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Original article

Experience in Peroral Endoscopic Myotomy in a Center in Bogotá, Colombia, Between 2018 and 2022

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Abstract

Background: Achalasia is a low-incidence disease, but it significantly affects the life quality of patients. Before 2010, peroral endoscopic myotomy (POEM) was the preferred course of treatment. However, due to its effectiveness and safety, POEM has been widely used since then. **Objective:** To describe the results of the largest cohort of patients with achalasia–treated with endoscopic surgery–with the poem technique to date in Colombia. **Methods:** Observational cohort study that included patients treated with peroral endoscopic myotomy in the city of Bogota, Colombia, between 2018 and 2022. Information from medical records was collected and analyzed retrospectively, with subsequent telephone follow-up prospectively. The presurgical and follow-up Eckardt scale was used to establish clinical success. **Results:** Between 2018 and 2022, 31 patients were intervened, 61% of which were men. The mean age was 47 years. Technical and clinical success was obtained in 97% of cases, with an Eckardt score less than or equal to three, in 93%, at two months of follow-up. Forty-five percent of the procedures were outpatient. The complication rate was 10%. **Conclusion:** Our study shows that peroral endoscopic myotomy for achalasia management is an effective, low complication rate, and safe technique to perform on an outpatient basis.

Keywords

Achalasia of the esophagus, myotomy, endoscopy, Colombia.

INTRODUCTION

Achalasia is a chronic disorder of esophageal motility caused by inflammation and cellular degeneration of the myenteric plexus. This condition leads to decreased relaxation of the lower esophageal sphincter and altered esophageal peristalsis, resulting in symptoms such as dysphagia, the primary symptom of this disease, as well as regurgitation, chest pain, and heartburn[1,2]. Due to the non-specific nature of these symptoms, achalasia is often detected late[3]. Diagnosis is based on the results of a series of studies, including upper gastrointestinal endoscopy (UGIE), timed barium esophagogram, and high-resolution manometry, the latter being the gold standard[4].

High-resolution manometry allows for the visualization and evaluation of esophageal pressure topography through 36 pressure sensors spaced along a transnasal catheter[1]. The diagnosis is confirmed when there is a lack of relaxation at the gastroesophageal junction, indicated by an integrated relaxation pressure (IRP) in the supine position exceeding 15 mm Hg, and absence of peristalsis in all swallows. According to manometric findings, the Chicago

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Classification Version 4.0 subdivides achalasia into three types based on pressurization patterns, which aids in guiding treatment and determining prognosis[1,4].

Once the diagnosis is confirmed, the severity of the disease is assessed using the Eckardt score, which allows for monitoring and evaluating the therapeutic response and the effectiveness of the medical-surgical management applied. This tool consists of four components: dysphagia, chest pain, regurgitation, and weight loss. Each component is assigned a score from 0 to 3 based on the patient's self-reported response, resulting in a total score ranging from 0 to 12 points. A score of three or less is considered remission of the disease[5,6].

Current treatments focus on symptomatic management. Available options include pharmacological, endoscopic, and surgical methods, such as oral medications, botulinum toxin, pneumatic dilation, Heller myotomy, and peroral endoscopic myotomy (POEM)[4,5,7].

Pharmacotherapy includes calcium channel blockers, which have short-term effectiveness, reducing lower esophageal sphincter pressure in 13% to 65% of patients. However, the short duration of action of these medications (30 to 120 minutes) requires multiple daily doses, which can lead to side effects and poor treatment adherence[6]. Botulinum toxin injected at the esophagogastric junction provides 50% symptom relief in approximately 80% of patients for up to six months, with progressive reduction in relief month by month[6]. Pneumatic dilation is an effective but not definitive alternative, requiring multiple sessions every 4 to 6 weeks. Symptomatic improvement is observed in 66% to 88% of patients after one year, but this decreases from 25% to 29% after 10 years[1]. Finally, surgical management remains one of the most effective treatments for achalasia. The original Heller myotomy was the preferred surgery for many years, but with the advent of minimally invasive techniques, laparoscopic myotomy with partial fundoplication has become the current surgical method of choice. This procedure is efficient, with a success rate of up to 89%, clinical improvement in 87% of patients at 40 months follow-up, less morbidity, better pain control, and faster recovery[1,4].

