IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 17, Issue 7 Ver. 10 (July. 2018), PP 23-28
www.iosrjournals.org

Role of Endoscopy in Paediatric Stricture Oesophagus

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Abstract: *Aim: To study outcomes of endoscopic dilatations in various cases of stricture esophagus. Materials & methods : Retrospective study done in Paediatric Surgery Department, Coimbatore Medical College Hospital, 2012-2016. Number of cases – 12 (7 males and 5 females). Age group – 1-12years of age (proven cases of stricture esophagus , diagnosed by contrast studies or Upper Gastrointestinal Endoscopy (UGIE) directly). The cases included post Tracheo esophageal fistula (TEF) stricture (8), corrosive stricture(2), foreign body strictures(FB)(1) and peptic stricture(1). Dysphagia / vomiting was the presenting complaint in most of the cases. Mid esophageal stricture was present in 9 cases and lower esophageal stricture in 3 cases. Dilatation was effective in most cases with 7 being totally cured (TEF – 4, corrosive- 2,FB -1), 2 on regular follow up (TEF), 2 of them underwent surgery (Acid Peptic Disease -1, TEF -1) and 1 mortality. Number of dilatations required were less than 3 in 4 cases, 3 - 5 in 6 cases and more than 5 in 2 cases.UGIE works on the principle of Controlled Radial Expansion. Under Guide wire(if necessary) UGIE Dilatation was done for 1min to 2 mins .Mechanism is by rupturing the anastomotic/ strictured fibres resulting in luminal dilatation.Pressure used is 8-9k Pa for 1- 2mins resulting in a minimal dilatation of 8mm upto 12mm.This study is presented to emphasise the effectiveness of endoscopic dilatation in paediatric age groups and its mandate in TEF cases for improved life style in the long run.*

Keywords: *Endoscopic dilatation ,Esophageal stricture,Tracheo esophageal fistula (TEF), Upper Gastrointestinal Endoscopy (UGIE)*

Date of Submission: 05-07-2018 Date of acceptance: 23-07-2018

I. Introduction:

Esophageal strictures in children have multiple etiologies such as congenital anomalies, esophageal atresia, inflammatory disorders, eosinophilic esophagitis, gastro-esophageal reflux disease and caustic ingestion [1,2]. The incidence of the different etiologies varies between countries. In developing countries, caustic injuries are more frequent [3,4]. A benign refractory or recurrent stricture in children occurs in case of an anatomic restriction because of cicatricial luminal compromise or fibrosis that results in dysphagia in the absence of endoscopic evidence of inflammation .Endoscopic balloon dilatataion can provide a safe and effective mean of relieving esophageal strictures with good long term outcome. Balloon dilatation is safe and highly effective in children.

Aim : To study outcomes , safety, efficacy of endoscopic dilatations in benign esophageal stricture in children

II. Materials & Methods :

This is a retrospective study done in Coimbatore Medical College Hospital between the years 2012 to 2016.

Esophageal balloon dilatations were performed with flexible endoscopy.(Fig 1)The inclusion criteria includes all proven cases of benign uncomplicated stricture esophagus between the age groups of 1 to 12 years diagnosed by either contrast studies or directly by Upper Gastrointestinal contrast study (UGIE).

Children with multiple esophageal strictures , strictures with complete occlusion of the lumen or strictures with fistula were excluded from the study.

