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Original Research Article

Per Oral Endoscopic Myotomy in Treatment of Moroccan Patients with Achalasia: Prelimanary Result

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Abstract

Background and Objectives: Endoscopic myotomy is a recent technique that did spread quickly across high-income countries. The aim of this study is to report the experience of our department regarding the practice of POEM. ***Study design***: It is a retrospective study including 13 patients with achalasia treated by POEM at the Department of Digestive Functional Explorations (EFD-HGE) of University Hospital Center Ibn Sina of Rabat, between January 2017 and June 2023. There was a break during the COVID19 pandemic and the endoscopic activity was stopped for a while. ***Results***: The median age was 40, 46. Women were more affected than men: 69% and 31% respectively. Only 15% of cases had previous treatment (pneumatic dilation/surgical myotomy). The clinical success rate reached 84.6%. The mean of Eckardt scores decreased from 8 at baseline to 3 at 2 months. The IRP's mean decreased from 23.9 mmHg to 15.6 mmHg after the gesture. The post-POEM reflux rate was less than 16%, but the rate of serious adverse events was relatively high. ***Conclusions***: POEM is an effective procedure to treat achalasia with a low morbidity, provided that it is carried out in an expert center with suitable and good quality material.

Keywords: Endoscopic Myotomy, POEM, Achalasia, Treatment.

BACKGROUND

Endoscopic peroral myotomy was performed the first time in Japan in 2008 by Professor Haru Inoue to treat achalasia. Since then multiple studies have reported the effectiveness of this technique in the short and long term.

It is a promising technique but has some constraints. Indeed, it requires special training, and an adequate technical platform with expensive equipment, and can expose to multiple complications of which GERD remains the most common.

This study evaluate the therapeutic efficacy and morbidity of POEM, which was carried out in a center with modest experience in Endoscopic submucosal dissection (ESD) and third space therapy.

METHODS

13 cases of achalasia treated by POEM, between January 2017 and June 2023, were retrospectively included. It is noted that endoscopic activity was stopped (except for urgent procedures) during the SARS-CoV-2 pandemic between 2019 and 2020.

The assessment of dysphagic patients included esogastroscopy and esophageal manometry. The majority also had an esophagram (Fig.1).

The analysis of the manometry results was carried out by MMS 9.5 software, so lower esophageal sphincter (LES) integrated relaxation pressure (IRP) was considered abnormal when it was more than 21mmHg.

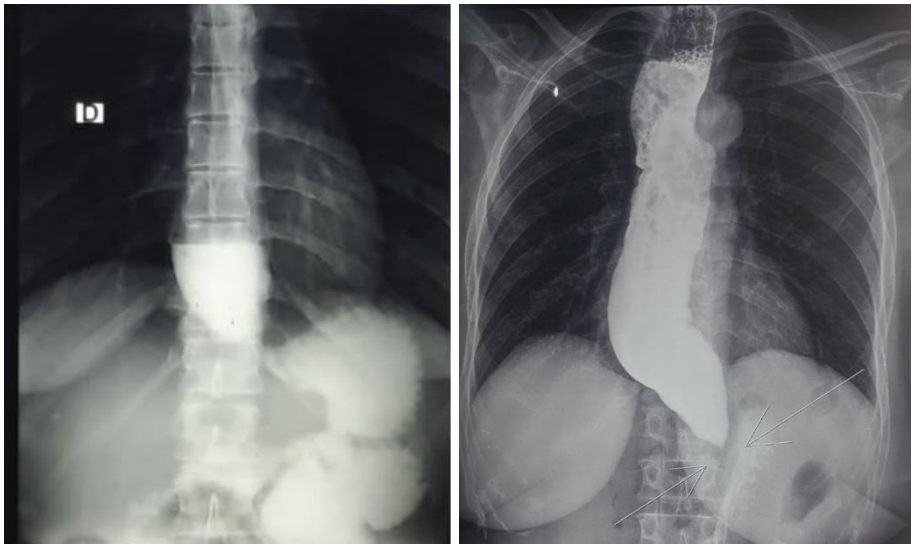

Figure 1: Barium swallow study demonstrating characteristics of achalasia, including the bird's beak deformity and a dilated esophagus

Patients were placed on a liquid diet 3 days before the procedure. POEM was performed under CO2 insufflator on the posterior or posterolateral side of the esophagus. The incision was made between 6 and 12 cm above the Z line, then the dissection was carried on until 2 or 3 cm under the esophagogastric junction (EGJ) where we could see the penetratings vessels. Myotomy was performed by a traingular or hook knife. Usually between 5 and 7 endoclips were used to close the mucosa incision.

