

**Comparison between Bougies and Balloon Dilatation via Endoscopic Treatment for Oesophageal Stricture****Toral Darshak Mehta<sup>1</sup>, Jignasha Prajapati<sup>2</sup>, Ushadevi Ahirwar<sup>3</sup>, Jahanvika Chauhan<sup>4</sup>, Jaymin Contractor<sup>2</sup>, Farida Wadia<sup>3</sup>**<sup>1</sup>Assistant Professor, Otorhinolaryngology, GMERS Medical College Panchmahal, Godhra, Gujarat, India<sup>2</sup>2<sup>nd</sup> year Resident, Otorhinolaryngology, Government Medical College, Surat, Gujarat, India<sup>3</sup>2<sup>nd</sup> year Resident, Otorhinolaryngology, Government Medical College, Surat, Gujarat, India<sup>4</sup>Senior Resident, Otorhinolaryngology, Government Medical College, Surat, Gujarat, India<sup>2</sup>Professor, Otorhinolaryngology, Government Medical College, Surat, Gujarat, India<sup>3</sup>Professor, Otorhinolaryngology, Government Medical College, Surat, Gujarat, India

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**Abstract:****Introduction:** This study compares the result of endoscopic treatment of Oesophageal Strictures with bougies vs. balloon**Method:** Patients having oesophageal stricture, suffering from dysphagia were undergone endoscopic treatment with either rigid bougies and/or balloon dilators. The results are reviewed and analysed.**Result:** Out of 25 patients, 8 patients became symptom free (dysphagia score 1,2) within 12 months of treatment. In 9 patients the outcome was moderate with occasional mild dysphagia (dysphagia score 3,4) with diet. There were 4 failures (dysphagia score 5,6). As a palliative treatment, stents were inserted in 3 of them with inoperable malignant strictures.**Conclusion:** It is concluded that dilatation with bougies and balloon is a safe and effective treatment for benign oesophageal stricture and should be utilized first for most strictures. Both balloon and bougie dilatation were effective in relieving dysphagia caused by benign strictures. Balloon dilatation were found to have low recurrence rate, required fewer procedures to achieve adequate luminal diameter and better patient tolerance compared to Bougie dilatation.**Key words:** Oesophageal Stricture, Bougie And Balloon Dilatation, Stent.This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.**Introduction**

Oesophageal dilatation, a technique developed four centuries ago[1], continuous to be an important method of treating the symptoms of dysphagia in the patients with stricture of the Oesophagus.

Benign stricture consists of fibrosis and thickening of oesophageal wall, particularly of the submucosa with atrophy of the muscularis propria. The lining epithelium is usually thin and sometimes ulcerated. Achalasia Cardia is characterized by Aperistalsis, partial or incomplete relaxation of the LES with swallowing and increased resting tone of the lower oesophageal stricture [2]

Rigid bougies[3] and balloon dilators[4] are the principal types of dilators in use for the treatment. Few trials have compared the different dilating methods. The result of these trials is mixed, and

further studies are necessary to determine if any technique has advantage in efficacy.

The introduction of modern endoscopic instruments has significantly simplified the technique and has also reduced the complications; therefore, Oesophageal dilatation has a fundamental role in the treatment of oesophageal stricture. Most patients suffering from peptic stricture, corrosive stricture, Oesophageal web, Achalasia cardia are successfully treated with endoscopic dilatation[5]. For malignant inoperable strictures, oesophageal stent placement is an established method for relieving malignancy induced dysphagia. The present study emphasized an effective algorithm comprising of endoscopic dilatation that can be used in patients suffering from dysphagia due to various types of strictures.

## Methodology

Twenty-five patients, suffering from dysphagia because of oesophageal stricture, have undergone treatment at new civil hospital, ENT department, Surat, have been reviewed and analysed in present work.

Twenty-five Consecutive random adult patients with biopsy proven benign or malignant structure of the oesophagus were prospectively treated and evaluated.

