Research Article

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Peroral Endoscopic Myotomy in Patients with Type III Achalasia and Non Achalasia Esophageal Motility Disorders.

Ahmad Madkour[1], Ahmad F. Aboelezz[2], Ehab Nashaat[3], Hossam Abdelaziz[3], Sohayb Ibrahim[4], Mohamad Nabil[3]

1. Endemic Medicine Department, Helwan University, Faculty of Medicine, Cairo, Egypt
2. Department of Internal Medicine - Gastroenterology and Endoscopy Unit - Tanta University - Egypt
3. Department of Internal Medicine and Gastroenterology - Ain Sham's University - Egypt
4. Dar Elshefa Hospital - Egypt

Ahmad Madkour
Email: doctor.ahmad.madkour@gmail.com

Ahmad Fikry Aboelezz
Email : ahmed_fikry64@yahoo.com

Ehab Hassan Nashaat Allam
Email: ehabnashaat@hotmail.com
ehabnashaat9@gmail.com

Mohamed Nabil Badawy AlAshram
Email: mohamed.n.badawy@med.asu.edu.eg

Hossam Abdelaziz
Email : dr.hossamabdelaziz@gmail.com

Sohaib Mohammed ibrahim Ibrahim
Email : sohayebmi@gmail.com

Corresponding author

Ahmad F Aboelezz ,
Department of Internal Medicine, Gastroenterology and Endoscopy Section, Faculty of Medicine, Tanta University, Egypt.
Email : ahmed_fikry64@yahoo.com

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ABSTRACT

Background : Achalasia is a disease characterized by dysphagia, regurgitation, chest pain, and weight loss. It is now classified into three subtypes according to the Chicago classification. Type III achalasia is characterized by lower esophageal sphincter obstruction with premature or spastic distal esophageal contractions. The aim of this study is to evaluate the efficiency of peroral endoscopic myotomy (POEM) in patients with type III achalasia as well as non achalasia esophageal motility disorders.

Methods : This pilot prospective observational study was carried out on 12 patients aged from 18 to 75 years old, both sexes, with achalasia type III and non-achalasia esophageal motility disorders. Follow up after 3 months of Peroral Endoscopic Myotomy was evaluated by Eckardt score.

Results : There is significant decrease in mean Eckardt score after Peroral Endoscopic Myotomy (9.83 vs 1.17, $P < 0.001$) as t-test showed (t-test 13.23 with 95% CI 7.23-10.11). Thus, the effect of POEM on reducing Eckardt score is statistically significant. During the operative procedure, the average length of myotomy measured 20.42 cm, with a mean operative duration of 55.33 minutes. Following a mean follow-up period of 15.83 months, the mean Eckardt score decreased to 1.17. Bleeding occurred during the procedure in three cases (25%), while mucosal injury was observed in only one case. Additionally, one case experienced postoperative chest infection.

Conclusions : Peroral Endoscopic Myotomy is safe and effective intervention in the management of achalasia type III as well as non-achalasia esophageal motility disorders.

Keywords : *Achalasia, non-achalasia, esophageal motility, Peroral Endoscopic Myotomy.*

INTRODUCTION

Therapeutic gastrointestinal endoscopy is rapidly evolving nowadays and its role in the management of motility disorders of the digestive tract is progressing(1). Peroral endoscopic myotomy as a treatment modality for achalasia was first described in humans by Inoue(2) as a novel limited endoscopic technique that can be performed for the management of various esophageal motility disorders. Diagnostic procedures for most esophageal motility disorders include barium

esophagram, esophagogastroduodenoscopy (EGD), manometry, and endoscopic ultrasound to rule out pseudo-achalasia based on clinical suspicion(3). Manometry remains the gold standard test to establish a diagnosis of primary esophageal motility disorders. The best defined primary esophageal motility disorder (EMD) is achalasia(4).

