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Original Research Article

Endoscopic Per Oral Myotomy in the Treatment of Achalasia: Initial Experience on 7 Patients in a Morocco Center

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Abstract

Endoscopic per-oral myotomy (POEM) is innovative an endoscopic technique for treatement of achalasia. This new technique has recently introduced in Morocco. It was performed on 7 patients at our institution. We collected patients data, the duration of the procedure, the location of the myotomy and patients follow-up**.** ***Results****:* Per-oral endoscopic myotomy was successfully performed in all patients, with adverse events observed in only one patient. Two months after POEM, significant reductions in symptom scores (Eckhardt Score 7.5vs 3) and this persisted at 3 years after POEM. Gastroesophageal reflux was observed in 16.8% of patients at 1 month and 21.3% at 3 years of follow-up. Per-oral endoscopic myotomy was successfully performed in all cases. Complications were rare (1.4%) and there was no mortality. Significant improvements in Eckhardt score were observed at 2 months, 1 year after POEM. ***Conclusions*****:** Based on our series, POEM is a safe and effective treatment for achalasia, there are relatively few contraindications, and the procedure can be used as first- or second-line treatment.

Keywords: Myotomy, Achalasia, Endoscopic.

INTRODUCTION

The term "achalasia" is derived from the Greek word "khalasis" which translates to "relaxation". Achalasia is a neurodegenerative motor disease of the esophagus resulting primarily from loss of function of the lower esophageal sphincter (LES), evident during swallowing, and major abnormalities of peristalsis [1]. Its incidence is low, approximately 1.6 per 100,000 [2] and it results in dysphagia, regurgitation and heartburn. The Chicago Classification v3.0 establishes a classification of esophageal motor disorders based on high resolution manometry.There is no curative or preventive treatment for esophageal myenteric plexus degeneration. The treatment strategy should incorporate the subtype of achalasia, age, patient comorbidities and preferences, degree of disease progression, and local expertise.Calcium channel blockers or nitrates can cause a rapid reduction in LES pressure of 47-64% with moderate efficacy on dysphagia [3]. It can theoretically be offered in patients who cannot tolerate invasive treatments but are in practice exceptionally prescribed. Surgical techniques such as Heller myotomy have been used to relieve symptoms. However, the efficacy of balloon dilation and botulinum toxin injection are considered temporary and repeated treatment is often required.The appropriate time to repeat treatment or change treatment modalities is still uncertain.

Surgical myotomy has long been considered the most definitive treatment for achalasia [4-5]. Endoscopic pneumatic dilatation allows forced distension of the LES. Two successive dilatations are performed, 1 week apart. The clinical efficacy of the technique is 90% at 1 year and 82% at 5 years, similar to that of Heller myotomy [6]. Patients not responding to iterative dilatations may also subsequently benefit from Heller myotomy, with more than a 70% treatment success rate [7].Per Oral Endoscopic Myotomy (POEM) is the most recent technique for the treatment of achalasia. It was first performed by the Inoue team in 2008. Usually, a mucosal incision is made 10 to 15 cm anterior to the esogastric junction. From this entry incision, a submucosal tunnel is created to reach the subcardial region. Subsequently, a section of the fibers of the inner circular layer is performed approximately 7 cm above and 2 cm below the esogastric junction under

endoscopic vision. The final step is the closure of the mucosal entry incision with endoscopic clips.

The presence of portal hypertension, severe coagulation disorders, a history of esophageal irradiation or extensive endoscopic mucosal resection are contraindications to POEM [7]. The efficacy of POEM varies from 82 to 100% according to the studies, with follow-ups up to sixteen months. Despite the encouraging results of POEM, its diffusion is slow due to the limited number of teams mastering the technique of endoscopic submucosal dissection. POEM is currently reserved for expert digestive endoscopy centers. The POEM technique has several advantages: it avoids the need to approach the abdominal wall and the peritoneum, dissection of the cardia, and it allows the approach to be varied (anterior or posterior) and the length of the myotomy. However, a recent meta-analysis seems to show that there is no difference in terms of efficacy, complication or length of hospital stay between POEM and Heller myotomy, but only a reduced procedure time with POEM [8]. POEM also appears to be as effective as iterative pneumatic dilatations [9].This new technique has recently been introduced for the first time in Morocco in the endoscopy unit of the Hassan II University Hospital in Fez