The median operation time was 90 minutes (range 80 to 150 min). Patients were treated with bi-antibiotic therapy and proton pump inhibitors (PPIs). Liquid diet was started after 3 days and regular diet after 2 or 3 weeks. Length of hospital stay was a median of 6 days (range 5 to 12 days). Clinical monitoring was based on the evaluation of the Eckardt score at 2 months post-operative, then at 1 year and 2 years. The esophageal manometry at 6 months could not be performed in all patients due to lack of means and accessibility.

RESULTS

As shown in Table 1, the median age was 40.5 years [extremes: 20 and 62 years]. Women were more affected than men: 69% and 31% respectively, the sex ratio was 0.44 H/F. Only 15% of cases (2/13) had previous treatment: one case had a history of pneumatic dilation and the second one was treated previously by Heller myotomy. Weight loss was a common sign (85% of cases). Half of the patients had regurgitations but only 8% of the cases reported a nighttime cough.

Table 1: Preoperative characteristics of study patients.

Patient characteristics	Data
Median age, y	40.5
Sex ratio, n, male/female	4/9
Duration of symptoms, y	3.9
Chicago classification, n	
Type I Type II Type III	8 4 1
Previous treatment, n (%)	
Pneumatic dilation	1 (7.7)
Heller myotomy	1 (7.7)
No previous treatment	11 (84.6)

The type I of achalasia (61.5%) was the most frequent, followed by patients with type II (30.8%) and finally 1 case with type III of achalasia (7.7%) according to the Chicago classification system. The mean of Eckardt's scores before procedure was 8 (range 4 to11). The median total length of the endoscopic myotomy was 7.3 cm (range 5 to 10 cm).

The clinical success rate reached 84.6%. The mean of Eckardt's scores decreased after two months to 3 (Fig.2), and after 2 years to 1. The IRP's mean decreased from 23.9 mmHg to 15.6 mmHg after the gesture (Fig.3).

