

Endoscopic Pneumatic Balloon Dilatation for Achalasia of the Cardia

P H Ding, MRCP
The Specialists Centre,
19 Logan Road, 10400 Penang

Summary

This study evaluated the efficacy and safety of endoscopic pneumatic balloon dilatation as the initial treatment for achalasia of the cardia. 15 patients with achalasia underwent a total of 19 dilatations using the new polyethylene dilator (Microvasive Rigiflex Balloon Dilator) over the last 6 years. An overall treatment success rate of 93% was achieved. 11 patients (73.3%) have not required a further dilatation and 3 patients (20%) required between 1 and 2 further dilatations. Elective surgery was necessary in 1 patient. The mean follow-up period was 31.5 months. There was no complication or death attributable to the procedure. Endoscopic pneumatic balloon dilatation is a safe and effective treatment for achalasia and should be considered as the initial treatment of choice in most patients with achalasia.

Key Words: Endoscopic pneumatic balloon dilatation, Achalasia, Oesophageal dilatation

Introduction

Achalasia of the cardia is a rare, primary oesophageal motor disorder characterised by loss of peristalsis and failure of the lower oesophageal sphincter to relax on swallowing¹. Definitive treatment is directed towards relieving symptoms by disrupting the circular muscle fibres of the lower oesophageal sphincter. This can be accomplished by either pneumatic dilatation or surgery. Some investigators have suggested that pneumatic dilatation should be the initial therapy for most patients with achalasia^{2,4,9,11}. The technique of forceful balloon dilatation of the oesophagus is evolving. Recently, a new type of pneumatic dilator with a polyethylene Gruntzig-type balloon has been developed. This new dilator (Microvasive Rigiflex Balloon Dilator) has been reported to produce excellent results suggesting it may be "an attractive alternative to other dilating systems in the treatment of achalasia"³. We report our experience with 15 patients with achalasia of the cardia who underwent endoscopic balloon dilatation using the Microvasive Rigiflex Balloon Dilator.

Patients and Methods

The diagnosis of achalasia was established on clinical, radiological and endoscopic grounds. Manometry was not available in our unit. Barium swallow in all the patients showed features compatible with achalasia. (Fig: 1). One patient with pseudo achalasia secondary to cancer of the cardia was excluded from the study. Pneumatic balloon dilatation was performed under sedation with intravenous midazolam 5 mg and pethidine 50 mg using fiberoptic endoscope with fluoroscopic guidance. Pre-treatment endoscopy in all patients was consistent with achalasia, i.e; dilated and/or tortuous oesophagus, aperistalsis, and popping of the endoscope as it passed through the lower oesophageal sphincter.

Microvasive Rigiflex Balloon Dilators (MRBD) of diameters 30 mm, 35 mm and 40 mm were used. After endoscopic inspection of the oesophagus, cardia, stomach and upper duodenum, a guide wire was passed into the stomach through the biopsy channel of the endoscope and its position confirmed by

fluoroscopy. The endoscope was removed leaving the guide wire in place and the MRBD was inserted over the guide wire. Under fluoroscopic guidance the balloon was positioned across the oesophagogastric junction and was inflated slowly to its maximum diameter with sufficient pressure (exceeding 10psi) until the "waist" was obliterated. The balloon remained inflated for 1 minute. After deflation of the balloon, the dilator was withdrawn. Endoscopy was repeated to exclude any perforation. After treatment, patients were examined for perforation both clinically and radiologically with barium swallows and chest X-rays. Further dilatation was performed if significant dysphagia recurred.