MATERIALS AND METHODS

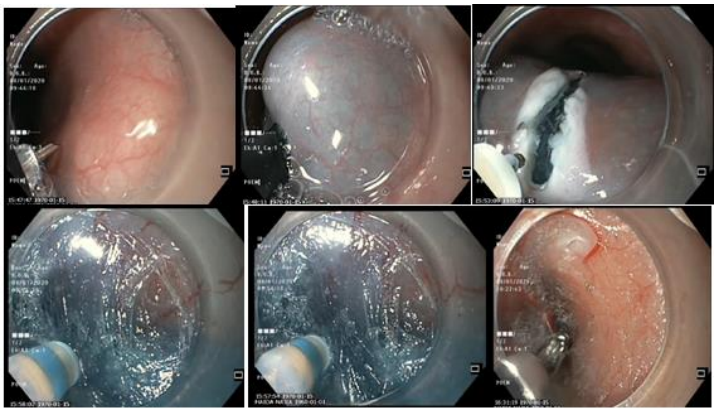
We report our experience with 7 patients with achalasia (5 males and 2 females, age range 38-59 years, 52.2 years) who underwent POEM in our institution. A clinical summary of the 7 patients is presented in **Table 1**. 4 patients had achalasia type II, 2 had achalasia type III, and the last patient had achalasia type I. Five patients were naïve to any treatment and 2 patients had benefited from multiple esophageal dilatations. Overall success rate was defined as a post-POEM Eckhardt score lower than 2 or a reduction of more than 4 points from baseline.

Preparation and devices

Patients were admitted the day before POEM and prevented from eating solid foods for 24 h before the procedure. A 9.8-mm outer diameter front-view endoscope (GIF-H260; Olympus, Tokyo, Japan) that is commonly used for upper gastrointestinal examination was used with a clear distal cap attachment (MH-588; Olympus). A triangle tip knife (KD-640 L; Olympus) was used to dissect the submucosal layer and also to divide the circular muscle bundles. Coagrasper (Coagrasper, FD-411QR; Olympus) was used to coagulate larger vessels before dissection and for hemostasis. An electrogenerator, VIO 300D (ERBE, Tübingen, Germany) was used. Hemostatic clips (EZ-CLIP, HX-110QR; Olympus) were also requested for final closure of the mucosal entry site. The procedures were performed under general anesthesia with positive pressure ventilation. The UCR CO2 insufflator (Olympus) was used with an insufflation tube (MAJ-1742; Olympus), which maintained CO2 insufflation at a constant rate of 1.2 L/min [10].

POEM Procedure

The POEM procedure was performed as follows. The mucosa was first elevated after injection of diluted methylene blue into the mid thoracic esophagus. A longitudinal mucosal incision of 2 cm was made as an entrance into the submucosal space **(Figure).** Then, a technique similar to endoscopic submucosal dissection (ESD) was used to create a tunnel submucosa of about 3 cm in the proximal stomachSpray coagulation mode (60 W, effect 2) was applied to dissect the submucosal layer. The larger vessels of the submucosa were coagulated using the forceps in soft coagulation mode (80 W, effect 5). Dissection of the circular muscle bundle was started 2 cm distal to the mucosal entrance. The sharp knife tip was used to capture circular muscle bundles and then to lift toward the tunnel lumen. The captured circular muscle was cut by current spray coagulation (60 W, effect 2). Division of the sphincter muscle continued from the proximal side towards the stomach and 2 or 3 cm over the cardia according to the surgical standards of Heller myotomy. After completion of the myotomy, the smooth endoscopic passage was confirmed from inside both the tunnel and the true esophageal lumen. The incised mucosal entrance was closed with hemostatic clips the successful closure of the mucosal entrance was confirmed by endoscopic appearance [10].