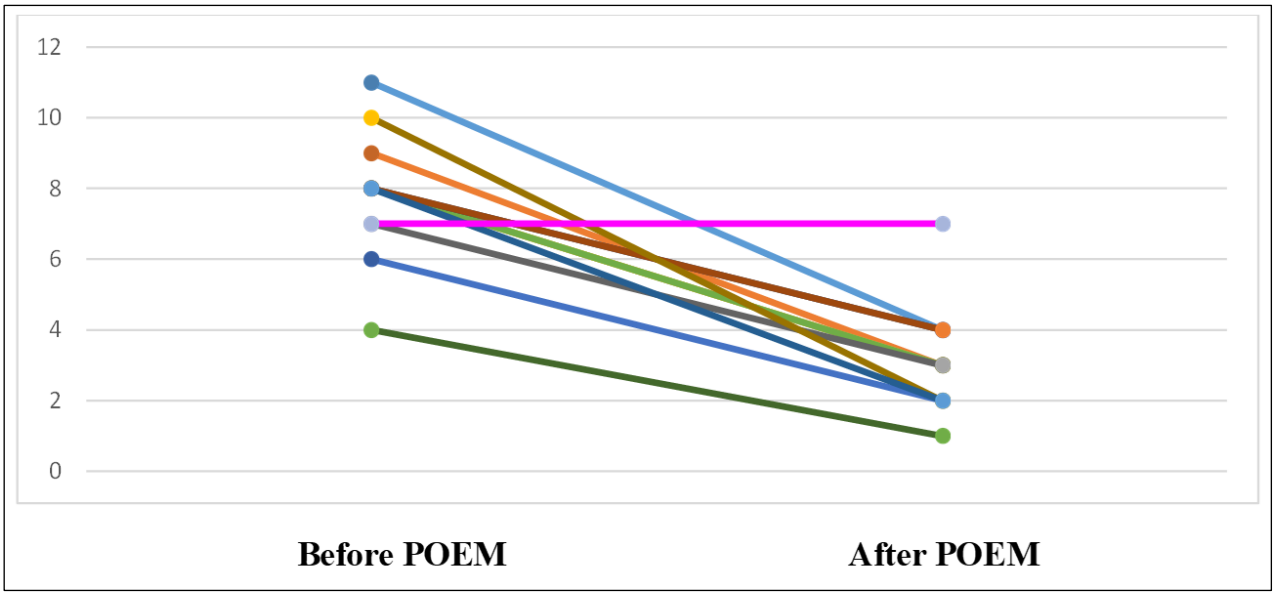

Figure 2: Individual changes in Eckardt score among achalasia patients two months after POEM procedures.

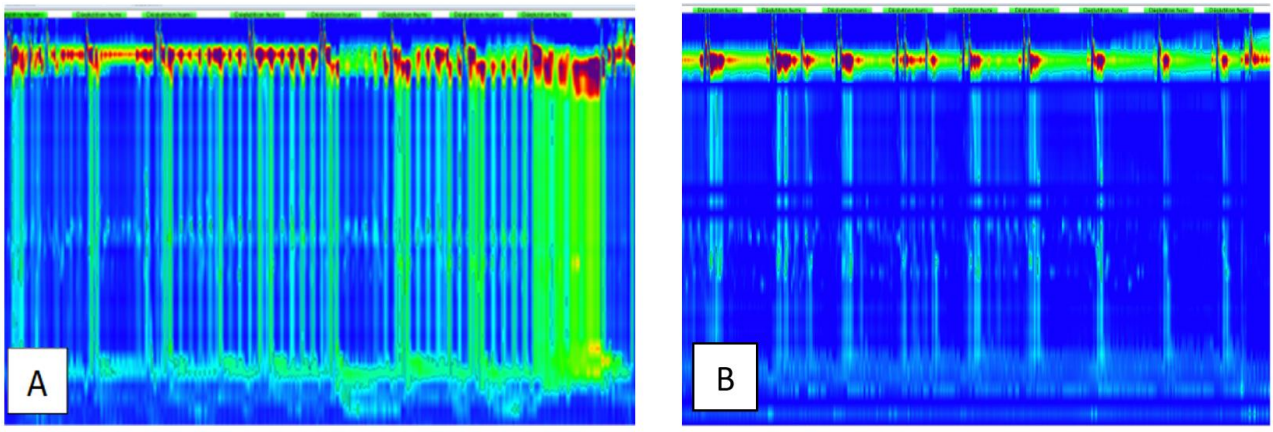

Figure 3: High resolution manometry before (A) and after (B) peroral endoscopic myotomy (POEM) for a patient who suffered from type II achalasia.

We report the occurrence of perioperatives complications, As shown in Table 2: two cases of mucosal injuries, they were closed by endoclips, and two cases of distal cap detachment in the submucosal tunnel, one case had an endoscopic extraction (Fig.4) and the second one had a surgical extraction due to impaction of the cap (Fig.5). The POEM procedures were accomplished successfully in all cases despite the occurrence of some adverses events.

Figure 4: Endoscopic extraction of detached cap.