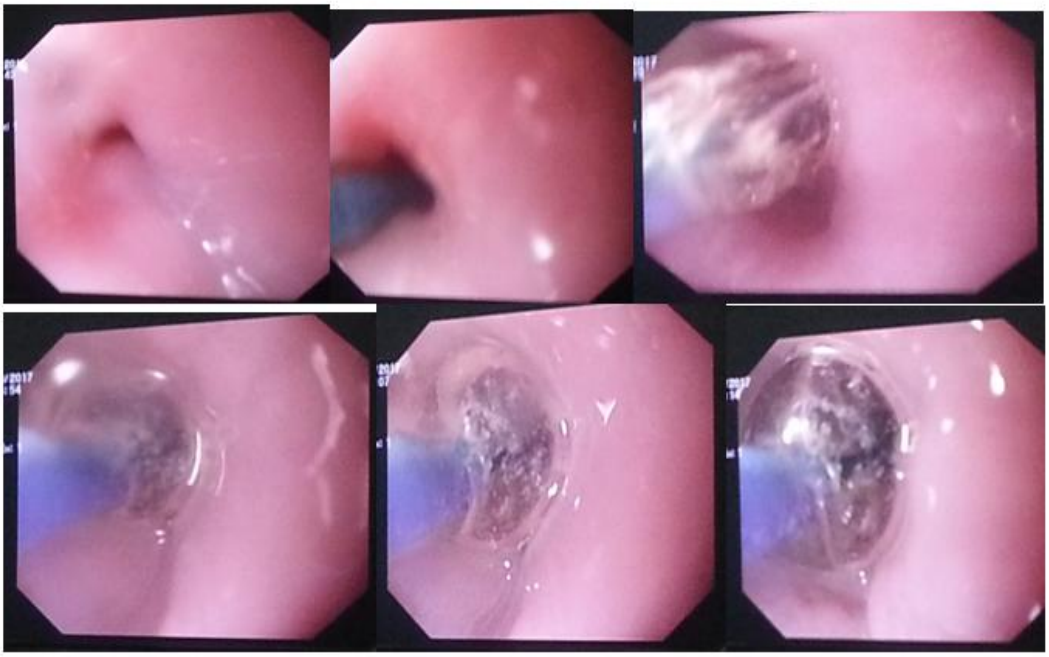

Fig 1 : Esophageal balloon dilatation

III. Results :

There were 12 people included in the study.
Post Tracheo esophageal fistula (TEF) repair Stricture Oesophagus- 8Corrosive Stricture – 2
Foreign body Stricture-1Peptic Stricture-1 Out of these 1 had a long segment stricture (more than 5 cms) whereas the rest 11 had a short segment stricture (less than 5 cms).

The site of stricture in all of these cases is illustrated in Table 1.

TABLE 1

Site	No. of cases
Upper esophagus	0
Mid esophagus	9
Lower esophagus	3

The various etiologies of the causative nature of the esophageal strictures and the respective age ranges is listed below in Table 2.

TABLE 2

AGE GROUP	TEF	APD STRICTURE	CORROSIVE	FOREIGN BODY
<1 YEAR	3	0	0	0
2-5 YEARS	3	1	1	1
6-12 YEARS	2	0	1	0

Most of these children presented with dysphagia. The presenting complaints in all the patients is shown in Table 3

TABLE 3

COMPLAINTS	NO. OF PATIENTS
DYSPHAGIA/VOMITING	8
FOREIGN BODY	1
ASPIRATION PNUEMONIA	1
SHOCK	2

The number of esophageal dilatations required ranged from 1 to 4 and 8 of the 12 cases were completely cured of the symptomatology post dilatation. The number of dilatations required and the results in each cases is listed in Table 4 & 5.

TABLE 4

NO. OF DILATATIONS	NO. OF PATIENTS	INFERENCE
<3	4	CURED -3 SURGERY - 1(APD)
3-5	6	CURED -4 DIED -2(TEF)
>5	2	ADV. SURGERY-1(TEF) CURED -1(TEF)

TABLE 5

OUT COME	NO. OF PATIENTS	CATEGORIES
CURED	8	TEF – 5 CORROSIVE- 2 FB -1
SURGERY	2	TEF-1 APD-1
DIED	2	TEF-2

From the above results we could infer that in our study, post tracheo esophageal fistula repair strictures are the most common. The average number of balloon dilatations required were 2 in cases of corrosive & foreign body strictures and 5 in cases of post TEF strictures.

Short segment esophageal strictures with length less than 5 cms had a better outcome than long segment strictures.

The average interval between each dilatation in cases of multiple dilatations ranged from 1 to 3.5 months.10 out the 12 cases were cured of the symptomatology by either dilatations alone or with dilatation and surgery. 2 of the 12 cases died due to the underlying disease pathology.

