Peroral endoscopic myotomy (POEM) for dysphagia and esophageal motor disorder after antireflux fundoplication

Authors

Jean-Michel Gonzalez¹, Laurent Monino^{1,2}, Philippe Ah-Soune³, Véronique Vitton¹, Marc Barthet¹

Institutions

- 1 Service de gastroentérologie, Aix-Marseille Université, AP-HM, Hôpital Nord, Marseille, France
- 2 Department of Hepatogastroenterology, Université catholique de Louvain, Cliniques universitaires Saint-Luc, Brussels, Belgium
- 3 Service d'hépato-gastroentérologie, CHG Sainte Musse, Toulon, France

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Bibliography

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Corresponding author

Jean-Michel Gonzalez, MD, AP-HM, Hôpital Nord, Service de Gastroentérologie, Chemin des Bourrelys, 13015, Marseille, France jean-michel.gonzalez@ap-hm.fr

ABSTRACT

Introduction Laparoscopic fundoplication is the treatment of severe and refractory gastroesophageal reflux disease (GERD). It induces dysphagia in 5% - 10% owing to a tight valve ± esophageal motility disorders (EMD), with challenging management. We assessed the first case series assessing peroral endoscopic myotomy (POEM) in such a situation.

Methods A retrospective case series including eight patients with severe dysphagia after laparoscopic fundoplication who were treated by POEM. They were assessed clinically by Eckardt and Mellow – Pinkas dysphagia scores, and by high resolution manometry (HRM). The procedure was a regular esophageal POEM, mainly posterior, including a myotomy of the wrap. The objectives were to evaluate the clinical efficacy, technical difficulties, and complications of this approach.

Results HRM showed aperistalsis in 6/8 patients and raised lower esophageal sphincter (LES) pressure in 5/8. The median preoperative Eckardt and dysphagia scores were 5 and 3.5, respectively. The procedure was completed in 7/8 patients, with a clinical efficacy rate (normalization of both scores) of 75% (6/8). Although the submucosa seemed more fibrotic and vascularized, no severe complications occurred.

Conclusion POEM is a newly described therapeutic option to consider for managing dysphagia due to EMD after laparoscopic fundoplication.

Introduction

The therapeutic options for gastroesophageal reflux disease (GERD) are oral proton pump inhibitors (PPIs) or antireflux surgery. Among patients choosing PPIs, 30% fail to respond, either partially or completely [1, 2]. In this situation, laparoscopic fundoplication is then the only recommended alternative to overcome PPI failure and avoid GERD-related complications [3 – 5]. There are three main techniques, depending on the extension and location of the wrap: Nissen (total, 360°), Toupet (posterior, 270°), and Dor (anterior, 170°). Many studies have confirmed high long-term efficacy for the relief of heartburn and regurgitation at 80% and 90%, respectively, whichever technique is used [4, 6–8].

The preoperative evaluation should include esophageal manometry to rule out severe motility disorders that contraindicate the surgery [3, 5,9]. Despite this, a non-negligible rate of patients may experience dysphagia and bloating, with 5% - 10% and 30% of patients experiencing these, respectively [10]. Moreover, it has been shown that performing a laparoscopic fundoplication increases the length and the pressure of the lower esophageal sphincter (LES), and may modify esophageal motility. Even if published data have suggested an improvement in 70% of cases, others have not confirmed these findings [11]. Recently, it has also been shown that 20% of patients develop de novo esophageal motility disorders (EMD) postoperatively [12]. These lead to severe dysphagia, with weight loss and impaired quality of life, and their management is difficult. Globally, 5% - 15% of patients undergo revisional surgery for symptoms, with an increased morbidity, after laparoscopic fundoplication, half of them because of dysphagia [10, 13]. When caused by a tight wrap, endoscopic pneumatic dilation has been proposed, with an efficacy rate ranging between 45% and 64% [14, 15].

Peroral endoscopic myotomy (POEM) is becoming the main therapeutic option for the management of esophageal achalasia [16, 17], focusing on the impaired relaxation of the LES, with an efficacy rate of around 95% [18–22]. To date, there are no reports in the literature about its potential efficacy for obstructive symptoms after laparoscopic fundoplication. We therefore report the first clinical experience of patients undergoing POEM for refractory dysphagia associated with de novo EMD.