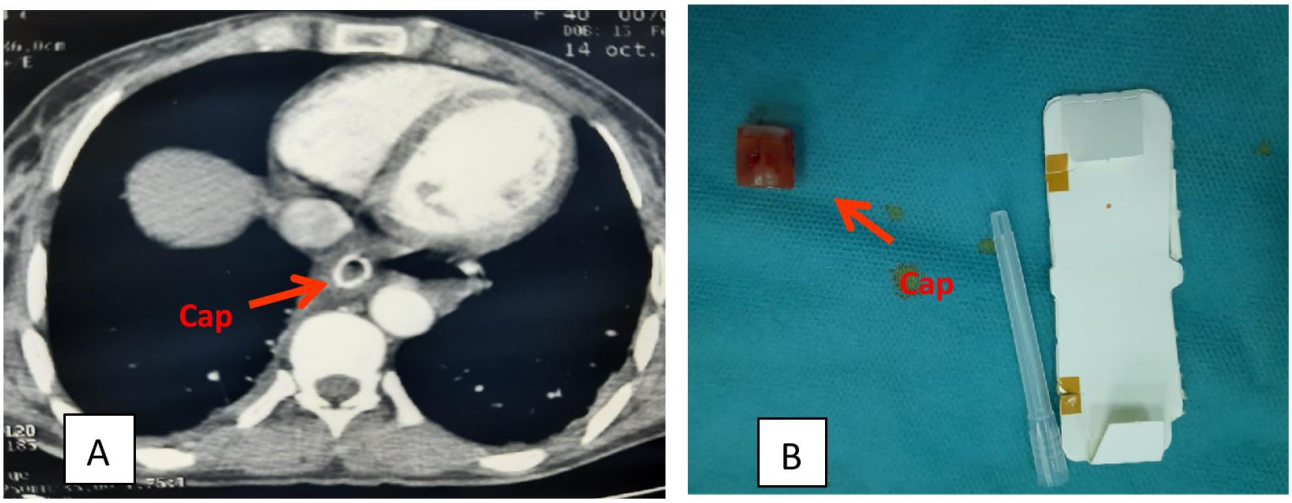

Figure 5: Endoscopic Cap (arrow) trapped in the esophageal submucosal tunnel A. CT image before extraction ; B. after surgical extraction.

Table 2: Procedure-Related Parameters

Parameters	Data
median operating time, min	90
Myotomy length, cm	7.3
Complications, n (%)	
Mucosal tear	2 (15.4)
detachment of the cap	2 (15.4)
Capno-peritoneum (requiring needle exsufflation)	3 (23.1)
Pleural effusion	4 (30.8)
Empyema	1 (7.7)
hospital stay, d	6

The postoperative complications were dominated by pneumoperitoneum (38%) followed by pleural effusion in about 31% of cases. A patient was re-admitted after two weeks for management of fever and deterioration of general condition, the initial post-POEM CT esophagram (before his discharge) didn't show postoperative leak while the recent radiological examinations found left empyema (Fig.6), this case has been treated by esophageal exclusion.

