RIGIFLEX BALLOON DILATION WITHOUT FLUOROSCOPY FOR TREATMENT OF ACHALASIA: A LONG-TERM FOLLOW-UP OF 99 PATIENTS

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Abstract- ***Achalasia is a well-defined esophageal motor disorder. Graded pneumatic dilation using Rigiflex balloon is one of the therapeutic modalities that had not been evaluated in a large long-term study. We aimed at evaluating long-term efficacy of graded Rigiflex pneumatic dilation in the treatment of achalasia. Symptomatic patients with achalasia who had been referred to our center were consecutively enrolled. The diagnosis was established by clinical, radiographic and endoscopic criteria. Exclusion criteria included pregnancy, coagulopathy, serious medical illness or malignancy. Initially all patients were clinically scored based on the severity of five main symptoms and then underwent pneumatic dilation with a 3 cm balloon. Symptom scores were evaluated at 1,6,12… months. Clinical recurrence was defined as an increase of symptom score to greater than 50% of the baseline and treatment with a 3.5 cm balloon dilation. If recurrence occurred again, third dilation was done with a 4 cm balloon. Over a five year period, 99 patients [mean age: 35.6 (3.0 -72.0) years.] were followed to an average length of 47.4 (18-60) months. 35 patients needed retreatment, only 6 of them required third dilation. After third dilation two patients did not reveal improvement and underwent cardiomyotomy. Over this time period, cumulative remission rate was 65% without redilation and 94% with redilation. The mean remission period was 44.7 months (95% CI, 43.52-51.27) for single pneumatic dilation by use of Kaplan-Meier survival analysis. There was no significant predictive value for age, gender, previous treatment and severity of initial score to outcome (p>0.4) by use of Cox regression analysis. Pneumatic dilation by a Rigiflex balloon using a graded approach is effective long-term therapy for achalasia in majority of patients.***
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Key Words: Achalasia, rigiflex pneumatic dilation, treatment

INTRODUCTION

Achalasia is a primary esophageal motor disorder characterized by incomplete relaxation of the lower esophageal sphincter (LES) on swallowing and aperiestalsis of the esophageal body (1). Histopathologic examination of the achalasic esophagus demonstrates a loss of inhibitory myenteric plexus ganglionic cells. The loss of inhibitory ganglion cells secreting nitrous oxide and vasoactive intestinal peptide and the persistence of cholinergic stimulatory cells appear to be the primary pathophysiologic defects (2). The mainstay of therapy is directed towards reduction of LES pressure resulting in improved esophageal emptying by gravity. Pharmacologic therapy, endoscopic dilation, botulinum toxin injection and surgical myotomy are the primary therapeutic modalities. Pharmacological agents that have been used include nitrates and calcium channel blockers.

Forceful balloon dilation of lower esophageal sphincter is considered to be the most effective nonsurgical treatment for achalasia (3). Studies have found that balloon dilation provides good to excellent symptomatic relief in 86 to 100% of cases (4-7). In a large prospective study, Barkin et al reported that dilation with a 3.5 centimeter balloon provides symptomatic response in 90% of patients (7). The advantages of this technique include the opportunity for a one-day outpatient procedure, decreased cost and a low complication rate. The disadvantages are the potential for perforation in 2% of cases (8) as well as reservations about the long-term durability of symptomatic relief. Vaezi et al reported just 2 esophageal perforations during 10 years with a 3.0 cm balloon (4). Eckardt et al reported that the probability of remainning in symptomatic remission after a single dilation was 59% for 1 year and only 26% for 5 years (9).

MATERIALS AND METHODS

Patients

Over a five-year period, from January 1993 to January 1998, all symptomatic achalasia patients presented to our center were consecutively enrolled. The diagnosis was established based on clinical, radiographic and endoscopic criteria. Exclusion criteria included pregnancy, a prothrombin time

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greater than three seconds over control values, recent myocardial infarction and symptomatic congestive heart failure. Subjects were also excluded if endoscopy revealed a large hiatal hernia, epiphrenic diverticula, esophageal ulcers, or esophageal varices.