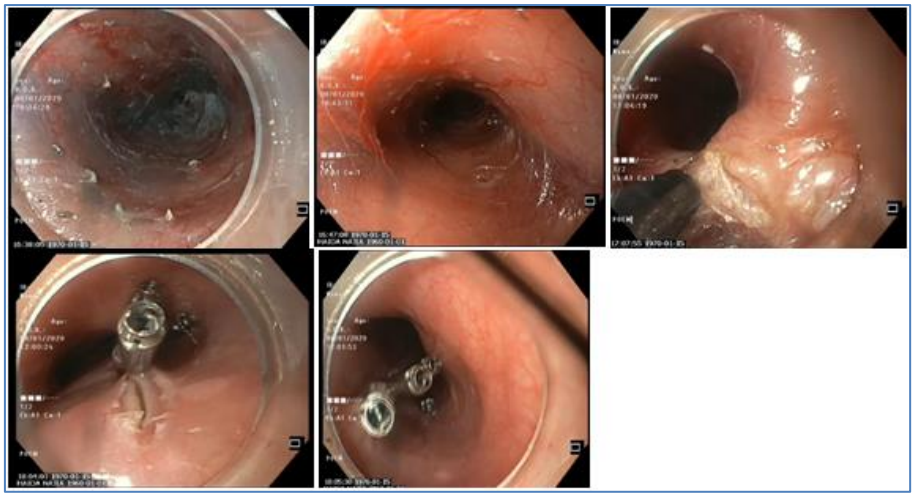


Fig-1: Images showing the different steps of POEM (images from the gastrology endoscopy unit of CHU hassan II of FES

Monitoring schedule

The initial follow-up visit was 1 month after surgery. Achalasia-related symptoms were assessed postoperatively using the Eckhardt score and compared to the preoperative score. The Eckhardt score is the sum of achalasia-related symptom scores of dysphagia, regurgitation, chest pain, and weight loss, which is used to assess achalasia symptom severity and treatment efficacy. A higher Eckhardt score reflects more severe achalasia symptoms; a lower score indicates improvement. Subsequent follow-up was then performed at 3 months and 6 months and 1 year and included a detailed interview; with determination of the Eckhardt score [10].

RESULTS

Clinical characteristics of7 cases of achalasia

A total of 7 consecutive patients (median age, 52 [range, 38-59 years], 5 men, 2 women were included in this study. The median body mass index was 20.6 kg/m2 (range 18.8 to 22.7 kg/m2). The median duration of symptoms was 2.1 years (range 1 to 4 years). Clinical data are displayed in Table 1. Esophageal manometry findings were classified as type I (one patient) type II (4 patients) and type III (2 patients) according to the Chicago Classification System [11].

In all cases, subjective symptoms, barium esophagography, pressure study and endoscopic findings significantly improved. There were no recurrences or late complications observed during postoperative follow-up (3 to 28 months, median 16 months).The mean Eckhardt score was 7.5 (6-9,) and 3 (2-4), before and 3 months after POEM, respectively). 7 cases had chest pain before surgery, which disappeared in all patients within 3 months of follow-up. Regurgitation and dysphagia persisted but also improved in all cases. However, 3 cases showed symptoms following postoperative reflux, and they were easily controlled by the usual dosage of proton pump inhibitors (PPI).

One patient had presented an esophageal preforation but not serious, the attitude was to keep her under surveillance with food restriction, antibiotic therapy by injection and parenteral nutrition, the patient remained hospitalized for 8 days with good improvement.

All 7 cases showed improvement in quality of life. All 5 cases gained an average of 2 kg (1 to 4 kg) of weight 3 months after the procedure.

Table -1: Summary of clinical characteristics of patients

Case	Age	Sex	Type of achalasia	Duration of follow-up	Past history of pneumatic dilatation	Past history of surgery
N 1	53	M	II	12 months	NO	NO
N2	59	F	I	4years	Yes	NO
N3	38	M	II	3 years	No	NO
N4	48	M	III	3 years	yes (3)	No
N5	55	M	II	12 months	No	No
N6	60	F	III	12 months	No	No
N7	56	M	II	2 years	Yes (2)	No

Table-2: POEM proceduresummaries

Case	Length of myotomy(cm)	Duration of procedure(min)	eckard score		Duration of hospitalization	Complications
			Before	After		
N1	12	40	9	4	3	NO
N2	11	60	7	3	3	NO
N3	14	90	9	3	3	NO
N4	10	70	6	2	3	NO
N5	12	90	9	4	3	NO
N6	12	60	7	2	8	YES
N7	12	100	6	3	3	NO

