












Clinical efficacy of peroral endoscopic myotomy treatment performed in patients diagnosed with achalasia

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ABSTRACT

OBJECTIVE: Achalasia is a movement disorder of the esophagus that continues with chest pain, dysphagia, weight loss, regurgitation of undigested foods, recurrent aspiration and night cough.

METHODS: Weight loss, presence of dysphagia, presence of retrosternal pain and regurgitation were recorded before POEM treatment and preoperative Eckardt Score was calculated and recorded. Patients were recorded at the 6th month after POEM treatment recording weight loss, dysphagia presence, retrosternal pain and regurgitation presence and calculating postoperative Eckardt score.

RESULTS: The change between the postoperative and preoperative values of the patients was calculated as Δ value. As a result of the examination, no significant difference was found between the values Δ weight loss, Δ dysphagia, Δ retrosternal pain, Δ regurgitation and Δ Eckardt score and gender variable (respectively, $p=0.112$; $p=0.412$; $p=0.619$; $p=0.171$; $p=0.092$). Postoperative weight loss, dysphagia, retrosternal pain, regurgitation and Eckardt score values were found to be lower than preoperative values. (respectively, $p<0.001$; $p<0.001$; $p<0.001$; $p<0.001$; $p<0.001$).

CONCLUSION: Peroral endoscopic myotomy treatment is an effective treatment method with its being more reliable, lower complication risk, being less invasive and with postprocedural and clinical results.

Keywords: Dysphagia; Eckardt score; peroral endoscopic myotomy; regurgitation; weight loss.

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Achalasia is a movement disorder of the esophagus that continues with chest pain, dysphagia, weight loss, regurgitation of undigested foods, recurrent aspiration and night cough [1]. As a result of the loss of myenteric neurons responsible for peristalsis and relaxation

of the lower esophageal sphincter (LES) in the esophageal body, peristalsis is lost in the esophageal body, especially in the distal part, and there is no relaxation during swallowing in the lower esophageal sphincter (LES) [2]. These neuronal structures responsible for peristalsis and

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relaxation in the patients do not exist or are depleted. As a result of this situation, the flow of the undigested food is impaired and the current clinic arises due to stasis that occurs. Although the most common form of achalasia is idiopathic, pseudoachalasia which may develop as a result of neoplastic infiltration of myenteric neurons or Chagas disease which may develop due to *Trypanosoma cruzi* infection may lead to similar clinic [3]. Barium esophagography and high-resolution manometry, which are seen as the gold standard in diagnosis, are used in patients with clinically and historically suspected achalasia [4, 5]. They are divided into three types based on high-resolution manometry results (Table 1) [6].

Symptoms perceived by patients in the achalasia clinic vary from person to person. Therefore, it does not provide a full correlation with physiological measurements [7]. Therefore, a common scoring system was needed to evaluate the long-term clinical improvement of patients after surgical or medical treatment and to correlate them with physiological tests [8].

The Eckardt score and the achalasia-specific quality of life questionnaire are two tools used to assess quality of life and symptom severity before and after achalasia treatment. The Eckardt Classification, which is a simple questionnaire created with clinical experience, has been used since 1992 [9].

Nitrates and calcium channel blockers (Nifedipine) are oral agents used in the treatment of achalasia and have been reported as the least efficient treatment option [10]. Botulinum toxin administration to the lower esophageal sphincter and pneumatic dilation are other treatment options as laparoscopic Heller myotomy (LHM), esophagectomy and peroral endoscopic myotomy (POEM) are surgical techniques applied today. POEM was first applied in Japan for the treatment of achalasia and has been used recently [11]. To the best of our research, there are not enough studies in the literature examining the clinical efficacy of POEM treatment in patients with achalasia according to the Eckardt score. In this study, it was aimed to determine the clinical efficacy of POEM in the treatment of achalasia.

MATERIALS AND METHODS

Study Design

The study was planned as retrospective-sectional. Data collection was started after approval from the Adana City Training and Research Hospital Clinical

Highlight key points

- Weight loss, retrosternal pain, regurgitation and dysphagia due to achalasia are the most important symptoms.
- POEM is a more comfortable method and a lower complication risk compared to other surgical methods for patients.
- It provides almost complete improvement in achalasia clinical findings after POEM treatment.

TABLE 1. Classification of achalasia by HRM

HRM types	Description
Type 1	Failed contractions and absent esophageal pressurization with swallowing (distal esophageal pressure <30 mmHg)
Type 2	Panesophageal pressurization with swallowing (pressure >30 mmHg)
Type 3	Spastic or premature contractions associated with rapidly propagated pressurization

HRM: High-resolution manometry.