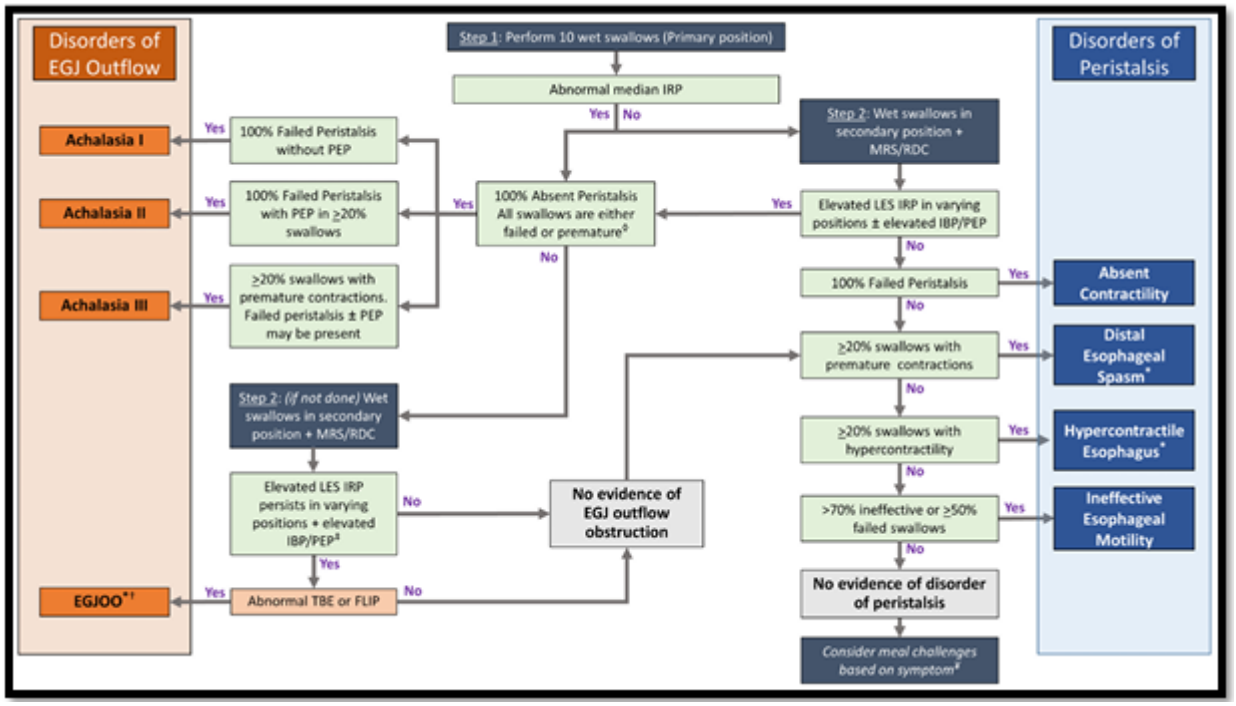
The widespread adoption of high-resolution manometry has led to an algorithmic scheme for esophageal motility disorders' classification summarized in the Chicago Classification CCv4.0(5). Achalasia is a disease characterized by dysphagia, regurgitation, chest pain, and weight loss. It is now classified into three subtypes according to the Chicago classification. Type III achalasia is characterized by not only lower esophageal sphincter obstruction, but also spastic activity in the esophageal body(6).

Idiopathic achalasia is a rare disease and affects individuals of both sexes and all ages. The annual incidence is estimated to be between 1.07 and 2.2 cases per 100 000 individuals, with prevalence rates estimated between 10 and 15.7 per 100 000 individuals(7).

Jackhammer esophagus, previously referred to as "nutcracker esophagus," was previously defined by mean distal contraction amplitude of 180 mmHg. The problem with this definition was both lack of specificity and poor symptom correlation(8).

Non-achalasia esophageal motility disorders are very rare and multicenter collaboration is required to develop an evidence-based methodology for the application of peroral endoscopic myotomy to these motility disorders. The Eckardt symptom score is the grading system most frequently used for the evaluation of symptoms, stages, and efficacy of achalasia treatment. It attributes points (0 to 3 points) for four symptoms of the disease (dysphagia, regurgitation, chest pain and weight loss), ranging from 0 to 12. It is used to evaluate the efficiency of a treatment during the follow up(9). The aim of this work was to study the efficiency of peroral endoscopic myotomy in patients with type III achalasia as well as non-achalasia esophageal motility disorders.

Figure 1: Chicago Classification 4.0 Hierarchical Classification Scheme.