With the development of POEM in 2010, following the advent of natural orifice transluminal endoscopic surgery (NOTES) in the mid-2000s, a new alternative for the treatment of achalasia was introduced. This procedure is considered safe, with success rates comparable to or even surpassing those of laparoscopic myotomy, and it has a low complication rate[1,3,8,9].

In Latin America, this technique is still in its developmental stages, and there is limited literature describing the experience and effectiveness of the procedure among various groups. Consequently, the aim of this study was to describe the outcomes of the largest cohort to date in Colombia of patients diagnosed with achalasia and treated with POEM in Bogotá.

MATERIALS AND METHODS

An observational cohort study was conducted. The study included patients over fifteen years of age with a diagnosis of achalasia confirmed by high-resolution manometry, who were treated with POEM at a quaternary care hospital in Bogotá, Colombia, between January 2018 and May 2022 by a group of three endoscopic surgeons. Patients with incomplete medical records or a concurrent diagnosis of gastroesophageal malignancy were excluded. Once patients meeting the selection criteria were identified, they were contacted by phone to invite them to participate in the study and, if they agreed, to complete the informed consent process via telephone.

Surgical Technique

Prior to the procedure, patients were instructed to follow a full liquid diet for two days and a clear liquid diet for one day. After verifying informed consent, the procedure was carried out in the operating room under general anesthesia, following the technique described by Inoue and colleagues[10], as outlined below.

With the patient in the left lateral decubitus position, the esophagus was thoroughly irrigated with sterile water using a conventional gastroscope fitted with a plastic cap. A submucosal injection was performed on the posterior wall with a mixture of hypertonic saline, gentamicin, and methylene blue. The injection site depended on the type of achalasia, the characteristics of the esophagus, and the presence or absence of prior interventions. Subsequently, the mucosa was incised with a hybrid knife endoscopic scalpel to enter the submucosal space and begin tunnel dissection. This was done by applying the previously described mixture with electrofulguration using the scalpel in aerosol function for coagulation up to 2 cm distal to the esophagogastric junction, respecting the perforating vessels. The myotomy was performed 2 cm distal to the initial mucosal incision, cutting the muscle fibers of the esophagus up to 2 cm distal to the cardia, while preserving the longitudinal fibers. Hemostasis of the dissection bed was achieved, followed by another irrigation, and the mucosal incision was closed with metal clips. At the end of the procedure, the presence of capnoperitoneum was clinically evaluated, and if present, decompression was performed with a single puncture using a 14-gauge needle in the left flank.

The patients were transferred to recovery and subsequently discharged with instructions to follow a full liq-

uid diet for three days and then transition to a soft diet. Analgesic management was indicated with nonsteroidal anti-inflammatory drugs (NSAIDs) for one week and a proton pump inhibitor for two months. The first follow-up was conducted eight days postoperatively, during which the Eckardt score was applied again, followed by another evaluation at three months with a new UGIE to assess esophagitis and a timed barium esophagogram.

Data Collection and Outcome Measurement

Sociodemographic and clinical data were retrospectively collected from medical records, including information on the diagnosis and procedure. Technical success was defined as the completion of the surgery. Additionally, immediate postoperative complications, hospital stay duration, and the Eckardt score at two months postoperatively were recorded. Data extraction was performed independently by two researchers in chronological order, and the database was subsequently reviewed by a third researcher.

