ISSN: 1607-8322, e-ISSN: 2220-5799 **Anaesthesia, Pain & Intensive Care**
Vol 30(3); March 2026 DOI: 10.35975/apic.v30i3.3180

CASE SERIES **ANESTHESIA FOR ENDOSCOPIES**

Anesthetic challenges in peroral endoscopic myotomy (POEM) in bizarre parosteal osteochondromatous proliferation (Nora lesion)

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ABSTRACT

Peroral endoscopic myotomy (POEM) is a novel technique that utilizes natural orifice transluminal endoscopy to address esophageal motility disorders. This method, which is performed under general anesthesia in an endoscopy suite, has shown effectiveness similar to that of Heller myotomy. A pivotal part of the POEM procedure involves the creation of a submucosal tunnel within the esophageal wall. However, the ongoing insufflation of CO? can inadvertently extend into nearby tissues, leading to Complications such as capnomediastinum, capnothorax, capnoperitoneum, and subcutaneous emphysema. An anesthesiologist faces several challenges, including administering anesthesia in remote locations, managing the heightened risk of aspiration during induction, and promptly identifying and addressing these complications with specific emergency measures. Consequently, the anesthesiologist on duty must be knowledgeable about these frequent complications and the necessary emergency responses, such as compensatory hyperventilation, percutaneous needle decompression, and thoracic drainage. While peroral endoscopic myotomy (POEM) is generally conducted under general anesthesia, there is a scarcity of reports that elaborate on its anesthetic management and associated complications.

Keywords: POEM, NORA, Aspiration, ventilation

Citation: Ubhe S, Khatri S, Nagrik R. Anesthetic challenges in peroral endoscopic myotomy (POEM) in bizarre parosteal osteochondromatous proliferation (Nora lesion). Anaesth. pain intensive care 2026;30(3):377-379. **DOI**: 10.35975/apic.v30i3.3180

Received: Sep 09, 2025, **Revised:** November 25, 2025, **Accepted:** December 06, 2025

1. INTRODUCTION

The word “achalasia” came from the Greek root chalasis, which means “relaxation.” It is a motility disorder affecting the lower esophageal sphincter and has a prevalence of approximately 10 cases per 100,000 individuals .[1]

Medical management includes calcium channel blockers and nitrates, while other options are endoscopic botulinum toxin injections, endoscopic pneumatic balloon dilation, laparoscopic Heller’s myotomy, and peroral endoscopic myotomy (POEM).[2] Peroral endoscopic myotomy (POEM) is an innovative procedure that has emerged as the leading treatment for esophageal achalasia, offering a safer and less invasive alternative to traditional surgery, with the added benefit of long-term symptom relief.[3]

This case series outlines the anesthetic management and challenges faced in 5 patients posted for POEM for esophageal achalasia. All patients followed a liquid diet for 48 hours and were kept nil per oral for 12 hours.

Residual gastric contents were suctioned endoscopically one day prior and on the day of the procedure.

2. CASE SERIES

In the endoscopy room all ASA standard monitors were attached and all patients were premedicated with oral clonidine 75 µg, intravenous midazolam 0.05 mg/kg and Fentanyl 2 µg/kg. Preoxygenation was done with 100% oxygen with nasal cannula and head up at 30 degree was given to avoid aspiration risk during intubation. Rapid sequence induction was done in all the patients with IV propofol 2 mg/kg and succinylcholine 2 mg/kg. Endotracheal intubation was done using videolaryngoscope with appropriate size cuffed endotracheal tube and fixed after bilateral chest auscultation.

CASE 1:

A 38 years-old female diagnosed with type 2 achalasia cardia was posted for POEM. After insufflation of CO_2 there was a rise in peak airway pressures (PAP) from 19 cmH_2O to a maximum of 35 cmH_2O during the procedure. But all other parameters were normal. The setting of CO_2 flow was kept on low flow (1-1.3 l/min). At the end of the procedure, subcutaneous emphysema was palpated in the neck region which was managed conservatively. The patient had adequate spontaneous attempts, anesthesia was reversed with intravenous sugammadex (2mg/kg) and the patient was extubated after performing the leak test. She was observed for 24 h in SICU.

