Rode *et al.* (1) in 1992 have reported 16 children with reflux strictures and reviewed the literature. To the best of our knowledge around 103 children with reflux strictures treated with antireflux surgery and dilatation have been reported in English literature to date with generally good results (Table 2). However, these previous studies included strictures with various degree of severity. In our study, we selectively reviewed children with "severe" peptic strictures treated with a specific protocol of preoperative esophageal dilatation, antireflux surgery and postoperative dilatation. Our study demonstrates that this approach is effective even in the most severe stricture and thus aggressive surgical approaches like resection and bowel interposition could be avoided. Early studies in adults advo-

cated resection of the strictures with esophagogastrotomy, bowel interposition, and gastric tube (2,13-15). On both adults and children surgical treatment of peptic esophageal stricture has evolved towards conservative non-resectional techniques (1,2,16,17).

In conclusion, preoperative dilatation, Nissen's fundoplication and postoperative dilatation is an effective

approach to treat severe pediatric peptic esophageal strictures. Other aggressive approaches such as resection and or replacement of the strictured esophagus is rarely indicated. Follow-up with esophagogram and/or endoscopy is advocated to detect early recurrences and to ensure complete recovery.

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