Prospectively, the Eckardt score was applied at six and twelve months post-intervention, with clinical success defined as a score of three or less. Additionally, the results of UGIE at six months post-surgery and the need for proton pump inhibitors (PPIs) in relation to gastroesophageal reflux symptoms or endoscopic findings of esophagitis were evaluated.

Statistical Analysis

A descriptive analysis of the results was performed. For qualitative variables, summary measures such as ratios and percentages, as well as relative and absolute frequencies, were used as appropriate. For quantitative variables, measures of central tendency and dispersion were used.

Ethical Considerations

This project was presented to and approved by the Ethics Committee of Hospital Militar Central de Bogotá.

RESULTS

Thirty-five patients over the age of fifteen diagnosed with achalasia and managed with POEM were identified. Four were excluded due to incomplete medical records at the start of the study.

General Characteristics

Among the 31 patients included in the cohort, 61% (19) were men and 39% (12) were women. The average age was 47 years, with a range between 15 and 87 years, and 10% (3) of the patients were over 65 years old. Associated comorbidities were identified in 26% (8) of the patients.

Diagnosis and Procedure Characteristics

All 31 patients had a manometric diagnosis of achalasia with the following distribution: type I: 23% (7 patients), type II: 61% (19 patients), and type III: 16% (5 patients). The median pre-surgical Eckardt score was 8 (interquartile range [IQR]: 6-8), with a range between 4 and 12. Additionally, 32% (10) of the patients had received prior treatment for achalasia, with the most common being Heller myotomy with fundoplication, accounting for 13% (4) of the patients.

Regarding the procedure characteristics, the average duration was 80 minutes, with a range between 80 and 120 minutes. The myotomy length ranged from 4 to 20 cm, with an average of 11 cm, and closure was achieved with clips in all cases. 45% (14) of the patients were tended to on an outpatient basis, 35% (11) had a hospital stay of 24 hours, and the remaining 20% (6) had a stay ranging from 48 hours to one week. Among the patients with hospitalizations longer than 24 hours, the increased stay was due to one case of pneumonia, one case of pneumothorax that resolved with medical management, and one case of major bleeding that required the suspension of the procedure and subsequent transfusion support. This last case was considered the only instance of therapeutic failure in our study.

Overall, the complication rate was 10% (3 patients). Additionally, 26% (8) of the patients experienced capnoperitoneum, clinically diagnosed during the procedure by subcutaneous emphysema in the chest, which was managed with drainage by puncture; this event was not considered a complication but an adverse event, as none of the cases required hospitalization or additional studies. There were no cases of mortality during the study.

The sociodemographic characteristics, comorbidities, and preoperative variables, including the type of achalasia and the preoperative Eckardt score of the patients, are summarized in **Table 1**.

Follow-Up

Follow-up was conducted using the Eckardt score at two, six, and twelve months, focusing only on cases of technical success, which included 30 patients. The results are presented in **Table 2**. There was one failed case involving a patient with a prior diagnosis of megaesophagus and type III achalasia, who had also undergone open myotomy over ten years ago. The tortuosity and dilation of the esophagus, along with anatomical changes due to the previous surgery,

led to significant bleeding that necessitated stopping the procedure. Consequently, this case was excluded from the analysis of the results presented below.

Table 1. Sociodemographic and Preoperative Characteristics of Patients

Characteristics of Patients		n = 31 (%)
Age (mean + SD)		47.2 + 15.6
Sex	Men	19 (61.2)
	Women	12 (38.7)
Comorbidities	Diabetes mellitus	1 (3.2)
	Hypertension (HTN)	3 (9.7)
	Hypothyroidism	2 (6.5)
	Obesity	2 (6.5)
BMI (mean + SD)		24.8 + 5.5
Type of achalasia	Type I	7 (22.6)
	Type II	19 (61.3)
	Type III	5 (16.1)
Previous treatment	Laparoscopic Heller myotomy	4 (12.9)
	Open myotomy	2 (6.5)
	Pneumatic dilations	2 (6.5)
	Medical management	1 (3.2)
Pre-POEM Eckardt score; mean ± SD		7.5 (2.1)

SD: standard deviation; HTN: hypertension; BMI: body mass index; POEM: peroral endoscopic myotomy. Source: Author's own research.

