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CASE REPORT

DUAL-POEM for associated esophageal and gastric motility disorders: case series of endoscopic cardiomyotomy and endoscopic pyloromyotomy

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ABSTRACT

Background: Per-oral esophageal myotomy endoscopic (E-POEM) has clearly proved safety and efficiency in the treatment of esophageal spastic disorders. Recent studies on endoscopic pyloromyotomy (G-POEM) suggest good efficiency and safety in the treatment of gastroparesis. In recent literature, some reports showed both esophageal motility disorders and gastroparesis.

Methods: We report the case of four patients with esophageal and gastric motility disorders who were successfully treated with DUAL POEM (E-POEM and G-POEM) in two separate procedures.

Results: Clinical improvement was reported in all patients with a decrease of the Eckardt score for esophageal motility disorders and a decrease of the GCSI score for gastroparesis. No adverse events occurred after any procedure. These reported cases suggest that is possible to perform an E-POEM and a G-POEM in the same patient in two distinct procedures.

Conclusions: DUAL POEM seems to be faisable in patient with esophageal motility disorders associated with gastroparesis. The possibility of the concomitant occurrence of esophageal and gastric motility disorders could lead to change in practices with an overall assessment including gastric empting scintigraphy, high resolution manometry and pH-impedancemetry for patients with digestive motility disorders.

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Gastroparesis; G-POEM; esophageal motility disorders; POEM; endoscopic myotomy

Introduction

Per-oral esophageal myotomy endoscopic (E-POEM) was firstly performed by Inoue et al. [1]. Achalasia was the first Esophageal motility disorder (EMD) treated with this endoscopic procedure that proved efficiency and safety [2]. With the utilization of high resolution manometry (HRM) and Chicago classification [3], numerous EMD have been described: Diffuse esophageal spams and jackhammer esophagus that could be managed with good clinical response with E-POEM [4]. E-POEM had inspired another procedure: endoscopic pyloromyotomy (G-POEM) for treating gastroparesis [5]. Gastroparesis is a complex disease with a complex pathophysiology associating abnormal plexus nerves, abnormal gastric peristalsis and pyloric dysfunction. Medical treatment suffered from lack of efficiency and variability in clinical improvement [6]. G-POEM was introduced to treat refractory gastroparesis and promising results suggested a good efficiency and safety [7]. Systemic disorders disease (like Diabetes, parkinson's disease, scleroderma and amyloidosis) or iatrogenic vagal injury after thoracic surgery have been affected multiple sites in gastrointestinal tract [8–13]. The relationship between gastroparesis and EMD has rarely been reported in the literature. To date, one study has investigated it suggesting that patients with gastroparesis are more likely to have an esophageal motility disorders and vice versa [14]. Nevertheless, the endoscopic management of both esophageal and gastric motility disorders has been rarely reported. This endoscopic management or DUAL POEM consisted on performing an E-POEM followed by a G-POEM or vice versa during two different hospitalizations separated by six months. There are two case reports of treatment of gastroparesis and achalasia with endoscopic procedure performed in the same patient within the same endoscopic procedure [15,16]. We report a case series of patients with EMD and gastroparesis treat successfully with DUAL-POEM in separate procedures.

Patients and methods

All patients presenting symptoms of esophageal and gastric motility disorders had a functional assessment with Eckardt score for EMD and with GCSI for symptoms of gastroparesis. An endoscopy was carried out to rule out nonfunctional disorder, a HRM to characterize EMD according to classification of Chicago [3] and a gastric empting scintigraphy (GES) to confirm diagnosis of gastroparesis. Delayed gastric emptying is defined as the percentage of the remaining radioisotope at 2 h (%H2)>60% and at 4 h (%H4)> 10% [17].

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Endoscopic procedures

E-POEM Procedure was performed as follows [1]: 10 ml of colloidal solution with indigo carmine was injected into the submucosal space on the posterior or latero-posterior wall 10 cm upstream to the EGJ. Using a triangle-knife, a longitudinal incision of 2 cm was realized (ERBE Endocut I) allowing to enter in the submucosal space. A submucosal tunnel was created (ERBE swift coag 40w eff 2) downstream to the EGJ. Dissection of the circular muscle was started 2 cm under the cardia (ERBE: swift coag 40 w eff 2) and followed until 2 cm under the mucosal entrance. Mucosal entrance was closed with hemostatic clips.