PATIENTS AND METHODS

This pilot prospective observational study was carried out on 12 patients aged from 18 to 75 years old, both sexes, with achalasia type III and other non-achalasia esophageal motility disorders. The study was done for 6 months after approval from the Ethical Committee of Ain Shams University, Cairo, Egypt. An informed written consent was obtained from the patients. Exclusion criteria were patients with achalasia type 1-2, unfitness for anaesthesia, marked coagulopathy and marked esophageal ulcerations.

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Sampling Method: Purposive sampling.

All patients were subjected to history taking, clinical examination [general and local examination (Eckardt score)], laboratory investigations [complete blood count (CBC), fasting blood sugar (FBS), serum creatinine, international normalised ratio (INR), alanine transaminase (ALT), aspartate aminotransferase (AST)], high resolution manometry and esophago-gastro-duodenoscopy (EGD) to exclude pseudo-achalasia. Peroral endoscopic myotomy has been performed for all patients and follow up evaluation after 3 months of POEM was done using Eckardt score.

Statistical analysis

Statistical analysis was done by SPSS v26 (IBM Inc., Chicago, IL, USA). Quantitative variables were presented as mean and standard deviation (SD). Qualitative variables were presented as frequency and percentage (%).

RESULTS

From a total of 12 patients, 8 patients were females (66.7%) with the mean age of the studied patients is 40.5 years. Most of the cases presented with achalasia type III (66.7%) with 1 case showing combined type III achalasia and hypertensive lower esophageal sphincter (8.3%). The most frequent comorbidities were hypertension and previous surgical intervention (8.3% and 16.7%) respectively, one case underwent Nissen fundoplication and 1 case had Heller myotomy previously. Two cases were presented with diffuse esophageal spasm (16.7%), and one had Jackhammer esophagus (8.3%) as shown in table 1.

Table 1: Demographic characteristics and comorbidities of the studied cases

		N=12
Age (years)		40.5 (13-76)
Sex	Female	8 (66.7%)
	Male	4 (33.3%)
Cases	Achalasia type III	8 (66.7%)
	Diffuse esophageal spasm	2 (16.7%)
	Achalasia type III with hypertensive lower esophageal sphincter	1 (8.3%)
	Jackhammer esophagus	1 (8.3%)
Comorbidities	HTN	1 (8.3%)
Surgical intervention	Nissen fundoplication	1 (8.3%)
	Heller myotomy	1 (8.3%)

Data are presented as median (IQR) or frequency (%). HTN: hypertension.

Preoperative endoscopic assessment of the studied cases revealed that esophageal dilation was performed previously in 7 cases (58.3%) and incompetent cardia was present in 3 cases (25%). Other preprocedural laboratory investigations and high-resolution manometry findings are shown in table 2

Table 2: Findings of preoperative investigations among the studied cases

		N=12
Laboratory investigations	Hb	12.5 (9.7-14.1)
	TLC	6.67 (3.9-10.3)
	PLT	253.92 (168-349)
	ALT	20.67 (15-25)
	AST	18.92 (12-27)
	S. Creatinine	0.62 (0.4-1.0)
	INR	1.05 (1.0-1.2)

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EGD results	Esophageal dilation	7 (58.3%)
	Incompetent cardia	3 (25%)
	Antral gastritis	2 (16.7%)
	Duodenitis	2 (16.7%)
Manometry results	UES IRP (mmHg)	30.8 (16.1-50.4)
	UES relaxation time (s)	0.49 (0-0.8)
	LES IRP (mmHg)	23.33 (10-40.5)
	DL (s)	4.03 (0.2-7.2)
	DCI (mmHg.s.cm)	1750.58 (195-7950)
	Pan-esophageal pressurization	26.17 (0-71)
	Unknown pressurization	67.5 (15-100)
	Premature contractions	20.5 (0-46)
	Failed contractions	58.08 (0-100)

Data are presented as mean (range) or frequency (%). Hb: hemoglobin, TLC: total leukocytic count, PLT: Platelets, AST: aspartate aminotransferase, ALT: alanine transaminase, INR: international normalised ratio, OGD: oesophago-gastro-duodenoscopy, UES: upper esophageal sphincter, IRP: integrated relaxation pressure, LES: lower esophageal sphincter, DCI: distal contractile integral, DL: distal latency.

