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**Peroral endoscopic myotomy assisted with elastic ring for achalasia of obvious submucosal fibrosis: case report and literature review**

**Peroral endoscopic myotomy assisted with elastic ring for achalasia of obvious submucosal fibrosis: case report and literature review**

Baihui Wang, shuaiqing zhang, XiuLi Zuo, Aijun Zhang, Ru-yuan Li

## **Abstract**

### **BACKGROUND**

Peroral endoscopic myotomy (POEM) is an established treatment option for esophageal achalasia. However, technical challenges and failures exist. Submucosal fibrosis is a rare cause of aborted POEM procedures.

### **CASE SUMMARY**

We performed POEM with an elastic ring for achalasia with obvious submucosal fibrosis. The short-term outcome was excellent, surgery time was significantly shorter, and success rate was higher with POEM for achalasia with obvious submucosal fibrosis.

### **CONCLUSION**

POEM performed with an elastic ring is a feasible and effective endoscopic treatment modality for achalasia with obvious submucosal fibrosis.

**Key Words:** POEM; Elastic ring; Achalasia; Submucosal fibrosis; Case report

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**Core Tip:** POEM performed with an elastic ring is a feasible and effective endoscopic treatment modality for achalasia with obvious submucosal fibrosis.

## **INTRODUCTION**

Submucosal fibrosis in achalasia patients is a rare cause of aborted peroral endoscopic myotomy procedures. Implementation of new technology in achalasia is a challenge for endoscopic treatment, when it comes to complex achalasia, because the dilated and tortuous esophageal lumen may make subsequent endoscopic dissection and separation

of tissue planes difficult. Bing Hu reported peroral endoscopic dual myotomy (D-POEM) for achalasia with severe esophageal dilatation. Besides, he also reported open peroral endoscopic myotomy (O-POEM) for achalasia with sigmoid-shaped esophagus and achalasia with failed Heller myotomy. Ping-Hong Zhou developed a modified version using a "Push and Pull" technique which reduced complications and accelerated wound recovery.

## **CASE PRESENTATION**

### ***Chief complaints***

A 54-year-old man who was unable to eat and drink for 1 wk presented at our hospital.

### ***History of present illness***

The patient had choking sensation for 30 years.

### ***History of past illness***

He had a history of ankylosing spondylitis. Physical examination on admission revealed malnutrition with a body mass index of 15.9. He had an Eckardt score of 12. A timed barium esophagram revealed that his esophagus was dilated and its lower end was narrow like a bird's beak. The contrast agent was not discharged after 10 minutes of observation. Preoperative gastroscopy revealed significant esophageal dilation and a large amount of food residue. Esophageal stenosis was observed 38 cm away from the incisors, and the cardia was 52 cm away from them. Chest computed tomography ruled out external compression. This patient had never undergone any prior endoscopic intervention.

### ***Personal and family history***

normal

### ***Physical examination***

The patient was thin. Abdominal examination was normal.

#### *Laboratory examinations*

normal

#### *Imaging examinations*

A timed barium esophagram revealed that his esophagus was dilated and its lower end was narrow like a bird's beak. The contrast agent was not discharged after 10 minutes of observation. Preoperative gastroscopy revealed significant esophageal dilation and a large amount of food residue. Esophageal stenosis was observed 38 cm away from the incisors, and the cardia was 52 cm away from them. Chest computed tomography ruled out external compression.

#### **LABORATORY EXAMINATIONS**

normal

#### **PHYSICAL EXAMINATION**

The patient was thin. Abdominal examination was normal.

#### **PERSONAL AND FAMILY HISTORY**

normal

#### **HISTORY OF PAST ILLNESS**

He had a history of ankylosing spondylitis. Physical examination on admission revealed malnutrition with a body mass index of 15.9. He had an Eckardt score of 12. A timed barium esophagram revealed that his esophagus was dilated and its lower end was narrow like a bird's beak. The contrast agent was not discharged after 10 minutes of observation. Preoperative gastroscopy revealed significant esophageal dilation and a large amount of food residue. Esophageal stenosis was observed 38 cm away from the

incisors, and the cardia was 52 cm away from them. Chest computed tomography ruled out external compression. This patient had never undergone any prior endoscopic intervention.

### **HISTORY OF PRESENT ILLNESS**

The patient had choking sensation for 30 years.

### **CHIEF COMPLAINTS**

A 54-year-old man who was unable to eat and drink for 1 wk presented at our hospital.

### **MULTIDISCIPLINARY EXPERT CONSULTATION**

none

### **FINAL DIAGNOSIS**

Achalasia

### **TREATMENT**

Esophageal distortion was obvious in this patient, and the opening position of the tunnel was more suitable for the establishment of a complete tunnel. We used the endoscopic hood Olympus, D201, and the dual knife had no water-jet function. Intraoperative submucosal injections were administered 10 cm above the cardia, resulting in a poor lift. There was obvious submucosal fibrosis. A 2-cm-long incision was made in the mucosa using the dual knife and submucosal adhesion was obvious. The elastic traction ring (patent number: ZL 2020 2 0016729.9) was used to tract the mucosa at the opening of the tunnel to the opposite side, and part of the circular muscle was cut to establish the submucosal tunnel. The elastic ring was deployed through the working channel. A clip was placed on the small ring at the initial incision site and a second clip was placed on the big ring attached to the opposing esophageal wall to create tension. The tunnel was built to 2 cm below the cardia. The muscle was incised 2

cm below the tunnel's opening, and full-thickness myotomy was performed from 3 cm above the cardia to 2 cm below the cardia. Lastly, we removed the titanium clip holding the traction ring opposite the tunnel opening using a pair of biopsy forceps. The operation lasted 53 minutes.

Postoperatively, the cardia was obviously relaxed. The patient underwent gastrointestinal decompression for 48 h and fasted for 72 h. The timed barium esophagram was repeated 4 days after the operation, and the contrast agent passed through the cardia smoothly.

### **OUTCOME AND FOLLOW-UP**

The symptoms of dysphagia were significantly relieved 3 wk after the operation, the Eckardt score was 2, and the patient's weight gain was 5 kg.

### **DISCUSSION**

Submucosal fibrosis in patients with achalasia is a rare cause of aborted peroral endoscopic myotomy procedures. Over 5000 POEMs have been performed worldwide, with limited numbers of aborted procedures formally reported<sup>[1]</sup>. Ping-Hong Zhou reported, thirteen of the 1693 POEMs (0.77 %) were aborted. 12 (92.3 %) were due to severe submucosal fibrosis, which precluded tunneling<sup>[2-3]</sup>. The implementation of new technology in achalasia is a challenge for endoscopic treatment when it comes to complex achalasia because the dilated and tortuous esophageal lumen may render subsequent endoscopic dissection and separation of tissue planes difficult. Hu reported peroral endoscopic dual myotomy (D-POEM) for achalasia with severe esophageal dilatation<sup>[4]</sup>. Further, he also reported open peroral endoscopic myotomy (O-POEM) for achalasia with a sigmoid-shaped esophagus<sup>[5]</sup> and achalasia with failed Heller myotomy<sup>[6]</sup>. Zhou developed a modified version using a "push and pull" technique which reduced complications and accelerated wound recovery<sup>[7]</sup>. POEM with an elastic ring helps to clarify exposure levels, facilitate tunnel construction.

## **CONCLUSION**

POEM with an elastic ring may be a feasible and effective endoscopic treatment modality for achalasia with obvious submucosal fibrosis. We observed that the short-term outcome was excellent. This technique significantly shortened the operation time and improved the success rate of POEM for achalasia with obvious submucosal fibrosis.



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