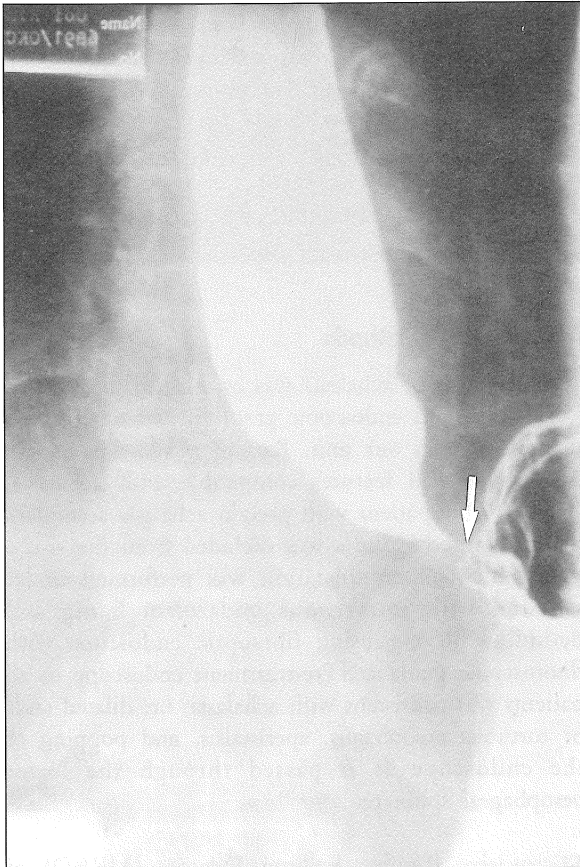


Fig. 1: Barium swallow showing typical features of achalasia: a dilated oesophagus with smooth, symmetric, tapering at the distal end (arrow), commonly called a "bird's beak"

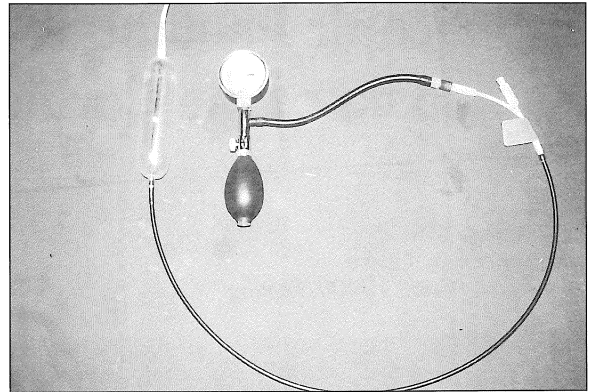


Fig. 2: Microvasive rigiflex balloon dilator fully inflated

Results

Between 1989 and 1995, 15 patients with achalasia of the cardia underwent endoscopic pneumatic balloon dilatation. There were 10 females and 5 males. Their ages at the time of their initial dilatation ranged from 19 to 66 years with a mean of 46.2 years. 1 patient had previously undergone bougie dilatation 5 years earlier. Pneumatic balloon dilatation was the initial treatment in all patients referred to our unit with achalasia. The duration of symptoms before dilatation ranged from 3 days to 30 years with a median of 1 year. All patients presented with dysphagia, regurgitation occurred in 73.3%, weight loss was noted in 66.6%, retrosternal pain in 33.3%, and nocturnal cough in 20%. 1 patient had concomitant ischaemic heart disease.

All patients except one were able to swallow satisfactorily immediately after dilatation. In one patient dysphagia persisted but was relieved after a second redilatation 1 week later. 2 patients complained of post procedure chest pain which resolved within 24 hours. No patient develop perforation, aspiration pneumonia, heartburn or oesophageal stricture following dilatation. All gained more than 3 kg in weight after dilatation. Most patients were discharged from hospital the following day. Follow-up assessment were performed for a mean of 31.5 months with a range of 6 months to 69 months. A total of 15 patients underwent a total of 19 procedures. 12 patients (80%) had 1 procedure, 2 patients (13.3%)