As regard the procedural characteristics and outcomes, the mean length of myotomy during the operation was 20.42 cm and the mean duration of operation was 55.33 min. as shown in figure 2, there was significant decrease in mean Eckardt score during the follow-up (mean interval of 15.83 months) after POEM in comparison with the score before the procedure (1.17 vs 9.83, $P < 0.001$) as t-test showed 13.23 with 95% CI 7.23-10.11. Thus, the effect of Peroral Endoscopic Myotomy on reducing Eckardt score is statistically significant. Only three cases (25%) suffered from bleeding during operation, and one case had mucosal injury. Also, one case had chest infection postoperatively as shown in table 3.

Table 3: Procedure characteristics and outcomes

Variables		**N=12**
Myotomy length (cm)		20.42 (18-22)
Duration of operation (min)		55.33 (35-80)
Follow-up interval (months)		15.83 (7-36)
Eckardt score before POEM		9.83 (8-12)
Eckardt score after POEM		1.17 (0-2)
Complications	**Bleeding during operation**	3(25%)
	Mucosal injury during operation	1(8.3%)
	Post-operation chest infection	1(8.3%)

Data are presented as mean (range) or frequency (%).

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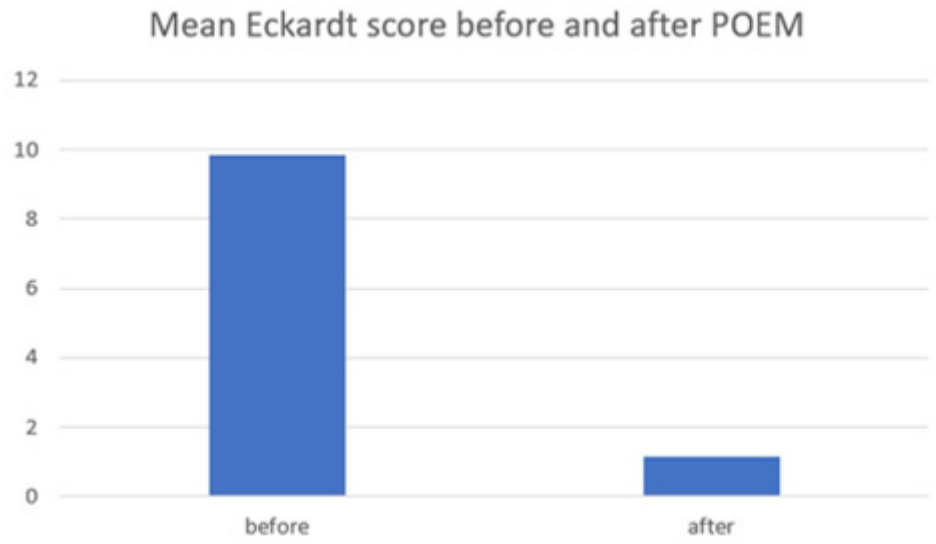
Figure 2: Mean Eckardt score before and after POEM



DISCUSSION

Advances in endoscopic submucosal dissection paved the way for a less invasive technique that help in treatment of esophageal motility disorders; including achalasia, and that what happened in 2007 when Pasricha illustrated Peroral Endoscopic Myotomy for the first time, based on submucosal tunnelling technique introduced by Sumiyama(10,11).

In 2010, Peroral Endoscopic Myotomy started to be a standardized management procedure in most of esophageal motility disorders(2). It was used primarily in the management of achalasia; especially type I and II. Type III achalasia and other non-achalasia esophageal motility disorders were not sufficiently investigated regarding efficacy of Peroral Endoscopic Myotomy in their management. Interestingly, long surgical myotomy guided by manometry from lower esophageal sphincter towards proximal esophagus gave better results than Heller myotomy in treating spastic achalasia and other esophageal motility disorders(12). Thus, Peroral Endoscopic Myotomy; being less invasive than long surgical myotomy, was supposed to have a great benefit for patients with achalasia type III and other non-achalasia esophageal motility disorders.