All patients were having complaints of dysphagia. On admission dysphagia was assessed according to a six-point score (1 means no dysphagia and 6 means severe dysphagia). The diagnosis of benign and or malignant stricture was made after radiology and endoscopic examination. On endoscopic examination, the length and diameter of stricture were assessed. Multiple biopsies from the area of oesophageal stricture, were taken to confirm the benign or malignant structure.

There is a scanty information about the diameter of an Oesophageal stricture that will cause dysphasia and just as little about the optimal diameter to which it should be dilated. It is observed that patients presenting with a stricture may have narrowing anywhere between 3 to 15 mm in diameter. Long-term result of conservative treatment of benign Oesophageal strictures are not very well-known. The purpose of the study was to evaluate the long-term results of conservative treatment of benign strictures by means of dilatation.

## Technique of Dilatation

All patients with benign stricture were dilated with either Gumclastic bougies or through the scope (TTS) balloon dilator depending on the characteristics of strictures. All patients were admitted in our ward at least one day prior to the procedure. One patient with post-op complication was kept in ward for longer time. All patients were given preop and postop anti-reflux therapy.

In nearly all cases dilatation procedure was done with use of rigid Jesberg type of oesophago scope under general anaesthesia.

In general, 3-4 dilatation were performed as per procedure with average increase of the diameter of the dilating device of about 2 mm at one time. In cases of severe stricture, first smaller size of gum elastic bougies were used to find the lumen and subsequently these tight strictures were gradually dilated with balloon dilator.

Out of 25 patients, 8 patients were dilated with gum elastic bougies, 14 patients were dilated with TTS balloon dilators & 3 patients were of malignant strictures in whom we have placed distal release

stent. The result of dilatation with bougies and balloon were compared.

In the case of suspicion of oesophageal perforation due to dilatation procedure, the patient was kept nil by mouth and postoperative chest X-ray was done along with physical examination to confirm the diagnosis of perforation. Adequate follow-up information was given to all patients. All patients were followed up first once-a-week, then every two weeks, then every month, then 3 for two years. On each follow-up visit dysphagia was scored according to scale.

In cases of severe strictures (diameter <10mm) the patient was dilated once a week until a larger diameter bougie could be passed then the dilatation interval was adjusted according to the clinical and endoscopic progression of the dilatory treatment.

## Dilatation with Gum-Elastic Bougies

The size of the first bougie, which is gripped by the stricture is recorded. The size of the largest that can easily pass should similarly be noted. The presence of blood is probably irrelevant and not necessarily a contraindication to further dilatation. No stricture was forcibly dilated and the grip of one or two fingers was a useful limit to strength needed. Safety is gained by proceeding slowly and if there is any uncertainty, the surgeon should stop.

The gum elastic bougies are available up to 30 FG. People whose stricture passed 30 FG bougie have adequate relief of dysphagia. In some patients passage of rigid oesophagus endured dilatation to 60 FG. It is almost impossible on 1" occasion to predict which stricture will require further dilatation, so on follow-up all patients were asked about how much relief in dysphagia was obtained. Dilatation of achalasia cardia patient with Rigi flex achalasia cardia balloon catheter: In present study Rigi flex achalasia balloon dilatation catheter for dilatation of the patient with achalasia cardia has been used. The most common cause of failure is balloon rupture caused by over inflation. Other causes of failure are kinking of the catheter due to forcefully manipulating the catheter and fraying at the tip caused by abrasion against the tissue.

## Balloon Dilatation Catheter

If a flexible endoscope is available and if the stricture could be passed with the endoscope, the balloon catheter was advanced via the working channel until the entire length of the balloon was in view but we did not have flexible endoscope reading available in our department hence the strictures were viewed with rigid oesophagoscope. As the stricture could not be passed with the endoscope, the endoscope was positioned above the stricture and the balloon catheter advanced until its tip freely cannulated the stricture, then balloon is inflated to its maximum pressure rating 40 to 60 pounds per square inch. The

inflation was maintained for 30 seconds, released and reinserted.