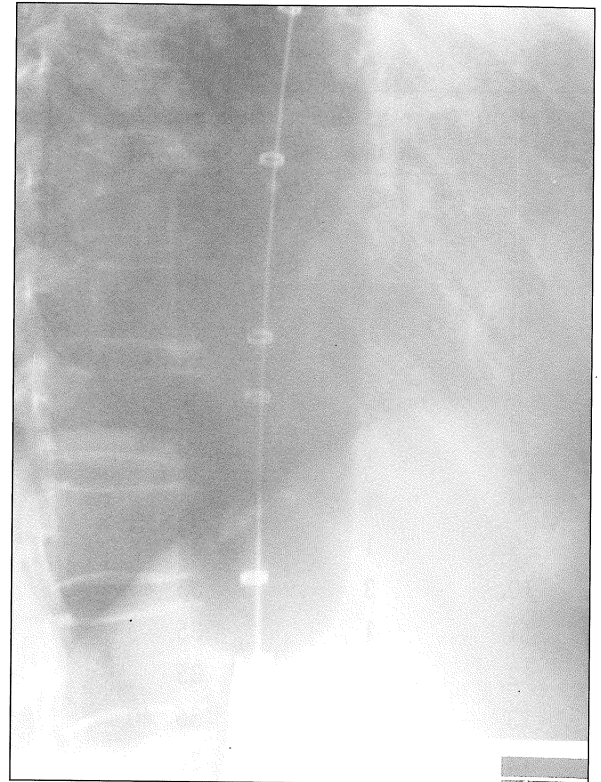
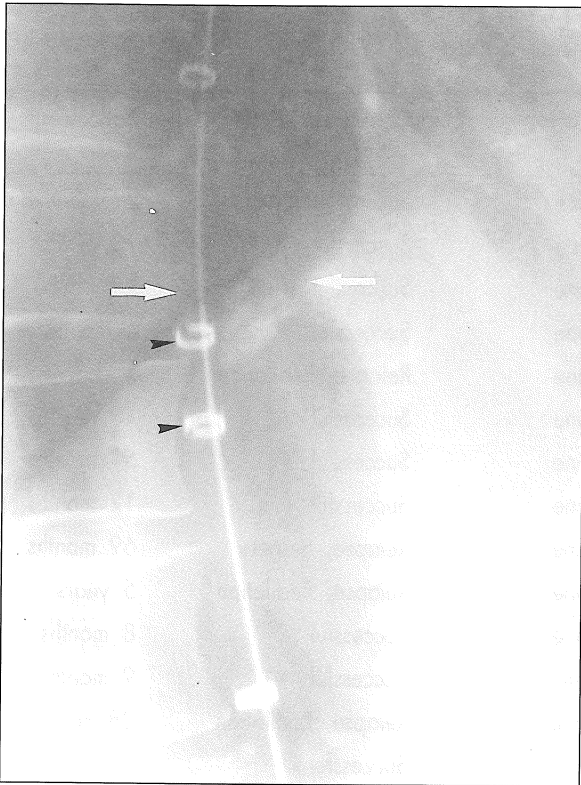


Fig. 3a: "Waist" of the balloon (white arrows) seen on fluoroscopy during inflation. Note the position of the middle markers of the balloon (black arrows) at the level of the diaphragm which corresponds to the gastro-oesophageal junction

Fig. 3b: Obliteration of the "waist" of balloon

required 2 procedures and 1 patient (6.6%) required 3 procedures (Table I). The total number of dilatations per patient was 1.2.

One patient underwent surgical oesophago-cardioplasty with gastric pouch after 1 dilatation failed to provide lasting relief of dysphagia. This patient had a very dilated tortuous "sigmoid" oesophagus. She had long term relief of symptoms following surgery. A total of 11 patients (73.3%) became asymptomatic after 1 dilatation. Four patients (26.6%) developed recurrence and 3 required further dilatations. The median maximum balloon size used was 35 mm in diameter with a range of 30 mm to 40 mm. During the follow-

up period one patient had died, 22 months after a single dilatation, of pheochromocytoma. There was no deaths related to pneumatic dilatation, achalasia or carcinoma of the oesophagus. No perforation occurred. None reported reflux symptoms based on the history alone since facilities for pH reading were not available.