Methods

Design

This was a retrospective single-center series of consecutive patients, between January 2017 and May 2019, who underwent POEM for symptomatic EMD following laparoscopic fundoplication. All patients had undergone high resolution manometry (HRM) prior to their surgery, which was completely normal and confirmed the absence of esophageal dysmotility.

The patients included were: over 18 years of age; had undergone laparoscopic fundoplication for refractory GERD (any technique); and were suffering from severe dysphagia, with abnormal HRM showing aperistalsis, defined as the absence (0%) of propagated waves, according to the Chicago classification and Weijenborg et al. who published the normal values of HRM after laparoscopic fundoplication, and/or impaired LES relaxation [23,24]. All patients were treated by esophageal POEM. They were permitted to have undergone previous endoscopic therapy, such as pneumatic dilation.

Importantly, it was clearly explained to patients that POEM was not a gold standard for their situation, but is one of the most effective treatments for EMD. All of the patients had refused revisional surgery and signed an informed consent document detailing the benefits and risks of the procedure.

The data collected were: age, sex, type of laparoscopic fundoplication, time from laparoscopic fundoplication, previous therapy, and clinical follow-up. All data were anonymized and collected from the computer file of the Assistance Publique-Hôpitaux de Marseille, which is declared to the Commission Nationale Informatique et Liberté (French National Commission for Data Protection).

Procedure and follow-up

All patients underwent POEM whilst intubated and in the supine position. The procedures were performed using a gastroscope with a large operating channel with CO_2 insufflation. The knife used was in all cases the Triangle Tip knife (Olympus, Tokyo, Japan). A regular POEM was completed, as described in the literature [18]. The myotomy length was around 10cm in patients with aperistalsis, and was adjusted according to the technical difficulties (fibrosis) that complicated tunneling and to the results of HRM if spasms were present. The specificities of the procedure with regards to the indication were: (i) the cardia was always crossed and the tunnel was continued 2–3 cm below on the gastric side; (ii) the myotomy always included the gastroesophageal junction at the level of the valve, cutting all the circular and longitudinal muscles; (iii) after complete myotomy, if fibromuscular fibers belonging to the valve were identified, they were cut until the cardia could be easily crossed (**> Video 1**).

The postoperative course included 24 hours of fasting, then gradual refeeding until discharge. The patients were re-evaluated clinically by calculation of the Eckardt score and the Mellow–Pinkas dysphagia score [25] because of the double component (functional and organic) of their dysphagia. Weight evolution and postoperative adverse events were also recorded.

Objectives

The main objective was to assess the clinical efficacy of the POEM procedure in relieving dysphagia symptoms in this situation. A clinical improvement was defined as an improvement of both the Eckardt and Mellow – Pinkas dysphagia scores of more than 50% from baseline.

The secondary objectives were to document: the technical peculiarities of POEM after laparoscopic fundoplication, the technical success rate, and the immediate or delayed adverse events.

Results

Patients characteristics at baseline

In total, eight patients (5 men; median age 67.5 years, range 44–81 years) were included. Four patients had had endoscopic dilation as previous therapy; the other four refused dilation because of its lack of efficacy and had contraindications for revi-



Video 1 Video showing the procedure, starting with a regular peroral endoscopic myotomy (POEM) up to the gastroesophageal junction, where the posterior valve is identified, which is then cut by retrograde myotomy. Online content viewable at: https://doi.org/10.1055/a-1147-1348 **Table 1** Main historical, clinical and manometric, and preoperative characteristics for each patient.

² Normal value for mean LES basal pressure: 13–43 mmHg.



Fig.1 Graphic showing the evolution of both the Eckardt and Mellow – Pinkas dysphagia scores for each patient before and after the peroral endoscopic myotomy (POEM) procedure.

sional surgery. With regards to their symptoms, all were suffering from dysphagia and regurgitation, with a median Eckardt score of 8.5 (range 6-11) and a median dysphagia score of 3.5 (range 2-4). Six patients had lost weight, with a median weight loss of 5.5 kg (range 0-8 kg).

The HRM showed complete aperistalsis (0% of propagated waves) in six patients, impaired relaxation of the LES in five patients, and pressurization into the esophageal body in six patients. All patients had at least two of these three disorders on HRM. Two patients had also undergone an esophagogram, which showed stagnation of contrast in the lower esophagus. The characteristics of all of the patients are reported in the **> Table 1**.