Research Ethics Committee (date: 04.07.2022, number: 2029). The files of the patients who applied to the gastroenterology clinic of our hospital between January 01, 2021 and June 30, 2022 and were diagnosed with achalasia were scanned. Patients receiving POEM treatment were included in the study. Data from 49 patients over the age of 18, whose file data were fully accessed, were recorded. It was determined as the exclusion criterion for patients whose file data could not be reached fully, who were under the age of 18, who did not follow up for 6 months, and who refused POEM treatment. A total of 49 patients were included in the study.

Data Collection

Patients' age, gender, vital signs, and achalasia type were recorded. Weight loss, presence of dysphagia, presence of retrosternal pain and regurgitation were recorded before POEM treatment and preoperative Eckardt score was calculated and recorded. The patients were re-evaluated 6 months after POEM treatment. Weight loss, presence of dysphagia, presence of retrosternal pain and regurgitation were recorded at 6 months after POEM treatment, and the postoperative Eckardt score was calculated and recorded (Table 2).

TABLE 2. Eckardt scoring

	Dysphagia	Regurgitation	Retrosternal pain	Weight loss (kg)
0	None	None	None	None
1	Occasioanal	Occasioanal	Occasional	<5
2	Daily	Daily	Daily	5–10
3	Each meal	Each meal	Each meal	>10

Statistical Analysis

SPSS (Statistical Package for the Social Sciences, Chicago, IL, USA) 25.0 package program was used for statistical analysis of the data. Categorical measurements were summarized as numbers and percentages, and continuous measurements as mean and standard deviation (median and min-max where appropriate). Shapiro-Wilk test was used to determine whether the parameters in the study showed normal distribution. Mann-Whitney U test was used in the double-group analyses. Wilcoxon signed-rank test was used to analyze the difference between preoperative and postoperative findings in normally distributed parameters. Statistical significance level was taken as 0.05 in all tests.

RESULTS

A total of 46 patients were included in the study. 19 (41.3%) patients were male and 29 (58.7%) were female. The mean age of the patients was 48.7 ± 18.6 . Thirty-eight (82.6%) patients were found to have type 2 achalasia (Table 3). The preoperative Eckardt score average of the patients was determined as 8.6 ± 1.97 , while the postoperative Eckardt score average was found to be 0.21 ± 0.47 . While the mean preoperative weight loss score was 2.54 ± 0.5 , the mean postoperative weight loss score was 0.0 ± 0.0 (Table 4). The change between the postoperative and preoperative values of the patients was calculated as Δ value. The differences between the calculated value and the gender variable were analyzed in Table 5. As a result of the examination, no significant difference was found between Δ weight loss, Δ dysphagia, Δ retrosteral pain, Δ regurgitation, Δ Eckardt score values and gender variable (respectively, $p=0.112$; $p=0.412$; $p=0.619$; $p=0.171$; $p=0.092$).

Postoperative weight loss, dysphagia, retrosternal pain, regurgitation, and Eckardt score values of the patients were found to be lower than their preoperative

TABLE 3. Analysis of patients' demographic and preoperative-postoperative symptoms

	Frequency (n)	Percent (%)
Sex		
Male	19	41.3
Female	27	58.7
Type of achalasia		
Type 1	2	4.3
Type 2	38	82.6
Type 3	6	13.0
		Median
Age, Mean \pm SD (Min–Max)	48.7 ± 18.6	50 (17–84)

SD: Standard deviation; Min: Minimum; Max: Maximum.

TABLE 4. Preoperative-postoperative comparison of Eckardt score and associated symptoms

	Preoperative Mean \pm SD	Postoperative Mean \pm SD	p*
Weight loss	2.54 ± 0.5	0.0 ± 0.0	<0.001**
Dysphagia	2.73 ± 0.49	0.10 ± 0.31	<0.001**
Retrosternal pain	1.60 ± 1.12	0.04 ± 0.20	<0.001**
Regurgitation	1.17 ± 1.14	0.10 ± 0.31	<0.001**
Eckardt scores	8.06 ± 1.97	0.21 ± 0.47	<0.001**

*: $P \leq 0.05$; **: $P \leq 0.001$, a: Wilcoxon Signed Rank Test; SD: Standard deviation.

values ($p \leq 0.001$; $p \leq 0.001$; $p \leq 0.001$; $p \leq 0.001$; $p \leq 0.001$, respectively) (Table 4).