Discussion

Since there is no cure for achalasia, all treatment modalities are palliative. The aim of therapy for achalasia is to relieve the functional obstruction of the lower oesophagus by decreasing lower oesophageal sphincter pressure, thereby improving oesophageal

Table I
Results of pneumatic dilation

Patient No.	No. of dilations	Balloon size (mm)	Complication	Outcome	Follow-up
1.	1	30	None	Successful	22 months
2.	1	35	None	Successful	10 months
3.	1	35	None	Successful	9 months
4.	1	35	None	Successful	6 months
5.	2	35, 40	None	Relapse, Redilation	5 years
6.	1	30	None	Successful	40 months
7.	1	35	None	Successful	51 months
8.	1	35	None	Successful	12 months
9.	1	35	None	Relapse, Surgery	69 months
10.	3	35, 40, 40	None	Relapse, Redilation	5 years
11.	1	35	None	Successful	8 months
12.	1	35	None	Successful	9 months
13.	2	35, 40	None	Relapse, Redilation	28 months
14.	1	30	None	Successful	43 months
15.	1	30	None	Successful	46 months

emptying and symptoms. Therapeutic methods include pneumatic dilatation, surgical oesophagomyotomy, oesophageal bougienage, and pharmacotherapy.

There is no doubt that pneumatic dilatation is the most effective non-surgical treatment for achalasia. Previous studies using the various older types of dilators including Mosher bag, Browne, McHardy, and Ridder Moeller showed good to excellent response rates between 65 to 82%^{4,5,6}. Recently, a newer Grunzig-like polyethylene balloon dilators (Rigiflex Microvasive, Watertown,) have been used by some investigators with long term treatment success rates ranging from 86 to 100%^{7,8,9,10,11}. The overall success rate of 93% in our series compares favourably to the success rate of 86-100% reported by others^{7,8,9,10,11}. The majority of our patients (73.3%) required only 1 dilatation for lasting relief of symptoms and the number of dilatations per patient was 1.2 which is comparable with other series^{7,11,15}. However it must be pointed out that our

follow-up period was short because results may get less favourable with time. The major advantages of the MVR dilator are its ease of use and the ability to place it over a guide wire in proper position under direct endoscopic visualization, a feature not available with the older Brown-McHardy (BMH) dilator⁸. This makes the MVR dilator useful and safe even in patients with a markedly dilated and tortuous oesophagus and probably explains for its higher success rate. A distinct advantage of the rigiflex balloon over other dilators is its noncompliant characteristic. This means that the balloon can only be inflated to a maximum designated diameter and further inflation of the balloon will only result in an increase in the pressure of the balloon without resultant increase in the diameter. Once the designated maximum pressure is exceeded, the balloon will burst without causing an increase in the diameter. This noncompliant character of the balloon provide a safety measure against perforation which may not be present in other non-polyethylene dilators. In our

study, the balloon was inflated until the "waist" was obliterated regardless of the pressure applied as we concur with others that this important feature may be related to successful therapy^{7,11}. There has been no consensus on the most important variables determining the outcome of the procedure: size of balloon, duration of balloon inflation, the number of inflation or the amount of pressure applied. The 35 mm balloon was used most often initially in our series based on its effectiveness in a previous study³.

Advantages of pneumatic balloon dilatation for treating achalasia as compared to surgery include: a short hospital stay; a short procedure with a brief period of discomfort; lower costs, short recovery time; and a low incidence of post dilatation gastroesophageal reflux (about 2% on long term follow-up)¹². Pneumatic dilatation has the advantage of requiring only an overnight hospitalization compared with 7-10 days in the hospital for myotomy. In fact some of our patients had the procedure done safely even as outpatient as advocated by Barkin *et al*¹¹. The recovery period for pneumatic dilatation is usually less than 1 week in contrast to 4-6 weeks after myotomy. Furthermore, pneumatic dilatation does not preclude successful surgery when the former fails. The disadvantage is the risk of oesophageal perforation which range from 0^{7,8,9,10} to 18%¹³. None of our patients had oesophageal perforation although the number of patients in our series is small. It is important to recognise this complication early and to make sure that the patient is kept nil by mouth for at least 2 hours following the dilatation. Perforation should be suspected if pain continues or if the patient develops pyrexia. Conservative management may be appropriate if the perforation is small and contained. Less serious complications are aspiration pneumonia, localised haematoma, bleeding and oesophageal tear without perforation.

