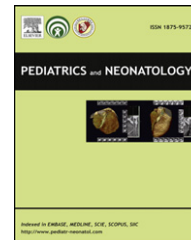




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ORIGINAL ARTICLE

Endoscopic Balloon Dilatation for Esophageal Strictures in Children Younger Than 6 Years: Experience in a Medical Center

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Key Words

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Esophageal strictures in children may be caused by congenital anomaly, caustic agent or foreign body ingestion, complication of reflux esophagitis, and after esophageal surgery. Accidental ingestion of alkaline fluid is the most common cause of corrosive esophagitis in children in Taiwan. In this article, we studied 10 pediatric patients who had esophageal strictures and required endoscopic balloon dilatation (EBD) therapy under general anesthesia from January 2003 to June 2009. The median age of the studied children who received their first EBD treatment was 36.2 months (13.4–60.9 months), with a dilator size of 8.0 mm (5–12 mm). The interval between injury and initial EBD was 3.0 months (1.3–60.8 months). The treatment duration averaged 16.7 months (3.0–69.3 months), with 13.5 (4–31) instances of EBD therapy per patient. The greater the length of stricture, the more number of times EBD was needed. In these cases, no severe complication was found after the procedure. The result indicated that EBD under general anesthesia was a safe and effective method to resolve the symptom of dysphagia and diet condition. Because of the limited number of study cases, long-term studies are required to further confirm the clinical effect of EBD under general anesthesia. Copyright © 2011, Taiwan Pediatric Association. Published by Elsevier Taiwan LLC. All rights reserved.

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1. Introduction

Esophageal strictures in children may be caused by congenital anomaly, caustic agent or foreign body ingestion, complication of reflux esophagitis, and after esophageal surgery.¹ Accidental ingestion of alkaline fluid is the most common cause of corrosive esophagitis in children in Taiwan.² People in Taiwan have “zong zi” (a traditional Chinese food made of sticky rice) to celebrate the Dragon Boat Festival. To prepare “zong zi,” a strong alkaline fluid is used to mix the rice before cooking it. There have been cases in the past in which children ingested the alkaline fluid by accident and thus suffered from severe corrosive esophagitis and esophageal strictures. Endoscopic balloon dilatation (EBD) is a nonsurgical method that treats esophageal strictures. It is relatively uncommon that EBD is used to treat pediatric patients. This study sets out to evaluate the results and procedures of EBD therapy performed on children with esophageal strictures under general anesthesia in a medical center.

2. Methods

This study was retrospective, based on a review of medical charts. Ten children with esophageal strictures treated by EBD in the Department of Pediatrics, China Medical University Hospital, Taichung, Taiwan, between January 2003 and June 2009, were enrolled in our study. We divided the patients into two groups.

- (1) Finished group: after a series of EBD treatments, the patients could eat soft or solid food, and no further EBD treatment was needed.
- (2) Unfinished group: the patients received EBD treatment, but further treatments, such as EBD or surgical intervention, were required to improve their diet condition.

The equipments used for EBD in this particular study were as follows:

- (1) Flexible video endoscope and light source (Olympus CV-240 EVIS Video Endoscopy System; Olympus CLV-U40 EVIS Universal Light Source, Tokyo, Japan);
- (2) Esophageal balloon dilatation catheter (Boston Scientific Microvasive Controlled Radial Expansion Dilatation, Natick, MA, USA).

After we informed the family of the patient regarding the procedure and risk of EBD and general anesthesia, they needed to agree and sign informed consent. Then, nothing by mouth was taken for at least 10 hours before the procedure. Patients received general anesthesia in an operating room. The size of the dilator was chosen depending on the diameter of the esophageal stricture portion. The procedures performed for EBD in this particular study were as follows: (1) the dilator balloon was inflated slowly; (2) the pressure was held for 40 seconds at the desired pressure; (3) the pressure of the balloon was released for at least 20 seconds; (4) the procedure was repeated one more time; and (5) the dilator size was increased gradually until marked bleeding or severe laceration was noted.

Then, the patient remained fasting for 1 day, and cefazolin or ampicillin intravenous injection was used during that day. If no fever or hemorrhage was noted, the patient was discharged the next day, and he or she took first-generation oral-form antibiotics for at least 3 days to prevent wound infection.

We recorded patients' sex, age, and cause of esophageal strictures, and compared the z scores of body weight and height, size of dilator, and diet between the first and the last EBD treatment. We also recorded the mean interval of EBD, total duration of follow-up, instances of dilatation, frequency, and rate of increase in dilator size.

All patients had undergone an esophagogram to evaluate the severity of injury, as in the example in Figure 1. The length and irregularity of the strictures were related to the severity of the illness and the treatment required.³ Because the esophagus begins at the level of the cricoid cartilage (T1 vertebra) and terminates at the level of T11 vertebra,⁴ we measured the distance between T1 and T11 vertebrae of the esophagogram as the whole length of the esophagus. Then we measured the distance of the stricture area on the level of vertebra of the esophagogram. After that, we counted the percentage of the length of stricture to evaluate the severity.

3. Results

From January 2003 to June 2009, a total of 10 patients who had esophageal strictures required EBD therapy. The results of the study are summarized in Table 1.⁵ The ratio of boys and girls was 3:2, and the median age at injury was 23.3 months (ranging from 0.1 month to 50 months). The causes of esophageal strictures included chemical agent injury (70%), congenital anomaly [tracheoesophageal (TE) fistula], post-esophageal surgery complicated with esophageal stricture (20%), and esophageal foreign body (10%). Eight patients were placed in the finished group. Two patients were placed in the unfinished group. The summary of treatment modalities of all cases is shown in Figure 2. If the patient had poor response to EBD treatment, such as diet condition not improving, poor body weight and height gain, or severe esophageal stricture, we would refer the patient for surgical intervention. Nine out of 10 cases with esophageal strictures received EBD in the first instance, whereas the remaining patient was treated by colon interposition before EBD (because of the diameter of stricture area being too small for EBD treatment) for stricture of anastomosis of esophageal colonic junction. One patient (Case 5) with corrosive esophagitis had received EBD 25 times before colon interposition. Because of poor body weight and height gain, he was referred for surgical intervention. After that, he also had six instances of EBD for strictures of anastomosis of esophageal colonic junction to improve his condition.

The median age of the patients and first-dilator size were 36.2 months (13.4–60.9 months) and 8.0 mm (5–12 mm), respectively. The interval between injury and initial EBD was 3.0 months (1.3–60.8 months). Two patients underwent the first EBD treatment at 36.6 months and 60.8 months of age. The result indicated that TE fistula status post esophagoesophageostomy complicated with esophageal

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