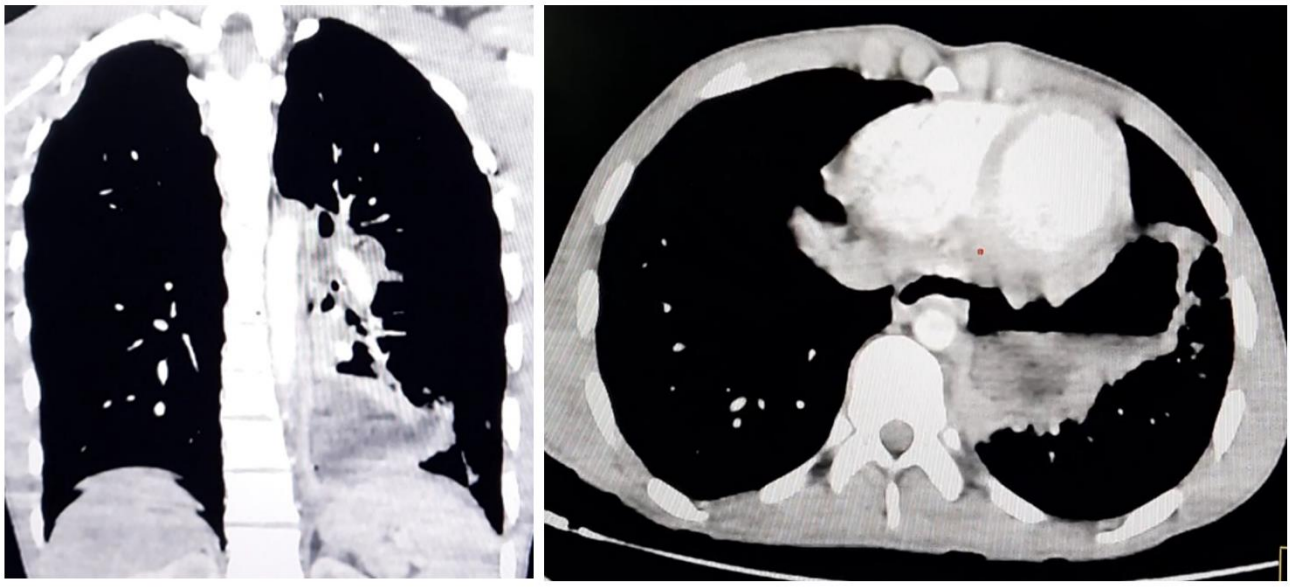

Figure 6: chest CT images showing pleural collection with air-fluid level (signs for empyema).

Two cases of gastroesophageal reflux disease (GERD) were encountered. The upper endoscopy found stage 1 and 2 esophagitis. They were put on long-term proton pump inhibitor (PPI) therapy with good clinical evolution.

DISCUSSION

Multiples studies, including two meta-analyses of over 1000 patients each, have demonstrated the short-term success of POEM in reducing Eckardt scores and LES pressures [1, 2]. Clinical success generally exceeds 90%, with a few rare exceptions [3, 4] (Table 3).

Table 3: A comparison between previous monocentric studies and the current study (technical aspects and success rate)

Study	Participants (N)	Site of mytomy anterior/ posterior	Previous treatments (%)	Myotomy length (cm)	Operating time (min)	Eckardt score before/after POEM	Clinical success (%)
Costamagna *et al.*, 2012 [5]	11	Ant	18	10	101	7/1	91
Hungness *et al.*, 2013 [4]	18	Ant	0	9	113	7/1	89
Inoue *et al.*, 2015 [6]	500	Ant (98%)	39	14	90	6/1	91
Ramchandani *et al.*, 2018 [7]	60	Ant (50%) Post (50%)	23 37	13 12	65 61	7/0.5 7/0.6	-
Xu *et al.*, 2021 [8]	278	Post	37	6	45	6.9/1	95.6
Modayil *et al.*, 2021 [9]	610 (Achalasia =561)	Ant / Post (44%) (56%)	47	10	54	7/0.5	98
The current study 2023	13	Post	15	7	90	8/3	84,6

The clinical success has been found to be comparable between the anterior and the posterior orientations of myotomy in all the trials [10, 11]. Initially introduced as an anterior approach for potential surgical correction of the possible complications, POEM is nowadays increasingly performed via a posterior approach [12, 13].

POEM is a valuable second-line approach, several published studies [14-17] demonstrated that POEM was equally efficacious and safe in achalasia patients with and without previous surgical or endoscopic intervention.

No procedure-related deaths have been reported to date.The reported incidence of Adverts Events associated with POEM procedure has been variable and ranged between 0 and 72.2% [18, 19]. There is no consensus about the terminology of Adverts Events. Not all studies considered the development of subcutaneous emphysema, asymptomatic capnoperitoneum/ capnothorax, and mediastinal emphysema as Adverts Events. Most of POEM- related complications can be managed conservatively.

Table 4: Procedure-related adverse events of comparative studies.

Study	Participants (N)	Average hospital stay (In days)	Mucosal injury (%)	Capnoperitoneum requiring decompression (%)	Pleural effusion (%)	GERD (%)
Costamagna *et al.*, 2012 [5]	11	4	20	-	-	0
Hungness *et al.*, 2013 [4]	18	1	-	39	-	28
Inoue *et al.*, 2015 [6]	500	4	1.6	-	0.4	16,8
Ramchandani *et al.*, 2018 [7]	30 (Ant) 30 (Post)	4	20 3.3	36.6 23.3	-	5.4 5.9
Xu *et al.*, 2021 [8]	278	7	9.4	1.8	0.4	35.1
Modayil *et al.*, 2021 [9]	610	2	10.5	-	-	57.1
The current study 2023)	13	6	15.4	23.1	30.8	15.4

Three cases of empyema caused by achalasia was reported secondary to aspiration pneumonia [20-22]. Empyema was rarely reported as adverts events of surgical or endoscopic achalasia treatment [18, 23-25]. The post POEM empyema reported by Chavez *et al.*, [18] was caused by severe esophageal leak and did require thoracotomy and chest tube insertion.