Procedure

The whole POEM procedure was completed in 7/8 patients (87.5%). The location of the tunnel was mainly posterior, especially where there had been a Toupet fundoplication. The patient with technical failure had a very longstanding history of GERD, had undergone fundoplication 30 years previously, and had been suffering from dysphagia for 10 years. His esophagus was very dilated, with a sigmoid shape, and without any submucosa even after injection. Consequently, the tunnel could only be created starting from right above the gastroesophageal

junction and he had only a partial myotomy of the cardia with a very short tunnel formed.

With regards to the successful procedures, three patients had fibrotic submucosa with difficult dissection, and two had both a sigmoid esophagus and fibrotic mucosa; two did not have any factors associated with added difficulty. The cardioe-sophageal junction was crossed with a jerk in 6/8 patients. The tunnel was posterior in six patients and the median myotomy length was 10 cm (range 5 - 13 cm).

There were no serious perioperative adverse events. One patient had a capnoperitoneum that was deflated during the procedure and one had a mucosal tear that was closed by clipping, both without clinical consequence. Postoperatively, two patients experienced retrosternal pain managed with analgesics. Finally, two patients described reflux symptoms, such as heartburn, but without esophagitis, that were easily managed by PPIs on demand.

Outcomes

The clinical efficacy was achieved in 75% of the patients (6/8), with a decrease in the Eckardt score to ≤ 2 and of the dysphagia score to ≤ 1 . The evolution of each patient's scores is illustrated in the scatterplot (**> Fig. 1**). Among patients with clinical success, the median postoperative Eckardt and dysphagia scores

were 1.0 (range 0-9) and 0.5 (range 0-3), respectively. Moreover, all of the patients with clinical success gained weight within the months following the procedure. The median follow-up was 13 months (range 4-53 months). One patient had a recurrence after 3 years, which was successfully treated by one session of pneumatic dilation.

With regards to the two patients with clinical failure, one was the patient with the very longstanding disease, in whom tunneling was not possible within the esophagus. This patient subsequently underwent stent placement, without success, so he eventually underwent Lewis Santy surgery in another center. The other patient had two pneumatic dilations following the POEM (3-monthly intervals) and has finally been free of symptoms for 1 year.

Discussion

POEM for esophageal dysmotility has been widely assessed, confirming its high level of efficacy at greater than 90%, for whatever the clinical situation is, previous therapies used, or patient age [22, 26, 27]. However, it has never been attempted in patients who have undergone laparoscopic fundoplication with a tight valve, inducing severe dysphagia, whether associated or not with a secondary motility disorder. We present in this case series, the first report of POEM for this indication, with a very promising clinical success rate of up to 75%. All of the improved patients returned to a normal diet, without dysphagia or regurgitation, and regained weight.

In comparison with the existing options for this situation, POEM possibly brings new hope. Indeed, pneumatic dilation is disappointing, with an efficacy rate lower than 50%. The only remaining possibility is then revisional surgery to remove the valve, which carries a significant morbidity, with inconsistent effectiveness.

From a technical point of view, the submucosa tended to be more fibrotic and vascularized in these patients, so the dissection was a little more challenging. Despite this, no severe complications occurred and the procedure was technically feasible. Moreover, the posterior location for the tunnel is preferred, especially in those with Toupet fundoplication, so that the wrap can be partially cut during the myotomy.

In addition, it seems important that not too many years are allowed to pass before patients with persistent dysphagia after laparoscopic fundoplication are assessed. Longer time periods could lead to very severe submucosal fibrosis, because of the chronic inflammation induced by the esophageal stasis, which may then complicate the POEM procedure. This was probably the situation with the one patient in whom we could not complete the tunnel and esophageal myotomy.

The main limitations of this study are its retrospective design and the small sample size. EMD are also not exactly similar in all patients, and postoperative HRM was not performed systematically owing to the retrospective nature of the study.

In conclusion, this case series presents esophageal POEM as a new potential option for the management of dysphagia after laparoscopic fundoplication, particularly that associated with induced EMD. The procedure might be a little more technically challenging, but remains safe. Further studies are required, with larger populations and in the absence of motility disorders, to confirm these results.

Competing interests

The authors declare that they have no conflict of interest.

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