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Case Report

Perioperative aspiration risk mitigation in a patient with type II achalasia undergoing laparoscopic Heller's myotomy: A case report.

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Abstract
Background
Achalasia is a rare oesophageal motility disorder characterised by impaired lower oesophageal sphincter relaxation and absent peristalsis. Progressive oesophageal dilatation results in retained food and secretions despite prolonged fasting, placing patients at high risk of regurgitation and pulmonary aspiration during general anaesthesia. There are no validated perioperative aspiration risk guidelines specific to achalasia. This report aims to describe the perioperative anaesthetic management and aspiration risk mitigation strategies employed in a patient with type II achalasia undergoing a Heller's myotomy.

Case presentation
This report describes the anaesthetic management of a 20-year-old male with type II achalasia undergoing laparoscopic Heller myotomy. Despite prolonged fasting of 15 hours for solids and 12 hours for clear fluids, pre-induction nasogastric decompression yielded approximately 800 mL of particulate oesophageal material. Anaesthetic management included head-up positioning, rapid sequence induction with cricoid pressure, continuous nasogastric suctioning, and the use of the suction-assisted laryngoscopy and airway decontamination (SALAD) technique. Endotracheal intubation was successful on the first attempt without regurgitation. Surgery and recovery were uneventful.

Take-away lessons
Patients with achalasia should be considered high aspiration risk regardless of fasting duration. Prolonged fasting alone may not eliminate retained oesophageal contents. Individualised perioperative planning incorporating dietary modification, oesophageal decompression, protected airway management, and cautious extubation may reduce aspiration risk. Further prospective research is needed to establish evidence-based perioperative management protocols for achalasia.

Keywords: *Achalasia, Pulmonary aspiration, Rapid sequence induction*
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Introduction
Achalasia is a primary oesophageal motility disorder characterised by impaired relaxation of the lower oesophageal sphincter (LES) and absent or abnormal peristalsis1,2. Diagnosis is confirmed using high-resolution manometry and classified according to the Chicago Classification. Type II achalasia, defined by pan-oesophageal pressurisation in ≥20% of swallows, is associated with a favourable response to myotomy2,3.
Progressive oesophageal dilatation and impaired emptying result in retention of food, fluid, and secretions4. This functional obstruction creates a reservoir effect, which may persist despite prolonged fasting. Consequently, patients with achalasia are at increased risk of regurgitation and pulmonary aspiration during induction and emergence from general anaesthesia4. Contemporary peri-operative aspiration risk estimates in the general surgical population range from approximately 1 in 2,000 to 1 in 10,000 anaesthetics, with a higher incidence in emergency and high-risk groups 4,5. However, there are no validated risk scoring systems or consensus perioperative guidelines specific to achalasia.
Minimally invasive procedures such as laparoscopic Heller myotomy and peroral endoscopic myotomy have increased the number of achalasia patients presenting for general anaesthesia. Anaesthetic management relies on extrapolation from general aspiration prevention strategies and limited case-based evidence. This case describes the anaesthetic management of a young adult with type II achalasia undergoing laparoscopic Heller myotomy and

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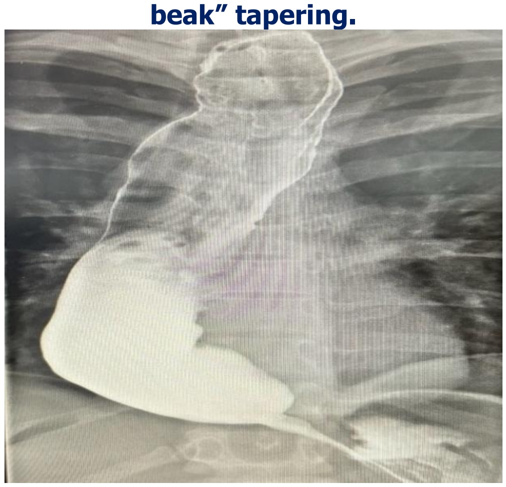
discusses current evidence surrounding aspiration risk mitigation.