The early stages of oesophageal leakage is diffuclt to diagnosis. Radiology (Chest CT scans and esophageal X- ray) remains the cornerstone of leakage evaluation, but they are also not completely reliable in detecting small leaks. In Zhang *et al.*, study [26], all leakages were detected by endoscopic exploration. Patients with esophageal leakage after POEM can achieve complete recovery in a short time without

surgical intervention by endoscopic closure of the leak, sufficient drainage, and optimal conservative management. [26]

Predictors associated to adverts events occurrence include mucosal edema, experience of <1 year or <20 cases, sigmoid-type esophagus, use of a triangular-tip knife, procedure length, submucosal fibrosis, and the use of an electrosurgical current different from spray coagulation [18, 27-30]. However, specific factors predisposing to major adverts events have not yet been identified.

Because of a lack in a standard definition of GERD in post-POEM patients, the reported incidence varies from 0 to 58% [4-9], [31-33] (Table 4). Despite the small sample size, our results are similar to those described in the previous studies regarding POEM effectiveness in achalasia and the post POEM GERD rate.

CONCLUSION

POEM is an effective and safe procedure to treat achalasia, provided that it is carried out in an expert center with suitable and good quality material. Endoscopic monitoring after the intervention may be necessary in order to prevent the progression of minor and moderate complications.