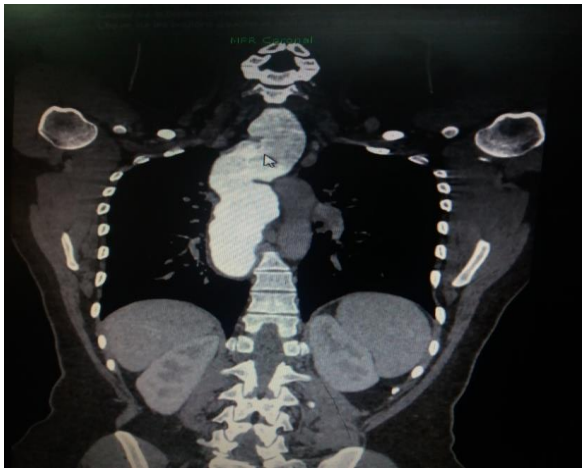


Fig-2: Abdominal CT scans: tortuous dilatation of the body of the esophagus up to 50 mm in diameter with a tapered aspect of the cardia

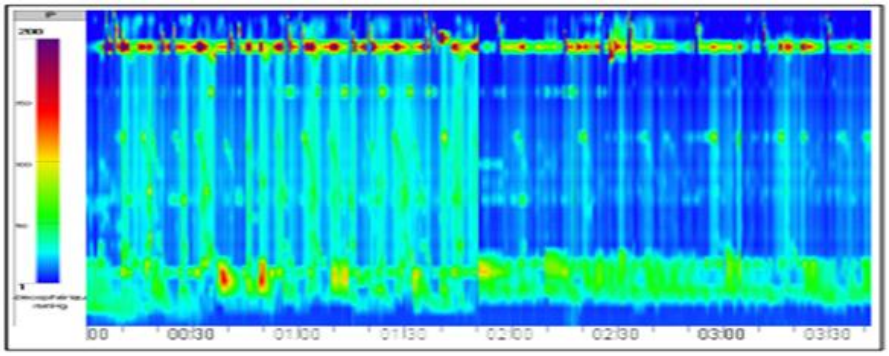


Fig-3: High resolution manometry: Defect in esophageal junction relaxation and panesophageal pressurization in favor of Chicago type II achalasia.

Fig-4: TOGD: dilated esophagus

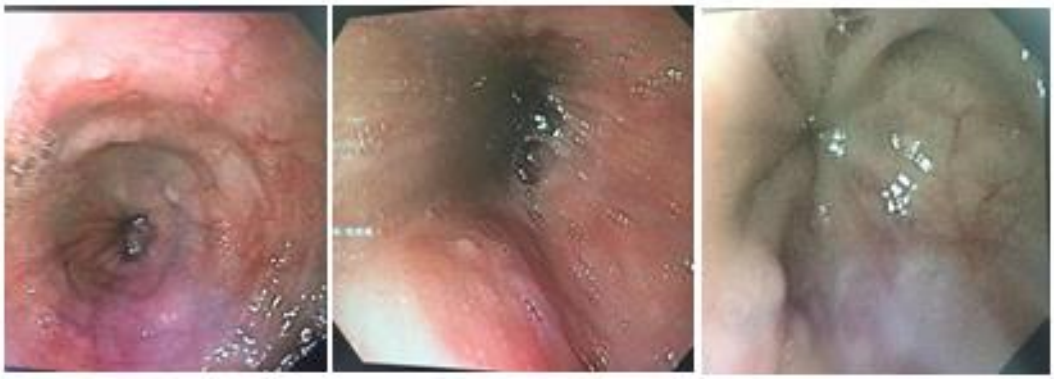


Fig-5: Decreased contractility figure b: Dilated esophagus with stasis figure C: Crossed cardia with fluid jump

DISCUSSION

Our experience with 7 consecutive cases indicates that POEM could be performed safely and effectively. Although POEM was first introduced in our institution, the indications now include almost all patients with achalasiae, even with these broad criteria, few severe complications have been observed. The learning curve of the technique is considered to be significant. Endoscopic per-oral manometry should be performed by experienced endoscopists to avoid complications or adverse outcomes.