IV. Discussion :

There are numerous etiologies for esophageal stricture in childhood, most of which are benign. This condition may most commonly result from caustic burns of esophagus following ingestion of acids or alkali (1-4), as a complication of gastroesophageal reflux, and iatrogenic insults after surgical repair of esophageal atresia. Also, esophageal atresia may rarely arise as a congenital condition in which a portion of the esophagus is stenotic . Treatment options investigated in our study included dilatation with a balloon and in some cases, surgical intervention . Due to the importance of esophageal stricture in children, this study was conducted to assess the causes, lesions location, available therapeutic options, and the final outcome of the patients.

Ingestion of corrosive substances is most often accidental and occurs much more in children, especially in toddlers, than in adults [5,6]. It can cause serious injuries to the digestive tract. In the developed world with the advent of child-unfriendly packaging, corrosive ingestion has become quite rare [7]. Household, industrial, and farm products, especially if stored in non-original containers, represent the most frequently ingested caustic agents. A variety of substances have been reported that were ingested leading to caustic injuries ranging from alkaline bases with pH up to 12 (e.g., sodium hypochlorite and sodium hydroxide), to acidic substances with a pH as low as 2 (e.g., hydrochloric acid and salicylic acid) and also bleaching substances in which the pH is around 7 . The extent and severity of the esophageal lesions is related to the nature, quantity and concentration of the caustic substance and duration of contact with the mucosa. Acids usually cause coagulative necrosis with limited tissue penetration and superficial scar formation. Strong alkalis produce liquefaction necrosis with deep ulcerations, and a subsequent risk to develop esophageal stricture and/or perforation. Upon swallowing, acids cause severe oropharyngeal pain and therefore they are usually ingested in smaller volumes than alkaline substances, resulting in a lower incidence of stricture formation and/or esophageal perforation.

After ingestion, vomiting should be prevented. Small amounts of water can be allowed if the child asks for it or even stimulated to rinse the mouth and esophagus. If the child has severe pain and if perforation is suspected, nothing should be given by mouth. Adequate pain relief is recommended.

The normal process of wound healing after creation of the esophageal anastomosis involves tissue remodeling and wound contraction, promoted by fibroblasts. Wound contraction in the setting of a circular end-to-end anastomosis creates narrowing. Therefore, it is quite natural to see a degree of narrowing at the site of the esophageal anastomosis after Esophageal Atresia (AE) repair.

Reported incidence of anastomotic stricture (AS) after TEF repair ranges from 32 to 59% in the majority of recent studies [8,9], but also lower and higher incidence has been reported, up to 5% and 80% , respectively. This variability relies in different definitions of anastomotic stricture (AS) and in a great number of pre-, intra-, and postoperative risk factor influencing the anastomosis outcome. These risk factors may affect stricture formation as well as its response to treatment, leading to recurrent and refractory ASs. Gestational age, AE type and associated malformations, and length of the gap have been proposed as preoperative risk factors. Intraoperative risk factors for ASs include tension of the anastomosis, degree of ischemia, and type of suture. Anastomotic strictures' formation is influenced by postoperative risk factors, including anastomotic leak and Gastro esophageal reflux (GER).

Retained esophageal foreign bodies are uncommon in pediatric practice and they should be endoscopically removed as soon as possible Esophageal stricture resulting from a long-standing lodgment of metallic foreign bodies has been reported earlier [10,11]. As retained esophageal foreign body can lead to stricture, a timely appropriate management should be done at the time of ingestion.

Peptic strictures are the end stage result of chronic reflux esophagitis. They account for 90% of benign oesophageal stricturesThe typical presentation of oesophageal stricture includes the insidious and sometimes sudden occurrence of dysphagia to solid food with antecedent pyrosis. However, in up to 25% of cases there is no prior history of heartburn and other acid-related symptoms. In fact, some patients present a history in which reflux-related symptoms might even resolve over time secondary to progression of fibrosis and oesophageal narrowing, only to return after therapeutic dilation.