REFERENCES

1. Talukdar, R., Inoue, H., & Reddy, D. N. (2015). Efficacy of peroral endoscopic myotomy (POEM) in the treatment of achalasia: a systematic review and meta-analysis. *Surgical endoscopy*, *29*, 3030-3046.
2. Patel, K., Abbassi-Ghadi, N., Markar, S., Kumar, S., Jethwa, P., & Zaninotto, G. (2016). Peroral endoscopic myotomy for the treatment of esophageal achalasia: systematic review and pooled analysis. *Diseases of the Esophagus*, *29*(7), 807-819.
3. Von Renteln, D., Fuchs, K. H., Fockens, P., Bauerfeind, P., Vassiliou, M. C., Werner, Y. B., ... & Rösch, T. (2013). Peroral endoscopic myotomy for the treatment of achalasia: an international prospective multicenter study. *Gastroenterology*, *145*(2), 309-311.
4. Hungness, E. S., Teitelbaum, E. N., Santos, B. F., Arafat, F. O., Pandolfino, J. E., Kahrilas, P. J., & Soper, N. J. (2013). Comparison of perioperative outcomes between peroral esophageal myotomy (POEM) and laparoscopic Heller myotomy. *Journal of Gastrointestinal Surgery*, *17*, 228-235.
5. Costamagna, G., Marchese, M., Familiari, P., Tringali, A., Inoue, H., & Perri, V. (2012). Peroral endoscopic myotomy (POEM) for oesophageal achalasia: preliminary results in humans. *Digestive and Liver Disease*, *44*(10), 827-832.
6. Inoue, H., Sato, H., Ikeda, H., Onimaru, M., Sato, C., Minami, H., ... & Kudo, S. E. (2015). Per-oral endoscopic myotomy: a series of 500 patients. *Journal of the American College of Surgeons*, *221*(2), 256-264.
7. Ramchandani, M., Nabi, Z., Reddy, D. N., Talele, R., Darisetty, S., Kotla, R., ... & Tandan, M. (2018). Outcomes of anterior myotomy versus posterior myotomy during POEM: a randomized pilot study. *Endoscopy international open*, *6*(02), E190-E198.
8. Xu, S., Chai, N., Tang, X., Linghu, E., Li, L., Wang, S., & Zhang, X. (2021). Outcomes of peroral endoscopic myotomy in challenging achalasia patients: a long-term follow-up study. *Surgical Endoscopy*, *35*, 3732-3743.
9. Modayil, R. J., Zhang, X., Rothberg, B., Kollarus, M., Galibov, I., Peller, H., ... & Stavropoulos, S. N. (2021). Peroral endoscopic myotomy: 10-year outcomes from a large, single-center US series with high follow-up completion and comprehensive analysis of long-term efficacy, safety, objective GERD, and endoscopic functional luminal assessment. *Gastrointestinal Endoscopy*, *94*(5), 930-942.
10. Mota, R. C. L., de Moura, E. G. H., de Moura, D. T. H., Bernardo, W. M., de Moura, E. T. H., Brunaldi, V. O., ... & Thompson, C. C. (2021). Risk factors for gastroesophageal reflux after POEM for achalasia: a systematic review and meta-analysis. *Surgical Endoscopy*, *35*, 383-397.
11. Nabi, Z., & Nageshwar Reddy, D. (2022). Impact of modified techniques on outcomes of peroral endoscopic myotomy: A narrative review. *Frontiers in Medicine*, *9*, 948299.
12. Teitelbaum, E. N., Soper, N. J., Arafat, F. O., Santos, B. F., Kahrilas, P. J., Pandolfino, J. E., & Hungness, E. S. (2014). Analysis of a learning curve and predictors of intraoperative difficulty for peroral esophageal myotomy (POEM). *Journal of Gastrointestinal Surgery*, *18*, 92-99.
13. Lv, H., Zhao, N., Zheng, Z., Wang, T., Yang, F., Jiang, X., ... & Wang, B. (2017). Analysis of the learning curve for peroral endoscopic myotomy for esophageal achalasia: Single-center, two-operator experience. *Digestive Endoscopy*, *29*(3), 299-306.
14. Zhou, P. H., Li, Q. L., Yao, L. Q., Xu, M. D., Chen, W. F., Cai, M. Y., ... & Cui, Z. (2013). Peroral endoscopic remyotomy for failed Heller myotomy: a prospective single-center study. *Endoscopy*, *45*(03), 161-166.
15. Nabi, Z., Ramchandani, M., Chavan, R., Tandan, M., Kalapala, R., Darisetty, S., ... & Reddy, D. N. (2018). Peroral endoscopic myotomy in treatment-naïve achalasia patients versus prior treatment failure cases. *Endoscopy*, *50*(04), 358-370.
16. Tan, S., Zhong, C., Ren, Y., Luo, X., Xu, J., Fu, X., ... & Tang, X. (2021). Efficacy and safety of peroral endoscopic myotomy in achalasia patients with failed previous intervention: a systematic review and meta-analysis. *Gut and Liver*, *15*(2), 153-167.
17. Olivier, R., Brochard, C., Des Varannes, S. B., Ropert, A., Wallenhorst, T., Reboux, N., ... & Coron, E. (2023). Peroral endoscopic myotomy: is it better to perform it in naive patients or as second-line therapy? Results of an open-label-controlled study in 105 patients. *Surgical Endoscopy*, 37(5), 3760-3768.
18. Haito-Chavez, Y., Inoue, H., Beard, K. W., Draganov, P. V., Ujiki, M., Rahden, B. H., ... & Khashab, M. A.

(2017). Comprehensive analysis of adverse events associated with per oral endoscopic myotomy in 1826 patients: an international multicenter study. *Official journal of the American College of Gastroenterology| ACG*, *112*(8), 1267-1276.