There are relatively few contraindications to pneumatic dilatation. Patients who are uncooperative and in whom a carcinoma mimicking achalasia cannot be excluded should undergo surgical myotomy. Children and infants, patients with previous myotomies, and variant forms of achalasia now can be successfully treated with pneumatic dilatation¹⁴. Epinephric diverticula and large hiatal hernias are still considered

by most experts to be relative contraindications to pneumatic dilatation because of the high risks of perforation.

The most commonly used surgical technique for treatment of achalasia is a modified Heller oesophagomyotomy. Good results are achieved in 70% to 90% of patients, and the overall mortality rate is 0.3%^{6,12,16}. The major advantage of surgery is that the division of circular muscle fibres is done under direct vision, and is usually complete. The disadvantages include high morbidity, high costs, long hospital stay and more importantly gastroesophageal reflux disease which occurs in about 10% to 15% of patients, depending on the length of incision, experience of surgeon, duration of follow-up, and methods of assessing reflux^{1,12}. Today, there are relatively few contraindications to surgery. This procedure should be done if three attempts at pneumatic dilatation with successively larger balloons have failed⁷. Newer techniques for oesophagomyotomy are being developed using thoracoscopic or laparoscopic esophagomyotomy^{17,18,19}. The technique of Heller laparoscopic myotomy with associated Dor anterior fundoplication for the treatment of oesophageal achalasia had been performed in a small number of patients with excellent results¹⁸. Complete relief of dysphagia and modifications of radiological and manometric patterns were achieved in all patients 1 month after surgery¹⁸. The authors concluded that laparoscopic treatment of achalasia is technically feasible, reduces surgical trauma, and may be considered a valid alternative to open surgery.¹⁸ Pellegrini *et al* reported excellent to good results in 90% of their 24 patients¹⁹. The only operative complications were mucosal lacerations, which occurred in 3 patients and required conversion to an open procedure.¹⁹ The main advantage of these minimally invasive procedures over open surgery is the shorter hospital stay (average 3 days) and shorter recovery period¹⁹. The main disadvantages of these minimally invasive procedures in comparison to pneumatic balloon dilatation are: limited experience and expertise, more time consuming, require longer hospitalisation and higher costs. Although these minimally invasive procedures are promising, the number of patients currently treated by these methods are still small and the follow-up period is still short. Future prospective

studies comparing these minimally invasive procedures with balloon dilatation will help to determine the preferred modality of treatment for achalasia.

Oesophageal bougienage usually results in temporary relief of symptoms. It can be performed as the initial therapy for achalasia and can be followed by pneumatic dilatation if it is unsuccessful²⁰. Pharmacological treatment for achalasia with nitrates and calcium channel blockers including nifedipine and verapamil have been used to decrease the lower oesophageal sphincter pressure in an attempt to relieve dysphagia²². Drug treatment has limited, often transient, efficacy²². Nifedepine has been shown to have greater effects on the lower oesophageal

sphincter than verapamil or diltiazam and is the calcium blocker of choice²³. We concur with Traube that most patients with achalasia should not be treated with drugs initially and should undergo pneumatic dilatation²¹. Drug treatment should be reserved for those patients with mild disease or who are poor candidates for more definitive therapy²¹.

In conclusion, this study shows that pneumatic balloon dilatation using the MRBD is a safe and effective treatment of patients with achalasia. Since it offers good relief to most patients, pneumatic dilatation should be considered as the first choice in the treatment of achalasia and surgery should be reserved for therapeutic failures.