Informed consent was obtained from all patients after a full discussion of risks, benefits and alternatives. The Ethics Committee for Medical Research at Tehran University of Medical Sciences reviewed and approved the study.

Study Design

Patients underwent a pretreatment evaluation consisting of clinical assessment, barium swallow, and upper endoscopy. Then, they underwent pneumatic dilation with a 3.0 cm balloon.

Clinical evaluation was performed at 1 month after treatment and repeated every six months after therapy. Clinical remission was considered a symptomatic score less than 50% of the initial pretreatment score. Relapse was defined as a symptomatic score equal to or greater than 50% of the initial pretreatment score. Relapsers were redilated with a 3.5 cm balloon for the first time and with a 4.0 cm balloon for the second time.

Clinical Evaluation

A structured interview evaluating esophageal symptoms was conducted at the time of initial investigation and follow up at 1 and every 6 months after the time of initial treatment. A single physician performed all interviews. The severity of symptoms was evaluated on the basis of a modified version of a symptom score initially reported by Annese et al (10). The symptom score was the sum of individual scores for five symptoms: dysphagia to solids, dysphagia to liquids, passive regurgitation, active regurgitation and chest pain. The severity of each of these symptoms was scored on a scale of 0 to 3 as depicted in Table 1. The highest obtainable total score was 15.

Pneumatic Dilation

All dilations were performed with the Rigiflex (Microvasive, Watertown, Massachusetts) balloon dilator by a single expert gastroenterologist. After a clear liquid diet for 24 hours and an overnight fast, conscious sedation was administered with diazepam and meperidine (10 and 50 milligrams IV, respectively and modified doses for children). After complete upper endoscopy, a guidewire was placed into the stomach under endoscopic visualization. A 3.0 cm balloon dilator was passed over the guidewire and positioned under endoscopic guidance with the LES positioned at the midpoint of the balloon. The balloon was inflated to 10 psi for duration of 30 seconds, lower inflation pressures (4-6 psi) were used for patients under 16 or over 60 years old. The balloon was deflated and removed along with the guidewire.

Patients were discharged after a 6-hour observation period. If symptoms such as chest pain, or subcutaneous emphysema in the neck or chest occurred, a gastrograffin swallow was done to rule out perforation. Patients developing relapse of symptoms were redilated with a 3.5 cm balloon. Second relapses were treated with 4.0 cm pneumatic balloon dilation.

Statistical Analysis

Continuous variables were summarized as mean ± standard deviation (10). Qualitative variables were summarized as a percentage of the total group. The cumulative relapse rate after the first and second treatment sessions was estimated by the Kaplan-Meier method. Cox regression analysis was used to evaluate correlation between predicting factors and outcome. Thus a p-value of less than or equal to 0.01 was considered significant.

RESULTS

101 patients with achalasia were enrolled in the study. 2 patients neglected follow up and were excluded from the study. 99 patient (42 males and 57 females) aged between 3 and 72 years (mean age: 35.6 years) were followed. Demographic characteristics and clinical presentations of the patients are presented in table 2.

Table 1. Grading system for evaluation of clinical symptoms

Score / Symptoms	0	1	2	3
Dysphagia to solids	none	weekly	daily	each meal
Dysphagia to liquids	none	weekly	daily	each meal
Active regurgitation	none	weekly	daily	each meal
Passive regurgitation	none	monthly	weekly	daily
Chest pain	none	monthly	weekly	daily

Patients were followed to an average length of 47.4 (18-60) months.

Symptoms in 35 patients (35.4%) recurred after mean length of 26.5 (1-60) months from initial treatment and they underwent pneumatic redilation with a 3.5 cm balloon. Of these, 6 (6.1%) experienced failure at the average duration of 34 (18-60) months and underwent third dilation with a 4.0 cm balloon.

At the end of the follow up time, 93.9% of patients were in symptomatic remission with two graded dilations and 64.6 % with initial dilation. The mean remission period was 44.7 months (95% CI, 43.52-51.27) for single pneumatic dilation by use of Kaplan-Meier survival analysis.

