

Anesthesia for peroral endoscopic myotomy: A retrospective case series

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Abstract

Background and Aims: Peroral endoscopic myotomy (POEM) is a safe and minimally invasive modality regarded as the first-line management of all types of achalasia. POEM is performed under general anesthesia with endotracheal intubation using an orally inserted flexible fiberscope. The aim of this study is to describe the anesthetic management of POEM for achalasia.

Material and Methods: A chart review of 21 patients who underwent POEM for achalasia at our center from March 2013 to June 2015 was performed.

Results: In the 21 patients, the end-tidal carbon dioxide was elevated following esophageal carbon dioxide insufflation and required adjustments in ventilation. POEM was successfully completed, and the patients were extubated immediately afterward. Subcutaneous emphysema occurred in five patients. Complications such as mediastinitis, pleural effusion, pneumoperitoneum, and pneumomediastinum were managed conservatively. Esophageal perforation occurred in one patient and needed surgical intervention.

Conclusion: For patients with achalasia, POEM offers the efficacy of surgery with the lower cost and morbidity of an endoscopic procedure. Prevention of aspiration and carbon dioxide insufflation-related complications are the two aspects that demand vigilance from the anesthesiologist.

Key words: Achalasia, anesthetic management, peroral endoscopic myotomy

Introduction

Achalasia, a benign motility disorder of the esophagus, results in incomplete relaxation of the lower esophageal sphincter (LES) and absent peristalsis. Patients experience dysphagia, regurgitation, chest pain, weight loss, and heartburn. Pharmacological therapy has been unsatisfactory and definitive treatment has focused on mechanical disruption of the LES.^[1] Peroral endoscopic myotomy (POEM) was introduced in 2008.^[2] In this retrospective case series, we describe the anesthetic management of 21 consecutive patients who underwent POEM.

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Material and Methods

Chart review of patients who underwent POEM for achalasia at our center from March 2013 to June 2015 was performed.

Achalasia was confirmed by esophagography, endoscopy, and motility study. Patients were advised a low residue diet and sips of carbonated drinks for 2 days before the procedure. They were fasted from 8 pm on the day before POEM and premedicated with antiemetics and broad spectrum antibiotics.

The procedure was undertaken in the endoscopy suite. The endoscopic workstation included ERBE VIO electrosurgery module with HybridKnife®. A Dräger Fabius® Plus machine

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Dräger Medical GmbH, Lübeck, Germany, 2011) was used along with standard multiparameter monitoring. Modified rapid sequence intubation using propofol and succinyl choline was performed in all the patients. Anesthesia was maintained with oxygen-air mixture, sevoflurane, atracurium, and fentanyl. Patients were positioned supine with their neck and chest exposed.

The procedure was performed by a senior consultant gastroenterologist with specialized training in POEM. Anesthesia was delivered by consultant anesthesiologists.

Induction of anesthesia was uncomplicated in all the patients. Esophagoscopy was performed using a large channel endoscope to clear the esophagus.

Carbon dioxide insufflation at a flow rate of 1.2 L/min was instituted. A mucosal bleb was created 10–12 cm above the gastro-esophageal junction (GEJ) and saline injected submucosally to make a ledge. With a hybrid knife, a tunnel was created from the mucosal site down to a point 4 cm below GEJ through which myomectomy was done. Following hemostasis, mucosal entry was closed using hemostatic clips [Figure 1].

POEM was successfully completed and all patients were extubated on table. They were observed in the Intensive Care Unit (ICU) for a day and sent to their rooms on day 2 after an esophagogram. They were maintained nil per os for the first 24 h, started on liquid diet on the 2nd day and solid feeds on the 3rd day. In uncomplicated cases, the patients were discharged on the 4th day.

Results

POEM was successfully completed in all the cases. Mean duration of anesthesia and surgery were 174 min and 150 min, respectively.

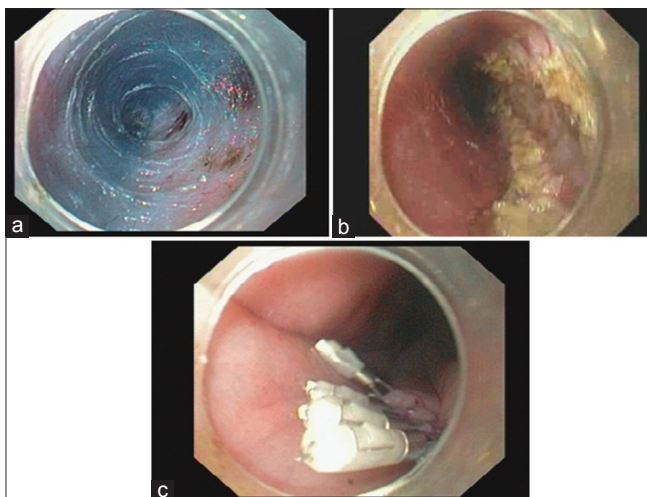


Figure 1: Endoscopic images of peroral endoscopic myotomy (a) Submucosal tunnel (b) Myotomy (c) Endoscopic clips