In our study, Peroral Endoscopic Myotomy was performed on 12 patients with esophageal motility disorders, nine of them was presented with achalasia type III, one had achalasia type III with hypertensive LES, one had Jackhammer esophagus, and a couple of patients showed diffuse esophageal spasm. All of the patients were diagnosed with Chicago classification criteria and confirmed by manometric findings. The study population had mean Eckardt score of 9.83 indicating severe symptoms. Two cases underwent surgical interventions; one performed Nissen fundoplication and the other performed Heller myotomy to relief symptoms, but the complaint recurred in a severe form again. Seven cases showed previous esophageal dilation, that indicates chronic existence of severe pathology. The mean duration of the procedure was 55.33 minutes and the mean length of myotomy was 20.42 cm in our procedures. The mean Eckardt score exhibited a notable decrease from 9.83 to 1.17 ($P < 0.001$), denoting a highly significant procedural outcome over an average follow-up duration of 15.83 months. Adverse outcomes following the procedure were very rare, for instance, no post procedural leaks or symptom recurrence had occurred. Only one case encountered chest infection post-operatively. Thus, we can conclude that Peroral Endoscopic Myotomy is safe and effective procedure in the management of achalasia type III as well as non-achalasia esophageal motility disorders. Limitations of this study included that the sample size was relatively small. Also, the study was in a single centre.

CONCLUSIONS

Peroral Endoscopic Myotomy is safe and effective in the management of achalasia type III as well as non-achalasia esophageal motility disorders. However, more research is needed to generalize the utilization of this procedure in more patients.

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Conflict of Interest: Nil

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REFERENCES

1. Chen YI, Inoue H, Ujiki M, Draganov P V., Colavita P, Mion F, et al. An international multicenter study evaluating the clinical efficacy and safety of per-oral endoscopic myotomy in octogenarians. Gastrointest Endosc. 2018;87(4):956–61.

2. Inoue H, Minami H, Kobayashi Y, Sato Y, Kaga M, Suzuki M, et al. Peroral endoscopic myotomy (POEM) for esophageal achalasia. Endoscopy. 2010;42(4):265–71.

3. Louis H, Covas A, Coppens E, Devière J. Distal esophageal spasm treated by peroral endoscopic myotomy. Am J Gastroenterol. 2012;107(12):1926–7.

4. Marjoux S, Brochard C, Roman S, Gincul R, Pagenault M, Ponchon T, et al. Botulinum toxin injection for hypercontractile or spastic esophageal motility disorders: may high-resolution manometry help to select cases? Dis Esophagus. 2015;28(8):735–41.

5. Yadlapati R, Kahrilas PJ, Fox MR, Bredenoord AJ, Prakash Gyawali C, Roman S, et al. Esophageal motility disorders on high-resolution manometry: Chicago classification version 4.0©. Neurogastroenterology and motility. 2021;33(1).

6. Galey KM, Wilshire CL, Niebisch S, Jones CE, Raymond DP, Litle VR, et al. Atypical variants of classic achalasia are common and currently under-recognized: a study of prevalence and clinical features. J Am Coll Surg. 2011;213(1):155–61.

7. Khashab MA, Saxena P, Kumbhari V, Nandwani M, Roland BC, Stein E, et al. Peroral endoscopic myotomy as a platform for the treatment of spastic esophageal disorders refractory to medical therapy (with video). Gastrointest Endosc. 2014;79(1):136–9.

8. Khan MA, Kumbhari V, Ngamruengphong S, Ismail A, Chen YI, Chavez YH, et al. Is POEM the Answer for Management of Spastic Esophageal Disorders? A Systematic Review and Meta-Analysis. Dig Dis Sci. 2017;62(1):35–44.

9. Werner YB, Costamagna G, Swanström LL, Von Renteln D, Familiari P, Sharata AM, et al. Clinical response to peroral endoscopic myotomy in patients with idiopathic achalasia at a minimum follow-up of 2 years. Gut. 2016;65(6):899–906.

10. Pasricha PJ, Hawarl R, Ahmed I, Chen J, Cotton PB, Hawes RH, et al. Submucosal endoscopic esophageal myotomy: a novel experimental approach for the treatment of achalasia. Endoscopy. 2007;39(9):761–4.

11. Sumiyama K, Gostout CJ, Rajan E, Bakken TA, Knipschield MA, Marler RJ. Submucosal endoscopy with mucosal flap safety valve. Gastrointest Endosc. 2007;65(4):688–94.

12. Leconte M, Douard R, Gaudric M, Dumontier I, Chaussade S, Dousset B. Functional results after extended myotomy for diffuse oesophageal spasm. Br J Surg. 2007;94(9):1113–8.