G-POEM Procedure was performed as follows [5]: 10 mL of colloid solution with indigo carmine was injected into the submucosal space on the greater curvature of the stomach 5 cm upstream to the pyloric ring at 5 o'clock. Using a triangle-knife, a longitudinal incision of 2 cm was realized (ERBE endocut I) allowing to enter in the submucosal space. A submucosal tunnel was created (ERBE swift coag 40w eff 2) up to the pyloric sphincter. Dissection of the pyloric sphincter was realized and followed by antral myotomy 2 cm below the mucosal entrance. Mucosal entrance was closed with hemostatic clips.

Post-procedural management

Whatever the procedure (G-POEM or E-POEM), the patients were admitted for hospital stay planned for three to four days. Day first, they were fasting and gradually refed. The patients were discharged at D3 or D4 and follow-up at three, six and twelve months for evaluating clinical response and achieving clinical scores (Eckardt and/or Gastroparesis Cardinal symptom Index (GCSI)). If there underwent a G-POEM, a GES was performed three month after the procedure. A HRM was performed in case of incomplete response of E-POEM.

Case series

DUAL-POEM was performed in two sessions in four patients (females). The patient data on esophageal motility disorders are reported in Table 1. Patient data on gastroparesis with suspected etiology are reported in Table 2. None of the patients had systemic diseases (such as diabetes, Parkinson's disease or scleroderma).

The first patient was a 70 years-old woman. Her clinical history was achalasia treated with surgical Heller's cardiomyotomy after failure of endoscopic dilatation. The main symptom was early gastric satiety, vomiting and bloating, with a GCSI score at 2, gastroparesis was confirmed with GES (T ½: 160 min, H2: 65% and H4: 20%). She was treated with G-POEM. She developed a recurrence of dysphagia. A HRM was performed and confirmed an achalasia with an Eckardt score at 8. After G-POEM treatment, she underwent a GES that confirmed disappearance of gastroparesis (T ½ = 120 min, H2: 48%, H4: 3%) and improvement of GCSI Score (GCSI at one year: 0.8). Six months later, an E-POEM was realized for treatment of achalasia. One year later, she reported a clinical improvement (Eckardt: 2) and weight gain.

The second patient was a 76 years-old woman. The main symptom was dysphagia associated with weight loss (Eckardt: 9). She also reported symptoms of gastroparesis. HRM was performed and confirmed an achalasia. An E-POEM was performed to treat achalasia with a partial clinical response (Eckardt: 6) and an esophagram showing an acute tapering at the lower esophageal sphincter associated with esophagus dilatation above. A Redo-POEM was performed on posterior wall, one year after the first one, with clinical improvement (Eckardt score at one year at 2). Two years later, symptom of gastroparesis rised up (GCSI: 3,3). A GES was performed and confirmed the diagnosis of gastroparesis (T ½: 211 min; H2: 76%; H4: 36%). A G-POEM was performed and a post-operative GES confirmed a good response to endoscopic management (T ½: 119 min; H2: 50% et H4: 2%) and a clinical improvement (GCSI: 0,22).

The third patient was a 21 years-old woman. Clinical history was achalasia treated by endoscopic pneumatique dilatation with partial response. The main symptom was bloating and early satiety (GCSI: 4,2) associated with dysphagia (Eckardt: 9). A GES confirmed the diagnosis of gastroparesis (T ½: 227 min H2: 76% and H4: 45%) and HRM diagnosed Achalasia type I. A G-POEM was performed without adverse events. At three months, main symptoms of gastroparesis decreased with GCSI Score: 1, despite GES showed persistent gastroparesis (T ½: 326 min H2: 76% et H4: 75%). Six month after G-POEM, an E-POEM was performed to treat achalasia. The one year follow-up showed an improvement in achalasia symptoms (Eckardt: 3) and gastroparesis symptoms (GCSI: 0,66).

The fourth patient was a 67 years-old woman. The main symptoms were early satiety and vomiting (GCSI: 2.77) associated with retrosternal pain and dysphagia. The GES showed a gastroparesis (T ½: 146 min H2: 58% H4: 36%). G-POEM was performed without adverse events. At three months, there was an improvement of gastroparesis symptoms and normalization of GES (T ½: 120 min; H2:45% and H4: 15%), but worsening of dysphagia and retrosternal pain (Eckardt: 9). HRM was performed and diagnosed a Jakehammer esophagus. An E-POEM was performed with a 20 cm length esophageal myotomy (6 month after G-POEM) without adverse events. At one year follow-up, the patient had a partial improvement in esophageal symptoms with retrosternal pain (Eckardt: 3) and complete improvement of gastroparesis symptoms (GCSI: 0.44).