Although achalasia is more common in young to middle-aged patients (median POEM age 52 years [range 38-59 years]; duration of symptoms, 2.1 years [range 1-4 years] in our series, POEM has been used in other series in many older patients with achalasia who tend to have more comorbidities and the use of medications such as antiplatelet agents and anticoagulants, putting them at higher risk for developing complications. They may also have a longer duration of disease, allowing time for the esophagus to dilate and twist, all these factors contribute to a more technically complex procedure. In addition, balloon dilation has been a mainstay of treatment for achalasia in older patients. However, advanced age and balloon diameter have been identified as important risk factors for perforation (in one group with an overall risk of 4%). This leads to the use of small diameter balloons to decrease the risk of perforation which may result in the need for repeat dilatation. This has a negative effect on the quality of life of elderly patients, so each episode carries a risk of perforation, POEM could be a first line option.

In our study, the clinical course was favorable in all 7 cases. Three patients had already received esophageal dilatation before POEM, demonstrating that POEM can be conducted safely and effectively even in such cases. The literature suggests that prior treatment with esophageal dilatation before surgical myotomy may make the operation more difficult and the results less successful. Horgan et al. reported that the difficulties of submucosal plane dissection were encountered much more often in the post-botulic injection group. In our experience, myotomy was successfully performed without encountering severe fibrosis due to old dilatations. Thus, even for surgical failure, POEM may be clinically feasible, effectively relieving symptoms due to previous incomplete myotomy.

The clinical feasibility and efficacy of this procedure in the Caucasian population has been discussed recently in the literature. Here we report the clinical experience of POEM performed in an uninitiated hospital in Japan population. They also reported changes in Eckhardt score, esophageal manometry, and esophageal reflux progression in Japanese patients rather than in the Caucasian population. Eckhardt et al. followed 54 consecutive patients treated with esophageal dilatation with clinical remission reported in 59% at 1 year after a single dilatation and in 26% at 5 years [11]. Dilatation showed a modest clinical response even with multiple sessions. Esophageal dilatation also has a small but significant risk of perforation (2-5%). In contrast to esophageal dilation, the POEM technique allows selective and sufficient dissection of the inner circular muscle layer in a single session. In addition, the response rates of endoscopic therapeutic options, including botulinum toxin injection and EBD in patients under 40 to 50 years of age is nearly half that of older patients. The majority of patients who are treated with experienced botulinum toxin injection relapse, usually 6 to 12 months after the first treatment and often require repeat treatment as the drug wears off and there is a recovery of neuromuscular communication. In contrast, Maselli *et al*. reported their experience of a 3-year-old child with very satisfactory results, indicating clinical feasibility and efficacy of POEM in the younger population [12].

Regarding the potential impact of previous treatment, it has been postulated that repeated damage to esophageal dilations may lead to fibrosis and associated lumen narrowing, which in turn may lead to recurrence of dysphagia [12].This may be one of the main causes of recurrence after endoscopic surgery with incomplete muscle dissection.

Surgical myotomy is the most promising treatment for achalasia. However, in the literature, some degree of dysphagia may persist in a significant number of patients, and more recent reports suggest that 20-25% of patients will require additional treatment, usually in the form of dilatation or repeated myotomy, with myotomy usually requiring additional anti-reflux procedures to avoid severe reflux esophagitis. In our series, symptomatic gastroesophageal reflux disease (GERD) had occurred in 3 cases, which was easily controlled with acid suppressant medication. The POEM procedure allows preservation of surrounding structures, including muscle fibers and the phrenic-esophageal membrane, effectively preventing reflux of gastric contents [13].

Nevertheless, careful observation is mandatory to screen for Barrett's esophagus and esophageal adenocarcinoma following persistent acid reflux.25 In their 48 cases Kilic *et al.* reported that the Heller myotomy in three of five patients failed and they required another surgical approach.

CONCLUSION

For many years, our institution had been the only hospital in Morocco where POEM could be performed. POEM is a safe and effective treatment for achalasia; there are relatively few contraindications, and the procedure can be used as a first or second line treatment

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