CASE 2:

A 30 years old male posted for POEM showed a rise in $EtCO_2$ from an initial 32 mm Hg to a maximum of 50 mm Hg. The PAP increased from an initial 21 cmH_2O to a maximum of 37 cmH_2O despite using PCV mode and requiring frequent hyperventilation. Subcutaneous emphysema was noticed. The endoscopist was asked to stop, and the stomach was decompressed. It was then observed that the CO_2 flows were kept at a moderate flow rate (1.5-3 l/min), leading to the hypercapnia. The flow rate was reduced to low flow (1-1.2 l/min). After this, $EtCO_2$ and PAP normalized and the rest of the procedure was uneventful.

CASE 3:

A 46 year old male with type 2 achalasia cardia, was posted for a POEM procedure. After inflation of CO_2, $EtCO_2$ rose to 48 cmH_2O. We requested to stop the procedure and the patient was hyperventilated. When $EtCO_2$ was normalized surgery was started again.

CASE 4:

A 62 years old male with dysphagia to solids and liquids for 3 years was diagnosed with type 2 achalasia. In this case, tachycardia and hypertension was noticed during the procedure which was controlled with dexmedetomidine infusion. At the end of the procedure subcutaneous emphysema was noticed in the neck region, which was managed conservatively.

CASE 5:

A 48 years old female with a history of dysphagia and weight loss of 9 kg for 6 months was diagnosed with type 2 achalasia cardia. She was a diabetic for 4 years with controlled blood sugars and was posted for a poem. Intraoperative raised blood pressure and tachycardia was managed with intravenous dexmedetomidine infusion.

3. DISCUSSION

POEM was first developed by Inoue et al. is minimally invasive, endoscopic and natural orifice surgery.[4] POEM is done under general anesthesia to achieve positive intrathoracic pressure and reduce the risk of mediastinal emphysema.[5] Because unexpected patient movements during the procedure can be dangerous, sedation alone is generally avoided.[5]

POEM is associated with several adverse events mainly due to CO_2 insufflation which includes capnomediastinum, capnothorax, capnoperitoneum and subcutaneous emphysema. Other complications include mucosal injury, hemorrhage, atelectasis and esophageal perforation. Patients of achalasia cardia are at increased risk of aspiration, so rapid sequence induction though debated is preferred in these patients.[6]

Positive pressure ventilation is preferred to reduce the risk of capnomediastinum.[4] Inoue recommends that the careful and responsible application of low-flow CO_2 insufflation provides the most significant reduction in the risk of adverse events.[4] Rapid sequence induction (RSI) is recommended to minimize the chance of aspiration from residual gastric contents.[7] PCV was selected, as it provides an adequate tidal volume with decelerating flow, minimizes pressure-related airway and alveolar injury, and optimizes alveolar ventilation according to lung compliance.[8]

In case 1, 2 and 4 subcutaneous emphysema was seen. This is a known complication associated with CO_2 insufflation which can be managed conservatively unless there is significant cardiorespiratory compromise.[9]

In case 2 and 3 there was an increase in PAP and rise in $EtCO_2$ upto 50 cmH_2O for managing the surgeons were

asked to stop surgery for sometime patient was hyperventilated and CO_2 flows were reduced till $EtCO_2$ came down to 35 mm Hg. Low flows (1-1.3 l/min) of CO_2 insufflation is indicated in the poem to reduce complications.[10]

4. CONCLUSION

Anesthesiologists should be ready to address CO_2-related complications and aspiration risks during POEM procedures as CO_2 insufflation causes systemic uptake and increased intra-abdominal pressure, leading to changes in cardiorespiratory parameters and common subcutaneous emphysema, which may delay recovery. Using low CO_2 flow rates (not air) and ensuring vigilant, experienced care are essential for safety.

5. Conflict of interest

All authors declare that there was no conflict of interest.

6. Ethical considerations

Written consent was obtained from the patient to publish this report in academic interest..

7. Authors' contribution

1. SU: conduction of study work.

2. SK: Concept, manuscript writing and editing.

3. RN: Manuscript editing.

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