After repeating this procedure three times attempts made to move the inflated balloon through the stricture segment. If this was not possible a balloon of smaller size was used. If inflated balloon passed whole stricture, then larger size balloon was used. The size of initial balloon selected was decided by estimated stricture diameter. If stricture diameter is <6 mm, a 10 mm balloon was used. If stricture diameter is >6 mm, a 15 mm balloon was used. The defined end point for dilatation was the ability to move an inflated 15 mm balloon to and fro through the stricture.

In the study, stenting was done with use of ultra-flux distal release uncovered oesophageal stent using rigid oesophagoscopy under general anaesthesia.

**Table 1: Age Distribution of patients in the study**

Type of stricture	Age Distribution	
	M	F
Corrosive	35 ±5	28 ±5
Oesophageal web	-	40 ±5
Malignant	50 ±5	
Peptic	41, 68	-
Achalasia Cardia	35	-

**Table 2: Sex Distribution of patients in the study**

Type of stricture	Sex Distribution	
	M	F
Corrosive	10	5
Oesophageal web	0	4
Malignant	2	1
Peptic	2	0
Achalasia Cardia	1	0

Male: Female ratio of 1.5:1 is observed.

**Table 3: Incidence of Various Strictures**

Type of stricture	Total no. of patients	Incidence (%)
Corrosive	15	60
Oesophageal web	4	16
Malignant	3	12
Peptic	2	8
Achalasia Cardia	1	4

In present study, out of 25 patients, 15 patients were of corrosive stricture, 4 patients were of oesophageal web, 3 patients were of malignant stricture, 2 patients were of peptic stricture, and 1 was of achalasia cardia.

**Table 4: Methods of Dilatation and Complication**

Type of Stricture	Bougies	Balloons	Stents	Complications
Corrosive	5	10	-	Perforation in one
Oesophageal web	2	2	-	
Malignant	-	-	3	
Achalasia cardia	-	Special dilator	-	
Peptic	1	1		

Out of 15 patients of corrosive poisoning 5 patients stricture dilated with gum elastic bougies & 10 patients stricture dilated with TTS balloon. Out of 5 patients who were dilated with gum elastic bougies, one developed post-operative oesophageal

## Post Procedure

All patients had x-ray chest PA and lateral view to see the stent position and for permanent record. Vital signs were monitored half-hourly. All the patients of dilatation were fully covered with antibiotics to prevent the remote possibility of developing bacteraemia. Clear fluid was started upright position after 24 hours semisolid food is started on the 2 days.

## Results

### Patient Characteristics

Characteristics of the patients who were enrolled in the study are summarized in the table-1 and 2.

perforation in thoracic oesophagus diagnosed and treated immediately by surgery department with surgery.

Out of 4 patients of oesophageal web, 2 patients were dilated with gum elastic bougies and 2 patients were dilated with balloon.

In 3 malignant stricture patients Uroflex oesophageal stents were inserted.

One Patients of achalasia cardia treated with Rigiflex achalasiacardia balloon catheter.

Out of 2 patients of peptic stricture, one patient's stricture was dilated with gum elastic bougie and one patient's stricture was dilated with balloon.

**Table 5: Treatment outcome**

Type of Stricture	Good Result		Moderate result		Failure	
	Duration of dilatation 1-12 months	Average no. of procedures range	Duration of dilatation 12-24 months	Average no. of procedures range	Duration of dilatation 25-36 months	Average no. of procedures range
	No. of patients		No. of patients		No. of patients	
Oesophageal web	3	10-12	8	12-18	3	20-30
malignant	3	3-5	1	10-15	-	-
Achalasia cardia	1	4	-	-	-	-
Peptic	1	8-10	-	-	1	15-20

This table summarizes the actual course of 25 individual patients with oesophageal stricture.