DISCUSSION

In our study, we aimed to see whether the procedure we performed with the Eckardt classification was clinically successful in the 6-month follow-up of the patients before and after the procedure who underwent POEM. Discussion In our study, we aimed to see whether the procedure we performed with the Eckardt classification was clinically successful in the 6-month follow-up of the patients who underwent POEM before and after the procedure. In the follow-up of the patients, we concluded that POEM was extremely successful in a 6-month peri-

TABLE 5. Analysis of the rate of change of Eckardt score and associated symptoms by gender of the patients

	Male (n=19) Mean±SD	Female (n=27) Mean±SD	p
ΔWeight loss	-2.68±0.47	-2.44±0.50	0.112
ΔDysphagia	-2.73±0.45	-2.55±0.69	0.412
ΔRetrosternal pain	-1.68±1.24	-1.48±1.05	0.619
ΔRegurgitation	-1.26±0.93	-0.92±1.14	0.171
ΔEckardt scores	-8.42±2.00	-7.44±1.90	0.092

Δ: Postoperative-preoperative; a: Mann-Whitney U test; SD: Standard deviation.

od. We found that all of the patients we followed up with had a complete resolution of the weight loss complaint at the end of 6 months. As a result of our literature review, we found a small number of studies in which the clinical findings constituting the Eckardt score were compared one by one at preoperative and postoperative 6 months.

It was observed that the mean weight loss score, which is the second most severe finding of the 46 patients we followed, improved significantly in the 6th-month follow-up, and the complaint of weight loss disappeared in all of the patients, and this decrease was statistically significant. In a study, it was shown that the weight loss score decreased significantly over a 6-month period and was statistically significant, but not in all patients improvement was recorded. Preoperative weight loss score was determined as 1.26 ± 1.34 and postoperative weight loss score was determined as 0.29 ± 0.84 [12]. Complete recovery of weight loss in our POEM treatment shows that POEM treatment has effective clinical results.

Compared with the Heller myotomy, which is frequently used in the treatment of achalasia, it has been reported that the complaint of weight loss completely regressed in the follow-up patients [13]. Although it has been reported that Heller myotomy performed in achalasia patients is more unsuccessful than POEM in studies, it is seen that the results are generally close to each other [14, 15]. Our study has important findings in terms of demonstrating the clinical efficacy success of POEM treatment with these results.

It was observed that dysphagia, the most severe complaint of the patients we followed, improved significantly after 6 months of follow-up, and the result was statistically significant. In the literature, there are studies

showing the success rate of 82% to 100% improvement of dysphagia complaints in the long-term results with other options applied in the treatment of achalasia [16, 17]. However, considering that the POEM procedure is less invasive than other surgical techniques and the patients return to their normal lives in a shorter time after the procedure, considering that it is more comfortable for the patients shows that it is a more correct treatment approach. As stated in the studies in the literature, we found a significant decrease in patients' complaints of regurgitation and retrosternal pain in our study.

In the 6-month follow-up of our patients, we found that the total Eckardt scores before and after the procedure decreased significantly and these results were statistically significant. In recent studies, it has been reported that Eckardt scores decreased significantly in the follow-up of patients who underwent POEM in parallel with our study [18–20].

Limitations of the Study

There are some limitations to our study. The first of these is that the study was designed retrospectively and was limited to single-center experience data. Another limitation is that the time frame included in the study is not in a longer interval. Third, the evaluation after POEM treatment is limited to 6 months. Limitations of the Study There are some limitations to our study. The first of these is that the study was designed retrospectively and was limited to single-center experience data. Another limitation is that the time frame included in the study is not in a longer interval. Third, the evaluation after POEM treatment is limited to 6 months. Prospective studies in which the follow-up period is evaluated for a longer period of time, clinical efficacy is demonstrated with the Eckardt score, and multicenter studies with large series and involving more patients will provide more reliable results.

Conclusion

Weight loss, retrosternal pain, regurgitation and dysphagia due to achalasia are the most important symptoms. The most important evaluation that reveals the effectiveness of the treatments to be applied is related to the improvement of these symptoms. In the 6-month follow-up of our patients, we found that the total Eckardt scores decreased significantly before and after the procedure. POEM treatment is a more reliable treatment method with a lower complication risk, less invasive and clinically effective treatment with post-procedure results.

Ethics Committee Approval: The Adana City Training and Research Hospital Clinical Research Ethics Committee granted approval for this study (date: 04.07.2022, number: 2029).

