

Fluoroscopy-Guided Balloon Dilatation of Benign Esophageal Strictures: A Single Center Study

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ABSTRACT

Objective: To review the efficacy and safety of balloon dilatation among children with benign esophageal strictures.

Methods: This is a retrospective review of 209 balloon dilation procedures performed under fluoroscopy guidance on 66 patients (38 male and 28 female) with benign esophageal strictures over 27 months (January 2009 to March 2011). The study was conducted at King Hussein Medical Centre. Patients had a mean age of 26 months and a median of 3.2 (1-18) dilatations. Immediate technical success was defined as the ability to dilate the stricture without complications. Long term success was defined as the disappearance of presenting symptoms for a minimum of 12 months post procedure. All patients had the procedure performed under general anesthesia with pre and post procedure esophagogram. Simple descriptive statistics (frequency, mean and percentage) were used to describe the study variables.

Results: Immediate technical success was noted in 208 procedures (99.5%). Esophageal perforation was encountered in one patient at the fifth dilatation session (type1 perforation). Long term success was achieved in 44%, 42% and 14% of cases following a single, two to five and more than five interventions consecutively.

Conclusion: Fluoroscopy-guided balloon dilatation procedure is a simple, safe and efficacious modality for treatment for benign esophageal strictures in children, with low rate of complications.

Key words: Benign esophageal strictures, Balloon Dilatation, Fluoroscopy

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Introduction

Benign esophageal stricture is a commonly encountered problem in our clinical practice.⁽¹⁻⁴⁾ Malnutrition, aspiration, pain and respiratory failure are encountered complications which may result from these benign strictures.⁽⁵⁻⁷⁾ Interventions are usually required to manage the dysphagia or to treat the stricture-related complications.⁽⁸⁻¹⁰⁾ Surgical repair is still

considered as a curative method of treatment; however it is associated with high rates of morbidity and mortality.⁽¹¹⁻¹³⁾ Endoscopic dilatation is another treatment option which is associated with a perforation rate of 0.1-0.3%.⁽¹⁴⁾ Balloon dilatation has been increasingly considered as a safe, effective, and relatively less invasive alternative treatment option for these lesions.⁽¹⁵⁾ In this single center a retrospective review was conducted at King Hussein Medical

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Center for a total of 209 balloon dilatation procedures which were performed for 66 patients over a period of 27 months starting January 2009 till March 2011. The aim of this study was to review the efficacy and safety of fluoroscopy-guided balloon dilatation in children with benign esophageal strictures.

Methods

During the period from January 2009 to March 2011, a total of 70 patients were referred for balloon dilatation of benign esophageal strictures. Four patients were found to have complete esophageal obstruction which could not be treated, and were referred for surgery. Those patients were excluded from our study. The remaining 66 patients (38 boys and 28 girls), with a mean age of 26 months (8-76 months) underwent fluoroscopy-guided esophageal dilatation. The main presenting symptoms included excessive drooling unrelated to oral intake (15 patients), regurgitation of food particles immediately after oral intake (38 patients), and discomfort associated with oral intake (13 patients). Esophagography was performed for all patients prior to the balloon dilatation procedure to evaluate the stricture location, extent, and severity. General anesthesia was used in all patients. Under fluoroscopic guidance, a guide wire with a soft tip (Terumo) was introduced through the mouth, manipulated through the stricture, and passed into the stomach. A multipurpose catheter was passed into the stomach over the wire, the wire was then pulled out, and water-soluble contrast was injected through the catheter starting distally in the stomach and continued as the catheter was pulled gradually proximally along the esophagus to demonstrate the site of stricture, and characterize it. The same guide wire was introduced through the catheter and passed through the stricture into the stomach. A balloon catheter of proper size was advanced over a guide wire, and placed across the stricture. The balloon was then inflated to the recommended luminal pressure. The balloon was kept inflated in site for 45 seconds. The balloon size was determined according to the size of the healthy esophagus distal to the stricture. Inflations were repeated three times per session. On subsequent sessions the balloon catheter size was increased by 2mm.

At the end of the session, a pull-back esophagography was performed through the retracted balloon catheter to rule out esophageal perforation. The patients were allowed a soft, warm diet for 24 hours followed by resumption of regular diet. If symptoms recurred a repeat dilatation was scheduled. Table I demonstrates the relation between the number of patients, and the number of procedure repeated per patient.