Case presentation

A 20-year-old male patient presented to the surgical department with progressive dysphagia to solids and liquids, vomiting, odynophagia, and weight loss. His medical history was otherwise unremarkable, with no known allergies or substance use. Based on gastroscopy and barium swallow findings (Figure I), the patient was diagnosed with type II achalasia cardia. The patient was commenced on pharmacokinetic therapy for symptom management – a proton pump inhibitor, calcium channel blocker, and nitroglycerin - and booked for a laparoscopic Heller's myotomy.

Figure I: barium swallow demonstrating a markedly dilated esophagus with distal "bird's beak" tapering.



On pre-operative examination, the patient was apyrexial and alert with a body mass index (BMI) of 18kg/m^2. The patient showed adequate effort tolerance, did not report nocturnal coughing, and his respiratory examination showed no evidence of aspiration pneumonia. The airway, cardiovascular, and neurological examinations were unremarkable. Pre-operative chest X-ray showed a dilated oesophagus with clear lung fields (Figure II). There was no evidence of aspiration pneumonia. Blood results and spirometry were unremarkable.

Figure II: Chest X-Ray showing dilated oesophagus with clear lung fields

The primary anaesthetic concern was the risk of aspiration during intubation. The decision was made to extend fasting times beyond the American Society of Anaesthesiologists (ASA) standard guidelines, to 15 and 12 hours for solids and clear fluids, respectively. The patient was counselled

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extensively, with specific mention of steps taken to mitigate the risk of aspiration, and consented to the plan.

In the operating theatre, standard ASA monitoring was applied, and the patient was positioned with his head elevated at 45 degrees. Before nasogastric tube (NGT) insertion, 1ml of 2% lignocaine and 100mcg of phenylephrine were instilled in the left nostril, and 8mg of ondansetron was given prophylactically to prevent nausea & vomiting. A size 18-gauge NGT was inserted, and approximately 800ml of particulate matter was suctioned (figure III), despite adherence to advised fasting times.

Following gastric decompression and pre-oxygenation, a rapid sequence induction (RSI) was performed with continuous suctioning of the NGT. Cricoid pressure was applied, and the Suction-Assisted Laryngoscopy and Airway Decontamination (SALAD) technique was employed. Induction was achieved with 30mg of lignocaine, 200mcg of fentanyl, 140mg of propofol, and 100mg of succinylcholine. Intubation was successful on the first attempt using the C-MAC video-laryngoscope with no evidence of regurgitation.

Anaesthesia was maintained with sevoflurane to ensure an adequate depth throughout the operation. Additional intraoperative medications given to the patient included 50mg of rocuronium, 8mg of dexamethasone, 1.2g of amoxicillin/clavulanate acid, and multimodal analgesia (comprising 1g of intravenous paracetamol, 5mg of morphine, 40mg of ketamine, 75mg of diclofenac, and 25mcg of dexmedetomidine). The patient was positioned in reverse Trendelenburg, and surgery was completed uneventfully. At the end of the case, neuromuscular blockade was reversed with 2.5mg of neostigmine and 0.4mg of glycopyrrolate, in line with institutional guidelines. Following confirmation of complete resolution of NMB with train-of-four monitoring, the patient was successfully extubated.

Adverse events and harms

No anaesthesia-related or surgical adverse events occurred during the perioperative period. There was no evidence of regurgitation, pulmonary aspiration, hypoxaemia, airway trauma, haemodynamic instability, or postoperative respiratory compromise. The patient recovered uneventfully and was discharged to the surgical ward on postoperative day two.

Discussion

Achalasia is a smooth muscle disorder characterised by impaired motility of the lower oesophageal sphincter (LES), resulting in a functional obstruction of the oesophagus1. The condition is rare, with an incidence of 1.6 cases in 100,000 patients and a prevalence of 9-10 cases per 100 0001,2,6. The average age of diagnosis is between 25 and 60 years old, with equal prevalence among males and females 6. High resolution manometry (HRM) is the gold standard for diagnosis and classifies subtypes according to the Chicago Classification as outlined in Table 11,2,3. There is currently no cure for achalasia; therefore, the primary objective of therapy is to alleviate symptoms through pharmacological, endoscopic, and surgical interventions 1,2. The introduction of less invasive procedures, such as Peroral Endoscopic Myotomy (POEM) and laparoscopic Heller's myotomy, has led to a growing demand for general anaesthesia in patients with achalasia cardia.2

Table 1: Manometric findings of achalasia subtypes according to Chicago Classification [1,2,3]

Achalasia Subtype	Manometric Findings
I	100% failed peristalsis
II	100% failed peristalsis, Pan-oesophageal pressurisation ≥20% of swallows
III	Premature/spastic contractions ≥20% of swallows, no evidence of peristalsis

Note. Adapted from Yadlapati et al. and Vaezi et al.