Following insufflation, the end-tidal carbon dioxide tension (EtCO₂) increased in all the patients. The mean increase was 8.5 mmHg (1–18 mmHg). In all but 1 min ventilation was increased to optimize the EtCO₂ (30–35 mmHg). In one patient, the EtCO₂ peaked at 47 mmHg, the procedure was temporarily paused and ventilatory parameters (frequency and I: E ratio) adjusted to obtain EtCO₂ < 35 mmHg. The patients' neck and upper chest were visualized and palpated intermittently. Five patients developed surgical emphysema. In all the patients, the peak airway pressure was maintained between 18 and 25 mbar.

Three of our patients had undergone prior treatment modalities (Heller's myotomy and serial endoscopic balloon dilatation) without lasting relief. Operative time was longer in these patients.

One patient developed mediastinitis and pleural effusion on the 2nd day postprocedure which was managed conservatively. Of the five patients who developed surgical emphysema, one had pneumoperitoneum and pneumomediastinum. Their subsequent chest radiographs showed complete resolution. In one patient, esophageal perforation was diagnosed on the 2nd postoperative day and needed surgical intervention. In one patient, esophagoscopy revealed a slipped mucosal clip; the site was sealed off endoscopically. Minor intraprocedural bleeding occurred in three cases and was managed with hemostatic forceps.

The patients were observed in the ICU on day 1 for early detection of potential complications. After an esophagogram on the 2nd day, patients were started on oral fluids. Solid foods were reintroduced on the 3rd day. The majority of our patients were discharged on day 4. Those with minor complications were discharged on day 7.

Discussion

POEM has engendered a lot of excitement since it offers the efficacy of surgery with the lower cost and morbidity of an endoscopic procedure. With current safety and efficacy data, this should be considered as a first-line treatment for all achalasia. POEM is performed under general anesthesia with endotracheal intubation to achieve a positive intrathoracic pressure and minimize the occurrence of mediastinal emphysema.^[3-5] Performing the procedure under intravenous sedation is associated with more complications.^[6] Unexpected movement of the patient during the procedure may be hazardous.^[4] Patients with achalasia are at an increased risk of aspiration. The rapid sequence induction technique albeit controversial is still advocated.^[7]

More than 3000 POEM procedures have been performed worldwide so far without requirement for conversion to open surgery or mortality. Adverse events reported to date include: surgical emphysema, hemorrhage, mucosal injury, atelectasis, pneumoperitoneum, pneumomediastinum, peritonitis, mediastinitis, pneumonia, pneumothorax, pleural effusions, and esophageal perforation.

Most of the adverse events are related to insufflation.^[3] Severe adverse events are rare (<0.1%). Mucosal injury, subcutaneous emphysema, and pneumoperitoneum can be managed conservatively. Tense pneumoperitoneum and pneumothorax require needle decompression and chest tube placement. Minor intra-procedural bleeding can be controlled with the needle knife or hemostatic forceps. Severe intra-procedural bleeding that precludes completion of POEM has not been reported. Mild gastro-esophageal reflux may be observed postprocedure.^[8]

Inoue suggests that “judicious and conscientious use of low-flow CO₂ insufflation offers the greatest reduction in the risk of adverse events.”^[3] Signs of abdominal distention should be watched for, as there is a risk of abdominal hypertension. Previous interventions such as botulinum toxin injection and balloon dilatation lead to fibrosis and distort the anatomy. POEM is technically challenging in such cases.^[9]

Postprocedure investigations and advancement of diet differ between various centers. An international survey has shown the duration of hospital stay ranges from 1 to 5 days after uncomplicated POEM procedure similar to our centre practice.^[10]

Achalasia is a chronic debilitating disease for which surgery had been the only definitive answer to date. A movement toward incisionless surgery started off in 2005 with natural orifice transluminal endoscopic surgery of which POEM is an accidental offspring.^[11] As anesthesiologists, we must be up-to-date with the developments in other specialties where our services are required. Often the challenges faced are different from those encountered during our routine practice. Based on the small size of our case series, we cannot make generalized recommendations.

Conclusion

Anesthesiologists providing anesthesia for POEM in achalasia patients should be prepared to tackle the complications of CO₂ insufflation during the procedure and prevent pulmonary aspiration. Vigilant monitoring will facilitate safe performance of POEM.

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Conflicts of interest

There are no conflicts of interest.

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