Multiple clinical and radiological data of the patients were obtained from their medical records including improvement in the patient's age-appropriate food intake, dysphagia following each dilatation session, number of dilatations for each patient, and any procedure related complications. Immediate technical success was defined as the ability to dilate the lesion with no complications. Long-term success was defined as relief of the presenting symptoms for at least 12 months after the dilatation session.^(10,13) Simple descriptive statistics (frequency, mean and percentage) were used to describe the study variables.

Results

Immediate technical success was encountered in 208 procedures (99.5%). Esophageal perforation was encountered in one patient at the fifth dilatation session, and the patient was treated conservatively (hospital admission for observation, NPO, and IV antibiotics).

Of the 66 patients, 29 patients (44%) had long-term success achieved following a single intervention. Twenty-eight patients (42%) required 2-5 interventions to achieve long-term success, and only 9 patients (14%) required more than 5 interventions. Table II demonstrates the relation between the cause of the stricture and the number of interventions required.

Discussion

Benign esophageal stricture, which is not an uncommonly encountered problem, can result from several benign processes that either obstruct the esophagus, or induce inflammatory or fibrotic changes resulting in esophageal narrowing,^(1-4,16-19) which in turn causes dysphagia, and other associated complications including malnutrition, aspiration, pain and respiratory failure.^(9,10,11) Deep esophageal injuries caused by peptic ulcer disease, surgery,

Table I: Number of patients and procedures repeated per patient.

Number of Procedures	Number of Patients
1	29
2	12
3	6
4	7
5	3
7	2
8	1
9	3
10	1
18	2
Total: 209 Procedures	Total: 66 Patients

Table II: The relation between cause of stricture and number of procedures required.

Stricture Cause	1 Intervention	2-5 Interventions	>5 Interventions	Total
Benign Web	9	0	0	9
Local Surgery	20	2	0	22
Corrosive ingestion	0	26	9	35
Total	29	28	9	66



Fig 1: Spot images showing a long moderate esophageal stricture with focal severe stenosis which is dilated with a 10mm balloon.

radiation therapy, Schatzki's ring, esophageal webs or corrosive injury, result in benign esophageal strictures.⁽⁶⁾ The pathophysiology involves stimulation of overproduction of fibrotic tissue leading eventually to the formation of benign esophageal strictures.⁽²⁰⁾

Treatment of these lesions by surgical repair remains a valid treatment option. However, it is associated with high rates of mortality and morbidity.^(11,12,13) Surgical repair related complications include leak at the anastomotic site, local infection and sepsis, malabsorption, anastomotic stricture, and anesthesia related complications. Another treatment option which is still practiced in many centers is endoscopic dilatation, which can be performed with or without fluoroscopy guidance,⁽¹⁹⁾ with a success rate of 95%.^(21,22) However, this procedure is associated with a 0.1-0.3% risk of perforation.⁽¹⁴⁾

These perforations are associated with a high mortality rate of 20%.⁽²³⁾ Fluoroscopy-guided balloon dilatation is considered a safe, effective initial option for treatment of benign esophageal strictures.^(1,3,4,12,15,24-26) Dilatation helps through widening of the luminal diameter of the esophagus by circumferential stretching and/or splitting of the stricture.^(1,3) Esophageal rupture is a serious complication which may be encountered during fluoroscopy-guided balloon dilatation. These ruptures are subdivided into three types: type 1 (intramural rupture), type 2 (transmural rupture with a contained leak), and type 3 (transmural rupture with an uncontained mediastinal leakage).

In this retrospective review for patients who have underwent balloon dilatation for benign esophageal stricture a high technical success rate (99.5%) which is comparable to other published

studies^(27,28,29) was demonstrated. Only one procedure related type rupture occurred in our review and the procedure was well tolerated by our patient population.⁽³⁰⁾

Long term success was achieved in 86% of the patients after five or less dilatations. Only 14% of the patients required more than five interventions to achieve long-term success.

Conclusion

Fluoroscopy-guided balloon dilatation procedure is a simple, safe and efficacious modality for treatment for benign esophageal strictures in children, with low rate of complications.

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