Table 2. Summary Measures for Pre- and Post-Surgical Eckardt Score

Evaluation Timepoint	Median	IQR	Range	n
Pre-surgical	8	6-8	4-11	30
2 months	0	0-1	0-5	30
6 months	1	1-2	0-7	29
12 months	1	1-3	0-7	21

IQR: interquartile range. Source: Author's own research.

97% (30) of the patients completed follow-up at two and six months, while the twelve-month follow-up rate was 71% (22 patients). At two months postoperatively, the reported clinical success rate was 93% (28/30), and this figure remained consistent at six months (28/30). At twelve months postoperatively, the clinical success rate slightly decreased to 91% (20/22). Three cases required additional management with pneumatic dilation due to persistent symptoms following POEM.

When evaluating clinical success at each follow-up point according to the type of achalasia, it was found that the prevalence of success was higher at all time points for patients with types II and III achalasia. These results are detailed in **Table 3**.

Table 3. Prevalence of Clinical Success by Achalasia Type at Each Follow-Up Point

Achalasia Type	Clinical Success	No Clinical Success	Total	Prevalence of Success
Follow-up at 2 months				
I	6	1	7	0,86
II	18	1	19	0,95
III	4	0	4	1,00
Total	28	2	30	
Follow-up at 6 months				
I	7	0	7	1,00
II	17	2	19	0,89
III	4	0	4	1,00
Total	28	2	30	
Follow-up at 12 months				
I	4	1	5	0,8
II	12	1	13	0,92
III	4	0	4	1,00
Total	20	2	22	

Source: Author's own research.

At the time of discharge, all patients were prescribed PPI and underwent follow-up UGIE at two months postoperatively. In 26% of cases (8 patients), erosive esophagitis of varying severity, as per the Los Angeles classification, was observed, with grade A being the most prevalent. These results are detailed in **Table 4**. Of the 30 patients who were followed up, 43% (13 patients) required an extended duration of PPI therapy due to symptoms associated with gastroesophageal reflux disease (GERD).

DISCUSSION

Since the advent of POEM, numerous studies have assessed its effectiveness and safety globally. In Colombia, the number of achalasia cases treated with POEM is increasing; however, to date, only a small series of cases, published four years

Table 4. Classification According to UGIE

Measure	n = 8 (%)
Post-POEM Esophagitis According to UGIE	
- Los Ángeles A	3 (9,7)
- Los Ángeles B	3 (9,7)
- Los Ángeles C	2 (6,4)
- Los Ángeles D	0

UGIE: upper gastrointestinal endoscopy; POEM: peroral endoscopic myotomy. Source: Author's own research.

ago by Rodríguez and colleagues[11], is available. This study represents the largest series of cases reported in Colombia.

Compared to global statistics on achalasia, which typically show a 1:1 ratio between men and women and a bimodal age distribution with peaks between 20-40 years and 50-70 years[4,5], our study found a slightly higher prevalence in males with a ratio of 1:0.6 and a mean age of 47 years. The most common type of achalasia was type II (61%), which is similar to the findings of Kahaleh and colleagues, Zhou and colleagues[1,5], and Hernández-Mondragón and colleagues[6], who reported frequencies of 66% and 52%, respectively.

Our successful outcomes are comparable to those reported in other Latin American studies. In a 2021 multicenter study that included 125 patients, Kahaleh and colleagues[12] reported a technical success rate of 93.5% and a clinical success rate of 88.8%, with an average follow-up of 16 months and a complication rate of 21.6%. Similarly, in a retrospective analysis of 15 patients in 2017, Mejía and colleagues[13] achieved 100% technical and clinical success with follow-up ranging from 1 to 15 months. Ramírez and colleagues[14], who published their results the same year, described a technical success rate of 100% and a clinical success rate of 88.6% in 35 patients, with an average follow-up of 10 months and a complication rate of 2.8%.