After third dilation, two patients did not reveal improvement and underwent cardiomyotomy.

Intention to treat analysis revealed 63.3%, 92.1% and 96.0 % with first, second and third dilation respectively.

Therapeutic response was not significantly affected by gender (P=0.73), age (P=0.46), initial total score (p=0.90), previous drug therapy (0.91) and previous cardiomyotomy (P=0.92) by use of Cox regression analysis.

Of total number of 140 dilations (99 initial ones, 35 redilations and 6 third dilations), two perforations occurred, of these got sealed off and another one underwent surgery.

Table 2. Clinical characteristics of the study population at initial evaluation (n=99).

Age	35.58 (3.0-72.0)
Sex (M/F)	(42/57)
Duration of symptoms (year)	2.38 (0.0-45.0)
Initial symptom score	10.59 (4.0-15.0)

DISCUSSION

In this prospective study, we followed 99 patients after Rigiflex pneumatic dilation. Our study showed a cumulative long term remission rate up to 94% with two pneumatic dilation and 65% with one dilation for a medium of about 4 years follow up. The majority of previous studies using Rigiflex balloons have been performed by smaller patient numbers.

In the largest of previous studies Barkin et al. showed a 90% symptomatic improvement by treatment with 3.5 cm balloon for an average length of 1.3 (0.1-3.4) years in 50 patients with no perforation (7). Kadakia et al reported 62% , 79% and 93% of symptomatic remission by first, second and third dilation respectively in 29 patients for an average duration of 4.0 (0.3-6.0) years (4). It seems that our study is one of the largest studies as regards number of patients and duration of follow up using graded Rigiflex balloon dilators.

Cumulative review of 4 studies using witzel dilators reveals that symptomatic improvement has been modestly lower and perforation rates have been higher as compared with studies performed by Rigiflex dilators 12 (15). Wehrmann et al showed 89% improvement by graded dilations after medium of 28 months with 3.0 and 3.5 cm balloons with only one perforation (16). Sixty two patients underwent graded pneumatic dilation in a retrospective study by Levin et al with remission rate of 85% and 88% for 3.0 and 3.5 cm balloons respectively (17). It seems that Rigiflex dilators are the most effective and the safest non-surgical therapeutic modalities in achalasia. There is an interesting study by Kim et al that showed no significant differences between 3.0 and 3.5 cm balloons, but the sample size was not large (14 patients) (18). In a recent study Favara et al have reported 61.9% good to excellent subjective response to single pneumatic dilation after the average period of 93.5 months of follow up by telephone interview and the average number of dilation was 1.4 per patient, but they did not use graded method and the size of the balloon was not fixed (3.0, 3.5 and 4.0 cm balloon in non-graded fashion) (19).

Efficacy of first dilation in our study seems not to exceed other investigations but remission rate achieved after second dilation is more satisfactory. This can be justified based on ethnic differences or technical details that emphasizes the need for more investigations.

Makela et al reported a perforation rate of 5.9%, but the sample size for their study was small (17 patients) (20). In the largest prospective study, there was no perforation among 50 patients in the study of Barkin et al (7).

Highest perforation rate has been reported up to 7% by Lee et al in 1993 using a graded approach with 3.0, 3.5 and 4.0 cm balloons in a prospective study in 28 patients (21). Our study showed just 2 perforations in 140 balloon dilation (1.44 %) that sounds a very hopeful point in using graded pneumatic dilation.

Although previously published guidelines have recommended that graded pneumatic dilation should be done under fluoroscopy to confirm balloon position and obliteration of the visualized balloon waist (22), we alternatively suggest that balloon position can be ascertained accurately under direct endoscopic visualization. Our end point for adequate dilation was application of 4-10 PSI over duration of 30 seconds. This method provides efficacy similar to that reported in past studies with some cost saving and no increased risk of perforation.

We conclude that pneumatic dilation with a graded approach is a safe and effective therapy in Iranian patients with achalasia without exclusion criteria and can be first step of therapy for idiopathic achalasia.

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