**Table 6: Result of rigid Bougie and Balloon dilatation**

Severity of dysphagia	With bougies	With balloon	With Stent
No dysphagia	2	4	3 patients were able to take liquids and semi-solids
Very mild intermittent	1	5	
Required continuous dilatation with benefit	3	2	
Present but did not come for follow-up	1	0	
Surgery with no further dilatation	2	2	

## Discussion

### Good results

Present study considers patient having good result if they become symptom free & no further dilatation was required after 1 year. 8 patients became symptom free within 12 months of treatment therefore no further dilatation was necessary in this group after follow-up for 12 months. 3 patients with corrosive stricture needed dilatation for 10-12 times and were able to take normal food by end of this procedure. Of the 3 patients of oesophageal web, 2 of them needed dilatation 3 times. One patient had recurrence of symptoms after 4 months and had to be dilated once again. She was asymptomatic at the end of one month but when she came for follow-up, we again posted her for endoscopy to evaluate the post cricoid opening with SOS dilatation. Thus, this patient had to undergo endoscopy five times. We had one patient of achalasia cardia. Majority of these patients came to the hospital go to the general surgery department as they have a flexible gastroscope. We have special achalasia cardia balloon (Rigiflex) (Photograph No.). This patient had to be dilated 4 times at 2 weekly intervals and was symptom free for 18 months. One patient of peptic stricture was 41-year male with complaint of acid peptic disease since the age of 18 years. He had to be dilated 12 times before he could start his normal diet. He was

also given lansoprazole initially, twice a day and later once a day with liquid antacid. One patient of corrosive stricture did not come for follow-up. Patient with corrosive stricture required longer treatment (more dilatation) for good result compared to other strictures.

### Moderate Result

In 9 patients the result was moderate which means occasional mild dysphagia 3-4 score with diet. 8 patients had a corrosive stricture and had to be dilated intermittently for 2 years. 1 patient had oesophageal web.

### Failure

There were 4 failures. Three patients with corrosive stricture and one with peptic stricture were dilated many times at frequent interval but they still had complaint of dysphagia score 1-4. So, ultimately, they were referred to general surgery unit for stricture resection with gastric pullup in this group only one patient with a corrosive stricture developed oesophageal perforation as I have already mentioned about that with 20 French gum elastic bougies.

### Complication

Only one patient developed oesophageal perforation. The patient had tight corrosive stricture and had undergone two previous dilatations with gum elastic bougies. He was irregular in follow-up

and came back again after 2½ months. With complete dysphagia he developed oesophageal perforation which we diagnosed on the postoperative evening round on the same day. As it

was detected within 1" 2 hours, he was transferred to surgery unit where he underwent primary closure with drainage. Patient died on 4" postoperative day.

**Table 7: Shows Comparison of Results from Previous Studies to Present Data.**

Study	No. of cases	Good (%)	Moderate (%)	Failure (%)	Perforation (%)	Morbidity (%)
Benedict (1966) <sup>[6]</sup>	133	70	15	15	Not given	1.5
Lanza (1978) <sup>[7]</sup>	90	79	14	7	Not given	0
Wesdrop (1981) <sup>[8]</sup>	100	88	4	8	8%	0
Present study* :bougies	9	3(33%)	3(33%)	2(22%)	1 (11%) Overall, 4%**	1
Present study* :Balloon	13	9(70%)	2(15%)	2(15%)	-	1

\*Out of 25 Patients there were 3 patients with malignant strictures. We inserted stent in these patients as a palliative measure to improve dysphagia.

\*\* 1 out of 25 patients (9 rigid Bougies+ 13 Balloon Dilators + 3 malignant strictures= 25)

Good result is defined as no dysphagia or mild dysphagia achieved in 3 patient (33%) of rigid bougies and 9 patients (70%) with TTS balloon.