References

1. Vantrappen G, Hellemens J. Treatment of achalasia and related motor disorders. *Gastroenterology* 1980;79 : 111-54.
2. Fellows IW, Ogilvie AL, Atkinson M. Pneumatic dilatation in achalasia. *Gut* 1983;24 : 1020-3.
3. Stark GA, Castell DO, Richter JE, Wallace CW. Prospective randomised comparison of Brown-Mchardy and Microvasive balloon dilators in treatment of achalasia. *Am J Gastroenterol* 1990;85 : 1322-5.
4. Prewett EJ, Desmond PV, Breen KJ. Achalasia of the oesophagus: Treatment with pneumatic dilatation. *J Gastroenterol Hepatol* 1990;5 : 682-5.
5. Ciarolla DA, Traube M. Achalasia. Short-term clinical monitoring after pneumatic dilation. *Dig Dis Sci* 1993;38 : 1905-8.
6. Csendes A, Braghetto I, Henriquez A, Cortes C. Late results of a prospective randomised study comparing forceful dilatation and oesophagomyotomy in patients with achalasia. *Gut* 1989;30 : 299-304.
7. Jankovic V, Viera L, Guelrod M, *et al.* Dilatacion Neumatica de acalasia con balones rigiflex polituff 150. *GEN* 1988;40 : 59-62.
8. Richter JE, Stark GA, Wallace CW, *et al.* Randomised comparison of Brown McHardy (BMH) and Microvasive Rigiflex (MVR) balloon dilator in treatment of achalasia. *Am J Gastroenterol* 1988;83 : 1024.
9. Gelfand MD, Kozarek RA. An experience with polyethylene balloons for pneumatic dilatation in achalasia. *Am J Gastroenterol* 1988;83 : 1074.
10. Cox J, Buckton GK, Bennet JR. Techniques. Balloon dilatation in achalasia: a new dilator. *Gut* 1986;27 : 986-9.
11. Barkin JS, Guelrud M, Reiner DK, Goldberg RI, Phillips RS. Forceful balloon dilation: an outpatient procedure for achalasia. *Gastrointestinal endosc* 1990;36 : 123-6.
12. Reynolds JC, Parkman HP. Achalasia. *Gastroenterol Clin North Am* 1989;18 : 223-55.
13. Fried RL, Rosenberg S, Goyal R. Perforation rate in achalasia with polyethylene balloon dilator. *Gastrointest Endosc* 1991;37 : 405 (abstract).
14. Csendes A, Braghetto I, Henriquez A, Cortes C. Surgery or pneumatic dilatation for achalasia: A head-to-head comparison. Now are all the questions answered? *Gastroenterology* 1989;97 : 1340-1.
15. Abid S, Champion G, Richter JE, *et al.* Treatment of Achalasia: the best of both worlds. *Am J Gastroenterol* 1994;89 : 979-85.
16. Ellis FM, Crozier RE, Watkins E. Operation for oesophageal achalasia. *J Thorac Cardiovasc Surg* 1984;88 : 344-51.
17. Shimi S, Nathanson LK, Cuschieri A. Laparoscopic cardiomyotomy for achalasia. *J R Coll Surg Edin* 1991;36 : 152-4.

ENDOSCOPIC PNEUMATIC BALLOON DILATATION

18. Ancona E, Peracchia A, Zaninotto G, *et al.* Heller laparoscopic cardiomyotomy with antireflux anterior-fundoplication (Dor) in the treatment of oesophageal achalasia. *Surg Endosc* 1993; 7 : 459-61.
19. Pellegrini CA, Leichter R, Patti M, *et al.* Thoracoscopic oesophageal myotomy in the treatment of achalasia. *Ann Thorac Surg* 1993;56 : 680-2.
20. McJunkin B, McMillan WO Jr, Duncan HE Jr, *et al.* Assessment of dilation methods in achalasia: large diameter mercury bougienage followed by pneumatic dilation as needed. *Gastrointest Endosc* 1991;37 : 18-21.
21. Traube M. On drugs and dilators for achalasia. (Editorial). *Dig Dis Sci* 1991;36 : 257-9.
22. Gelfond M, Rozen P, Gilat T. Isosorbide dinitrate and nifedipine treatment of achalasia: A clinical, manometric and radionuclide evaluation. *Gastroenterology* 1982;83 : 963-9.
23. Traube M, McCallum RW: Calcium-channel blockers and the gastrointestinal tract. *Am J Gastroenterol* 1984;79 : 892-6.