Achalasia cardia presents several unique challenges for the anaesthesiologist because aspiration risk arises primarily from the oesophageal, rather than gastric, content retention (Table 2)[7]. However, the primary concern is the risk of regurgitation and pulmonary aspiration. Pulmonary aspiration is defined as the inhalation of oral or gastric contents into the larynx and respiratory tract and complicates between 1 in 900 and 1 in 10000 general anaesthetics, with increased incidence in emergency cases and among special-risk groups [4,8,9].

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Table 2: Anaesthetic concerns associated with achalasia cardia[7]

Pre-operative	Induction	Intra-operative
Malnutrition	Regurgitation	Carbon dioxide insufflation-related complications in cases of laparoscopic procedures
Dehydration & associated electrolyte abnormalities	Aspiration	
Pre-existing aspiration pneumonia and associated lung changes	Tracheal compression due to oesophageal dilation, resulting in a difficult airway	

Note. Adapted from Mohapatra et al.

There are currently no validated risk scoring systems or standardised management guidelines specific to preventing aspiration in achalasia cardia. Management is therefore guided by generalised aspiration avoidance strategies, such as those proposed by Robertson and Davidson, summarised in Table 3[10]. Several case reports have described anaesthetic management strategies in achalasia cardia cases, the findings of which are summarised in Table 4[11-18]. The primary considerations identified in these studies for prevention of aspiration include prolonged low-residue diet, extended pre-operative fasting periods, oesophageal decompression via NGT or endoscopic evacuation, RSI with or without cricoid pressure, and cautious extubation[7-14]. However, no prospective comparative studies exist, and evidence quality remains low.

Table 3: Robinson and Davidson's Summary of available strategies for reducing aspiration risk[10]

Intervention	Suggested Strategies
Reducing Gastric Volume	Pre-operative Fasting
	Nasogastric Aspiration
	Pro-kinetic Premedication
Avoidance of General Anaesthesia	Regional Anaesthesia
Reducing the pH of the contents	Antacids
	H2 Histamine antagonists
	Proton Pump Inhibitors
Airway Protection	Tracheal Intubation
	Second-generation supraglottic airway devices
Prevent Regurgitation	Cricoid pressure
	Rapid Sequence Induction
Extubation	Awake, after the return of airway reflexes
	Position (lateral, head down, or upright)

Note. H2 = histamine-2

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Table 4: Comparison of existing literature on pre-induction optimisation of patients for prevention of aspiration[11-18]

Note. RSI = rapid sequence induction

Author	No of patients	Pre-operative fasting guideline	Pre-op Endoscopic clearance	NGT insertion & drainage	General Anaesthetic Technique	Aspiration
Tanaka et al.[11]	28	Nil per os 24 hours. No diet specified.	Yes – retained contents were suctioned immediately before induction	No	GA with ETT RSI. No explicit statement on the use of cricoid pressure.	Nil
Nishara et al.[12]	86	Low-residue diet for 48 hours. No solids for 24 hours.	No	Yes	GA with ETT RSI. No explicit statement on the use of cricoid pressure	1
Haraguchi-Suzuki et al.[13]	1	Prolonged fasting period	No	Yes. 300ml suctioned	GA with ETT RSI. Cricoid pressure was not applied.	Nil
Darisetty et al.[14]	480	Clear fluids 24-36 hours. Nil per os 12 hours.	Yes – the day before endoscopic evacuation	No	GA with ETT RSI. Cricoid pressure at the clinician's discretion.	Nil
Yang et al.[15]	52	Standard pre-op fasting overnight. Liquid diet for 48 hours.	No	No	GA with ETT RSI. Cricoid pressure applied.	Nil
Jayan et al.[16]	21	Low-residue diet for 48 hours Nil per os 12 hours	No	No	GA with ETT RSI No explicit statement on the use of cricoid pressure,	Nil
Goudra et al[17]	24	No standardised regimen with variable	No	No	GA with ETT. 16 patients' standard induction 7 RSI with cricoid pressure 1 RSI without cricoid.	1 aspiration event noted to be during the non-RSI induction.
Loser et al [18]	173	Liquid diet for 2 to 5 days Nil per os 8 hours	Yes.	No	GA with ETT RSI No explicit statement on the use of cricoid pressure	Nil