19. Onimaru, M., Inoue, H., Ikeda, H., Yoshida, A., Santi, E. G., Sato, H., ... & Kudo, S. E. (2013). Peroral endoscopic myotomy is a viable option for failed surgical esophagocardiomyotomy instead of redo surgical Heller myotomy: a single center prospective study. *Journal of the American College of Surgeons*, *217*(4), 598-605.
20. Huang, C. L., Kitano, M., Tanaka, F., Nagasawa, M., Iwata, T., Taguchi, Y., ... & Nakamura, Y. (1994). A surgical case of achalasia with empyema. *Kyobu geka. The Japanese Journal of Thoracic Surgery*, *47*(2), 157-159.
21. Maitani, F., Iwasaki, M., & Inoue, H. (2005). Video-assisted thoracoscopic surgery under local anesthesia for right empyema secondary to aspiration pneumonia caused by esophageal achalasia: case report. *The Tokai Journal of Experimental and Clinical Medicine*, *30*(3), 183-187.
22. Ando, R., Sato, C., Fukutomi, T., Okamoto, H., Takaya, K., Taniyama, Y., ... & Kamei, T. (2021). A case of esophageal achalasia presenting with empyema and septic shock differentiated from esophageal rupture. *Clinical Journal of Gastroenterology*, *14*, 422-426.
23. de Moura, E. T. H., Jukemura, J., Ribeiro, I. B., Farias, G. F. A., de Almeida Delgado, A. A., Coutinho, L. M. A., ... & de Moura, E. G. H. (2022). Peroral endoscopic myotomy vs laparoscopic myotomy and partial fundoplication for esophageal achalasia: A single-center randomized controlled trial. *World Journal of Gastroenterology*, *28*(33), 4875-4889.
24. Masadeh, M., Nau, P., Chandra, S., Klair, J., Keech, J., Parekh, K., ... & Gerke, H. (2020). Experience with peroral endoscopic myotomy for achalasia and spastic esophageal motility disorders at a tertiary US Center. *Clinical Endoscopy*, *53*(3), 321-327.
25. Gupta, S., Sidhu, M., Banh, X., Bradbear, J., Byth, K., Hourigan, L. F., ... & Bourke, M. J. (2021). A prospective multicentre study of per-oral endoscopic myotomy (POEM) for achalasia in Australia. *Medical Journal of Australia*, *214*(4), 173-178.
26. Zhang, Y. Q., Yao, L. Q., Xu, M. D., Li, Q. L., Chen, W. F., Hu, J. W., ... & Zhou, P. H. (2016). Early diagnosis and management of esophageal leakage after peroral endoscopic myotomy for achalasia. *Turk J Gastroenterol*, *27*(27), 97-102.
27. Khashab, M. A., El Zein, M., Kumbhari, V., Besharati, S., Ngamruengphong, S., Messallam, A., ... & Clarke, J. O. (2016). Comprehensive analysis of efficacy and safety of peroral endoscopic myotomy performed by a gastroenterologist in the endoscopy unit: a single-center experience. *Gastrointestinal endoscopy*, *83*(1), 117-125.
28. Zhang, X. C., Li, Q. L., Xu, M. D., Chen, S. Y., Zhong, Y. S., Zhang, Y. Q., ... & Zhou, P. H. (2016). Major perioperative adverse events of peroral endoscopic myotomy: a systematic 5-year analysis. *Endoscopy*, *48*(11), 967-978.
29. Wu, Q. N., Xu, X. Y., Zhang, X. C., Xu, M. D., Zhang, Y. Q., Chen, W. F., ... & Zhou, P. H. (2017). Submucosal fibrosis in achalasia patients is a rare cause of aborted peroral endoscopic myotomy procedures. *Endoscopy*, *49*(08), 736-744.
30. Nabi, Z., Reddy, D. N., & Ramchandani, M. (2018). Adverse events during and after per-oral endoscopic myotomy: prevention, diagnosis, and management. *Gastrointestinal endoscopy*, *87*(1), 4-17.
31. Jones, E. L., Meara, M. P., Schwartz, J. S., Hazey, J. W., & Perry, K. A. (2016). Gastroesophageal reflux symptoms do not correlate with objective pH testing after peroral endoscopic myotomy. *Surgical endoscopy*, *30*, 947-952.
32. Lu, B., Li, M., Hu, Y., Xu, Y., Zhang, S., & Cai, L. J. (2015). Effect of peroral esophageal myotomy for achalasia treatment: a Chinese study. *World Journal of Gastroenterology: WJG*, *21*(18), 5622-5629.
33. Bechara, R., Inoue, H., Shimamura, Y., & Reed, D. (2019). Gastroesophageal reflux disease after peroral endoscopic myotomy: lest we forget what we already know. *Diseases of the Esophagus*, *32*(12), doz106.