Moderate result is defined needing continuous dilatation with benefit achieved with 3 patients (33%) with bougies and 2 patients (15%) with balloon dilatation.

Failure is defined no further dilatation is possible in 2 patients (22%) with rigid and 2 patients (15%) with TTS balloon.

From this study it is observed that irrespective of the type of device bougie or balloon used almost all patients have experienced an improvement in their ability to swallow after dilatation.

The duration of this beneficial effect however is quite variable. In most patients the stricture ultimately recurs and a need for repeated dilatation has been the rule.

All patients in both treatments have experienced either complete alleviation of dysphagia or an improvement in their ability to swallow reflected by an increase in dysphagia score at follow-up 1 week after dilatation. The initial benefit was virtually identical for both treatment arms. With time dysphagia not unexpectedly recurred and by 24 months of follow-up overall 12 (50%) patients did not require any further dilatation.

### Conclusion

Both Through the Scope balloon and bougie dilatation were effective in relieving dysphagia caused by benign strictures.

Balloon dilatation of oesophageal strictures can be performed with significantly lower shear force than bougie dilatation. Mclean showed the sheer force of rigid bougies to be 6 times than balloon<sup>[9]</sup>. Balloon catheter essentially eliminated the application of shear force replacing it with an almost purely radial

(i.e. dilating) force. So, it is indicated that both devices are effective in relieving dysphagia, but balloons may have a long-term advantage.

Good results (71%) are achieved with balloon as compared to 33% with rigid bougies. Rigid dilators may impact on the edge of stricture and not pass through, while balloons permit direct assessment of dilatation result.

Ultraflax distal release stents do not improve the prognosis and outcome of malignant strictures, but they help by improving the quality of life. Without a stent, the patient relies on either a ryles tube or gastrostomy for feeding and both these are not readily acceptable to the patient. With intraluminal stent in position, they can still have semisolid oral feeds which gives them a lot of satisfaction and does not make them feel helpless.

### References

1. Lew RJ, Kochman ML. A review of endoscopic methods of esophageal dilatation. *J Clin Gastroenterol.* 2002 Aug;35(2):117-26.
2. Kuo WH, Kalloo AN. Reflux strictures of the esophagus. *Gastrointest Endosc Clin N Am.* 1998 Apr;8(2):273-81.
3. Poddar, U., & Thapa, B. R. Benign esophageal strictures in infants and children: Results of Savary-Gilliard bougie dilatation in 107 Indian children. *Gastrointestinal Endoscopy,* 2001;54(4); 480-484.
4. Van Boeckel PG, Siersema PD. Refractory esophageal strictures: what to do when dilatation fails. *Curr Treat Options Gastroenterol.* 2015 Mar;13(1):47-58.
5. Shah SWH, Butt AK, Malik K, Alam A, Khan AA. Pneumatic Balloon Dilatation for Achalasia Cardia; Early & late results, a single center study. *Pak J Med Sci.* 2017 Sep-Oct; 33(5): 1053-1058.

6. Benedict EB. Peptic stenosis of the esophagus. A study of 233 patients treated with bougienage, surgery, or both. *Am J Dig Dis.* 1966 Oct;11(10):761-70.
7. Lanza FL, Graham DY. Bougienage is effective therapy for most benign esophageal strictures. *JAMA.* 1978 Sep 1;240(9):844-7.
8. Wesdorp IC, Bartelsman JF, den Hartog Jager FC, Huibregtse K, Tytgat GN. Results of conservative treatment of benign esophageal strictures: a follow-up study in 100 patients. *Gastroenterology.* 1982 Mar;82(3):487-93.
9. McLean, G. K., Cooper, G. S., Hartz, W. H., Burke, D. L., & Meranze, S. G. Radiologically guided balloon dilatation of gastrointestinal strictures. Part II. Results of long-term follow-up. *Radiology,* 1987;165(1): 41–43.