In achalasia cardia, the risk of aspiration is primarily attributed to the morphological changes of the oesophagus. Figure 1 illustrates the classical barium swallow findings of a dilated oesophagus with narrowed LES producing a characteristic 'bird beak' appearance2. These morphological changes contribute to delayed oesophageal emptying with

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retained food and fluids7. In a case series by Tanaka et al, 37% and 14% of patients with achalasia cardia retain solid food particles and fluids, respectively, after 24 hours of fasting11. Retrospective case series and isolated case reports have demonstrated persistent oesophageal contents after 24-48 hrs of dietary restriction, suggesting that conventional fasting intervals may be insufficient in this population11-18. This has prompted recommendations for a low-residue diet before fasting and longer nil per os periods, with longer periods being described for more severe cases (12, 16, 18). As it is difficult to assess the volume of retained contents within the oesophagus, the use of dietary preparation and prolonged fasting is a prudent precaution that reduces, but does not eliminate, the volume of residual oesophageal content and subsequently the aspiration risk. Although the terms low-residue diet and low-fibre diet are often used interchangeably, the term "low-fibre diet" is more consistently used in the literature (19). Lijoi et al. 20 define a low-fibre diet as an intake of less than 10 g per day20. However, the literature lacks specificity regarding which types of fibre should be prescribed, despite fibre comprising both soluble and insoluble fractions with distinct physiological effects 19.

Point-of-care gastric ultrasound is a validated method for estimating gastric volume by measuring the antral cross-sectional area and applying predictive models in fasted and non-fasted patients. In achalasia, aspiration risk arises primarily from retained oesophageal rather than gastric contents5. Anatomically, the oesophagus lies posterior to the trachea in the cervical region and behind the aerated lung within the thorax, resulting in acoustic shadowing and a limited sonographic window21. Although the cervical oesophagus may occasionally be visualised, there are no validated methods to quantify oesophageal volume. Furthermore, the stomach may appear empty on ultrasound despite substantial retained oesophageal material, creating potential false reassurance. Therefore, gastric ultrasound cannot reliably exclude aspiration risk in patients with achalasia and should not replace protective airway strategies 21,22.

Pre-induction oesophageal decompression using an NGT is variably described. While technically challenging, it is a relatively simple and resource-conserving intervention. After induction of anaesthesia, positive pressure ventilation or loss of airway tone can precipitate regurgitation of any retained matter. In this case, an NGT was inserted before induction, with approximately 800ml of particulate matter suctioned. Nishara et al similarly reported that pre-induction nasogastric decompression yielded large fluid volumes despite 48-hour low-residue diets and prolonged fasting12. However, NGT insertion in achalasia can be technically challenging as the oesophagus is often tortuous and dilated, resulting in NGT coiling, as noted in the case report by Haraguchi-Suzuki et al.13. Where possible, radiographic techniques such as X-ray or point-of-care ultrasound may assist in confirming correct placement of the tube.

Some authors have suggested endoscopic guidance or pre-induction endoscopic clearance of the oesophagus to improve the efficacy of clearing residual food 11,14,18. However, this practice is considered controversial, as prophylactic endoscopy could increase the risk of aspiration as it is often performed under sedation or general anaesthesia, or if not performed under optimal conditions (15). Given this controversy, and in the context of a resource-limited setting, NG decompression is a practical first-line strategy for pre-induction oesophageal emptying to prevent aspiration, with endoscopic clearance reserved for selected cases such as extreme oesophageal dilation or when NG insertion attempts fail, and the potential benefits vs procedural risks must be considered.