Every child that has ingested a corrosive substance should have a thorough follow-up. The majority of corrosive ingestions may be asymptomatic at presentation. But, absence of oral burns does not exclude ingestion and esophageal/gastric damage and the consequent need for an endoscopic evaluation . Potential mucosal injury and the risk for stricture development should be suspected in a similar way for acidic and alkali ingestion. However, alkali ingestion, especially lye, is associated with more severe esophageal lesions and severe gastric lesions can occur in acidic ingestion. Endoscopy is guided by the presence of symptoms. If symptoms are present, the timing should be within the first 24 hours after ingestion [1]. It is recommended that every child with a suspected caustic ingestion and symptoms/signs (e.g., any oral lesions, vomiting, drooling, dysphagia, hematemesis, dyspnea, abdominal pain, etc.) should undergo an endoscopy. In case the ingestion of a corrosive is suspected, endoscopy is withheld if the child is asymptomatic and that adequate follow-up is assured. Anesthesiology and surgical assistance should be available during esophageal dilation procedures in children—the latter in case of complications [12].

Esophageal dilation should only be performed only when symptoms occur. Strictures shorter than 5 cm in length appeared to have a significantly better outcome. Wire-guided polyvinyl bougie dilators (Savary Gilliard) and "through-the-scope balloons" are the most frequently used material to dilate benign esophageal strictures.

According to a retrospective study from 2001 comparing 125 balloon dilations versus 88 bougie dilations in children with benign esophageal strictures fluoroscopically guided balloon dilatation is safer and has fewer technical failures than surgical bouginage [12]. These findings were confirmed by another retrospective

study in patients with esophageal atresia, showing that balloon dilation was more effective and less traumatic than bougienage [13]. However, bougie dilation is also safe and effective.

Most centres will prefer balloon dilations over bougies if financially possible. But the experience of the centre with a given technique may be more important. Balloon dilation can be performed under direct endoscopic or fluoroscopic view. The size of the balloon catheter can vary from 4 to 22 mm. There is a heterogeneity in literature regarding the duration of balloon inflation which varies from 20 to 120 seconds [14].

The hydrostatic balloon dilatation exerts only radial forces on the stricture, reducing mucosal trauma to a minimum.6,11 Accordingly, the balloon was the dilator of choice in our series. This is supported by the lack of complications in our material. By contrast, bougies, apply both radial and shearing forces, which may render them more harmful. The increased frequency of ruptures with the Maloney dilators (3 in 26 dilatations) led us to abandon this mode and S-G bougies were used when balloons became inadequate.

We performed the balloon dilatations with endoscopic placement of the guide wire. We conclude that the use of balloons for the dilatation of various benign esophageal strictures is a safe and efficacious mode of treatment. Its advantage in comparison with the Savary-Guillard bougies, is that is caused less damage, to the stricture. However, the bougies are more successful in the treatment of very rigid strictures, as seen following esophageal replacement

Rupture is a rare but serious complication of bougienage, less so with hydrostatic balloon dilatation, and can be treated, in most cases, with primary transverse suture of the tear, thus avoiding esophageal replacement.

Data on the best timing of esophageal dilation are scarce. Two retrospective studies in children post esophageal atresia compared routine esophageal dilation every 3 weeks starting 3 weeks post-surgery versus when symptoms developed. No difference in outcome and complications were found between both groups but significantly fewer dilations were needed in the on-demand dilation group [15,16]. Although there is no evidence regarding a number of practical aspects, there is consensus to apply in most situations the rule of three: dilate maximal up to three times the diameter of stenosis, with an average of three dilations and a minimal period of three weeks between two dilation sessions. Symptomatic esophageal strictures should be dilated, either using balloons or bouginage. Administration of high dosis corticoids could of interest in some conditions. In case of refractory stricture, mytomycin-C and/or stenting can be useful. Every effort should be made to minimis ethe need for surgery and esophageal replacement.

It has been recommended that esophageal dilatations in children should be considered unsuccessful if no permanent improvement is achieved in a relatively short period of time.

V. Conclusion :

Post tracheo esophageal fistula repair strictures are the most common cause of strictures in children and short segment esophageal strictures had better outcomes than long segment strictures.

Endoscopic Balloon Dilatation can provide a safe and effective mean of relieving esophageal strictures with good long term outcome Balloon esophageal dilatation in children is an effective and safe first line therapy and hence has to be employed when compared to other modalities in children for their betterment.

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Dr.N.Venkatesh" Role of Endoscopy in Paediatric Stricture Oesophagus."IOSR Journal of Dental and Medical Sciences (IOSR-JDMS), vol. 17, no. 7, 2018, pp 23-28.