We believe that our success and complication rates are comparable to those of previous studies. The differences observed can be attributed to variable sample sizes and losses during long-term follow-up.

Other studies have evaluated the association between the type of achalasia and clinical success. Andolfi and colleagues[15] conducted a meta-analysis that included 20 studies, reporting clinical success rates of 95%, 97%, and 93% for type I, II, and III achalasia, respectively. They argued that there is no clear relationship between these variables[15]. When evaluating our results, we observed a trend towards better outcomes for patients with type III achalasia at the two and twelve-month follow-ups. However, these findings are limited by the small sample size and losses during follow-up, which prevent drawing definitive conclusions regarding this association.

Traditionally, this procedure is performed on an inpatient basis with a hospital stay ranging from 2.8 days in the Chilean group[13], 3 days in the Mexican group [12], and 1.3 days in the Argentinian group[14]. In our study, 45% of cases were managed on an outpatient basis, suggesting that POEM for achalasia can be performed on a scheduled outpatient basis in selected cases and in centers with the necessary experience and infrastructure for managing complex gastrointestinal pathology.

One of the few aspects where POEM has not yet proven its superiority over Heller myotomy is in postoperative GERD. In our study, 42% (7) of patients required extended PPI consumption for more than two months due to persistent GERD symptoms. However, only 26% (11) of patients presented postoperative esophagitis as evidenced by follow-up UGIE at two months. Some studies report a prevalence of GERD in up to 50% of cases[14], but these figures vary considerably depending on the method of diagnosis and follow-up. For example, in the study by Hernández and colleagues[16], 17% had clinical manifestations, 15% had some degree of esophagitis on UGIE, and 37% had a positive pHmetry, confirming reflux disease one month after surgery.

Although our results are comparable to those of Hernández and fall below the described incidence of post-POEM GERD in the literature, it is important to consider that these studies evaluated GERD using pHmetry associated with UGIE. The absence of these diagnostic tests in our follow-up may have led to an underestimation of GERD presence, indicating that incorporating these methods could enhance future study results in Colombia.

We acknowledge the study's limitations and primarily aim to describe our experience; we believe our results are valuable and comparable with the Latin American literature, contributing important information to the national literature to encourage further research in this area.

Future research, preferably prospective and multicentric, should ideally include timed esophagogram evaluations, pHmetry, and manometry at six months for an objective assessment of the results. This approach would enable comparisons with the Eckardt score before and after the intervention.

CONCLUSION

Our results indicate that POEM is a procedure with low morbidity and mortality, achieving high technical and clinical success rates in both the short and medium term. Additionally, in selected cases, it could be performed on

an outpatient basis with standardized protocols. The outcomes observed are comparable with those from other specialized centers in Latin America.

This study, the largest published in Colombia to date, demonstrates that POEM is an effective technique with low morbidity and mortality. This underscores the importance of training and improving techniques in endoscopic surgery for managing gastrointestinal tract pathologies. It also opens opportunities for new studies with larger sample sizes and longer follow-up periods to analyze long-term outcomes.

Author Contributions

Tatiana Barragán, MD: conception of the idea, study design, data collection and analysis, writing, and final approval of the article. Paola González-A., MD: conception of the idea, study design, data collection and analysis, writing, and final approval of the article. Carlos Fuentes-D., MD: conception of the idea, data analysis, critical review, and final approval of the article. Jesús Rodríguez-F., MD: conception of the idea, critical review, and final approval of the article. María Camila Gómez-Ayala, MD, MSc: conception of the idea, study design, data analysis, writing, critical review, and final approval of the article.

Conflict of Interest

The authors declare no potential conflicts of interest with the publication of this article.

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