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REFERENCES

- Boeckxstaens GE, Zaninotto G, Richter JE. Achalasia. *Lancet* 2014;383:83-93. [\[CrossRef\]](#)
- Rubin BP, Fletcher JA, Fletcher CD. Molecular insights into the histogenesis and pathogenesis of gastrointestinal stromal tumors. *Int J Surg Pathol* 2000;8:5-10. [\[CrossRef\]](#)
- Gockel HR, Schumacher J, Gockel I, Lang H, Haaf T, Nöthen MM. Achalasia: will genetic studies provide insights? *Hum Genet* 2010;128:353-64. [\[CrossRef\]](#)
- Blonski W, Kumar A, Feldman J, Richter JE. Timed barium swallow: diagnostic role and predictive value in untreated achalasia, esophago-gastric junction outflow obstruction, and non-achalasia dysphagia. *Am J Gastroenterol* 2018;113:196-203. [\[CrossRef\]](#)
- Kahrilas PJ, Bredenoord AJ, Fox M, Gyawali CP, Roman S, Smout AJ, et al; International High Resolution Manometry Working Group. The Chicago Classification of esophageal motility disorders, v3.0. *Neurogastroenterol Motil* 2015;27:160-74. [\[CrossRef\]](#)
- Ramai D, Lai JK, Ofori E, Linn S, Reddy M. Evaluation and management of premalignant conditions of the esophagus: a systematic survey of international guidelines. *J Clin Gastroenterol* 2019;53:627-34. [\[CrossRef\]](#)
- Ross D, Richter J, Velanovich V. Health-related quality of life and physiological measurements in achalasia. *Dis Esophagus* 2017;30:1-5. [\[CrossRef\]](#)
- Zaninotto G, Bennett C, Boeckxstaens G, Costantini M, Ferguson MK, Pandolfino JE, et al. The 2018 ISDE achalasia guidelines. *Dis Esophagus* 2018;31:doy071.
- Slone S, Kumar A, Jacobs J, Velanovich V, Richter JE. Accuracy of achalasia quality of life and Eckardt scores for assessment of clinical improvement post treatment for achalasia. *Dis Esophagus* 2021;34:doaa080. [\[CrossRef\]](#)
- Vaezi MF, Pandolfino JE, Yadlapati RH, Greer KB, Kavitt RT. ACG clinical guidelines: diagnosis and management of achalasia. *Am J Gastroenterol* 2020;115:1393-411. [\[CrossRef\]](#)
- Inoue H, Minami H, Kobayashi Y, Sato Y, Kaga M, Suzuki M, et al. Peroral endoscopic myotomy (POEM) for esophageal achalasia. *Endoscopy* 2010;42:265-71. [\[CrossRef\]](#)
- McKay SC, Dunst CM, Sharata AM, Fletcher R, Reavis KM, Bradley DD, et al. POEM: clinical outcomes beyond 5 years. *Surg Endosc* 2021;35:5709-16. [\[CrossRef\]](#)
- Costantino CL, Geller AD, Visenio MR, Morse CR, Rattner DW. Outcomes of laparoscopic heller myotomy for achalasia: 22-year experience. *J Gastrointest Surg* 2020;24:1411-6. [\[CrossRef\]](#)
- Leeds SG, Burdick JS, Ogola GO, Ontiveros E. Comparison of outcomes of laparoscopic Heller myotomy versus per-oral endoscopic myotomy for management of achalasia. *Proc (Bayl Univ Med Cent)* 2017;30:419-23. [\[CrossRef\]](#)
- Park CH, Jung DH, Kim DH, Lim CH, Moon HS, Park JH, et al; Achalasia Research Group of the Korean Society of Neurogastroenterology and Motility. Comparative efficacy of per-oral endoscopic myotomy and Heller myotomy in patients with achalasia: a meta-analysis. *Gastrointest Endosc* 2019;90:546-58. [\[CrossRef\]](#)
- Stavropoulos SN, Modayil RJ, Friedel D, Savides T. The International Per Oral Endoscopic Myotomy Survey (IPOEMS): a snapshot of the global POEM experience. *Surg Endosc* 2013;27:3322-38. [\[CrossRef\]](#)
- Moonen A, Annese V, Belmans A, Bredenoord AJ, Bruley des Varannes S, Costantini M, et al. Long-term results of the European achalasia trial: a multicentre randomised controlled trial comparing pneumatic dilation versus laparoscopic Heller myotomy. *Gut* 2016;65:732-9. [\[CrossRef\]](#)
- de Pascale S, Repici A, Puccetti F, Cariani E, Rosati R, Fumagalli U. Peroral endoscopic myotomy versus surgical myotomy for primary achalasia: single-center, retrospective analysis of 74 patients. *Dis Esophagus* 2017;30:1-7. [\[CrossRef\]](#)
- Bhayani NH, Kurian AA, Dunst CM, Sharata AM, Rieder E, Swansstrom LL. A comparative study on comprehensive, objective outcomes of laparoscopic Heller myotomy with per-oral endoscopic myotomy (POEM) for achalasia. *Ann Surg* 2014;259:1098-103. [\[CrossRef\]](#)
- Schneider AM, Louie BE, Warren HF, Farivar AS, Schembre DB, Aye RW. A matched comparison of per oral endoscopic myotomy to laparoscopic Heller myotomy in the treatment of achalasia. *J Gastrointest Surg* 2016;20:1789-96. [\[CrossRef\]](#)