Discussion

We reported four patients with esophageal motility disorders and gastroparesis occurring either simultaneously or with different sequences. Three patients underwent G-POEM before E-POEM and one E-POEM before G-POEM. The sequence was decided according to the main symptoms. The choice of performing the G-POEM or the E-POEM first appeared to depend on the severity of the patient's symptoms, the etiology of the EMD and its previous treatment. They were treated

Table 1. Characterizes esophageal motility disorders (EMD) of four patients and results of Eckardt score before and after E-POEM.

	High resolution manometry						
Patient	$DCI_{mmHg.cm.s}$	Peristaltism	IRP_{mmHg}	EMD	BeforeE-POEM	Eckardt beforeE-POEM	Eckardt12 month after
First	1574	Weak	38	Achalasia type I	Surgical Heller	8	2
Second	635	Weak	17.5	Achalasia type I	E-POEM	6	2
Third	Inapplicable	None	17	Achalasia type I	Pneumatic dilatation	9	3
Fourth	15,422	Continuous	3	Jakehammer	None	9	3

DCI: Distal Contractile Integral; IRP: Integrated relaxation pressure.

Table 2. Results of gastric empting scintigraphy (GES) before and after G-POEM for four patients.

		GES before				GES 3 month after			
Patient	Etiology	T1/2 (min)	H2%	H4%	GCSI Before	T1/2 (min)	H2%	H4%	GCSI 12 month after
First	Post-surgical	160	65	20	2	120	48	3	0.88
Second	Idiopathic	211	76	36	3.3	119	50	2	0.22
Third	Idiopathic	227	76	45	4.22	326	76	75	0.66
Fourth	Idiopathic	146	58	35	2.77	120	45	15	0.44

endoscopically in two distinct procedures successfully. No adverse events occurred after each procedure. In our case series, three of four patients had reported a clinical improvement after E-POEM with decreased of Eckardt score at twelve months. One patient had persistent symptom of achalasia and a Redo-E-POEM was performed with clinical improvement. In recent meta-analysis, clinical success rate of E-POEM is approximatively 90% [2,4]. In our case series, three of four patients had improved gastric emptying scintigraphy results after G-POEM. Whereas all four had reported an improvement in gastroparesis symptoms with decreased GCSI at twelve months. In literature, the clinical success rate of G-POEM is between 70 and 86% [7].

Zikos et al. [14] suggested a correlation between esophageal and gastric motility disorders. This study suggested that patient with an abnormal HRM are more likely to have an abnormal GES. Moreover, an abnormal GES was independent predictors of an abnormal HRM with OR 2.14 and an abnormal HRM was independent predictor of an abnormal GES with OR 2.11. It would appear that the presence of an EMD should lead to the presence of gastroparesis and vice versa. But Interpretation of GES could be disturbed with the existence of an EMD due to an esophageal retention of radionuclides. Nevertheless, in our cases, no esophageal retention was identified. In our series, it appears to be an association between gastroparesis and esophageal motility disorders in three of four patients. In case one, a vagal nerve injury after Heller's surgery could be implicated in the development of gastroparesis.

Our case series highlight the possibility of endoscopic treatment for esophageal motility disorders and gastroparesis in two sessions, in opposition to Bapaye et al. [15] and Erhatova et al. [16], who had performed these procedures in one session. Bapaye and Erhatova did not report any adverse events. In our center, we prefer to perform these two procedures in two different sessions separated by 6 months to allow optimal healing of the mucosal and after clinical stabilization of patients. Our case series and case reports suggest that there is no more technical issues in patient with Dual-POEM which patient with E-POEM or G-POEM alone.

In conclusion, endoscopic management of esophageal motility disorders and gastroparesis in same patient is feasible and seems to be safe. The choice to perform E-POEM and G-POEM during the same procedure or in two times does not seem to increase the risk of adverse events. The choice of performing these procedures in one or two session is up to the operator according to the dominant symptoms. It seems to be an overlap between digestive motor diseases. Future studies seem to be necessary to confirm this theory in order to optimize the management of these patients.

Disclosure statement

Pr Barthet and Dr Gonzalez are consultant for Boston Scientific. None of the other author has conflict of interest to disclose.

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