General anaesthesia in achalasia demands meticulous airway protection. High aspiration risk patients, such as those with achalasia, are managed with RSI to minimise the interval between loss of consciousness and secure cuffed intubation. The use of an RSI with the patient in a head-up tilt position was consistent throughout the reviewed literature (11-18). However, the decision to use cricoid pressure during RSI differed between authors. Although theoretically cricoid pressure mechanically occludes the oesophageal lumen, preventing passive regurgitation, there is a paucity of high-level evidence that cricoid pressure truly reduces aspiration events23. Applying the correct amount of required force while maintaining proper airway alignment can be difficult and worsen the laryngoscopy view23. In achalasia, the dilation and anatomical distortion of the oesophagus may result in unpredictable positioning and therefore render cricoid pressure ineffective. In comparison of articles reviewed, there were no differences in outcomes between patients where RSI was performed with or without cricoid pressure (11-18). Therefore, the decision to apply cricoid pressure should remain at the discretion of the anaesthesiologist; consequently, it should be performed by experienced personnel and released if it impedes intubation. The SALAD technique was employed prophylactically as a precaution to reduce the risk of regurgitation and pulmonary aspiration during airway instrumentation24. Although SALAD was originally described by Root et al. 24 for management of grossly contaminated airways in emergency settings, its prophylactic use in selected high-risk patients may decrease the likelihood of aspiration and improve conditions for successful first-pass intubation24. As described by Root et al. (24 the technique entails introducing a rigid suction catheter under direct vision before laryngoscopy to clear secretions and displace the upper

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airway, creating space for visualisation. After laryngoscopy placement, the catheter is repositioned into the hypopharynx or proximal oesophagus to provide continuous suction during endotracheal intubation, with additional suctioning through the endotracheal tube before initiating ventilation24. A demonstration video is included in the original article by Root et al24. While supporting evidence derived primarily from simulation studies and emergency medicine contexts, its theoretical benefit in anticipated high-risk aspiration scenarios is logical. In this elective setting, SALAD was used as an additional measure rather than as a rescue manoeuvre.

Extubation warrants the same vigilance as induction. Restoration of neuromuscular function, protective airway reflexes, and muscle strength is essential. Although regurgitation risk may be decreased after myotomy, early postoperative retching and vomiting could precipitate aspiration, so appropriate post-operative nausea and vomiting prophylaxis should be administered22. In this case, neuromuscular blockade was quantitatively reversed by assessing the train of four, and extubation was delayed until the patient was responsive with intact airway reflexes.

Limitations

This report describes the management of a single patient and, therefore, as a single case, it cannot determine the relative effectiveness of individual interventions. The absence of regurgitation does not establish causality between specific measures and outcomes. Furthermore, there was no objective assessment of residual oesophageal content volume beyond the nasogastric aspiration performed. The substantial quantities aspirated highlight the potential inadequacy of fasting alone and reinforce the need for heightened vigilance. Finally, current recommendations are based largely on retrospective studies and case reports, highlighting the need for prospective investigations in this patient population.

Conclusion

This case highlights the importance of identifying anaesthetic risk factors and individualised peri-operative planning for patients with rare conditions, especially those where no consensus guidelines or management strategies exist, such as achalasia. In the presented case, the major identified risk factor was regurgitation with subsequent aspiration. Standard aspiration prevention strategies, in conjunction with the reviewed literature, identified key strategies to prevent aspiration. These strategies include extended fasting, diet modification, oesophageal decompression, airway protection with RSI, and cautious extubation. Ultimately, the case was performed without complication, highlighting best practices for managing achalasia aspiration risk in the perioperative setting. Prospective studies are required to define optimal perioperative protocols and to determine whether routine oesophageal decompression or modified fasting strategies improve patient outcomes.

Learning points

- Achalasia confers aspiration risk due to oesophageal content retention rather than gastric volume alone.
- Prolonged fasting does not reliably eliminate retained oesophageal contents.
- Pre-induction oesophageal decompression may reveal significant residual material.
- Rapid sequence induction remains standard practice, though the role of cricoid pressure is debated.
- Multimodal aspiration mitigation strategies should be individualised in the absence of formal guidelines.

Ethical approval

Ethical approval was obtained from the Human Research Ethics Committee (Medical), University of the Witwatersrand (approval number M260359).

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Conflict of interest

The authors declare that there is no conflict of interest regarding the publication of this case report.

Data availability

All data relevant to this case are included within the manuscript. Additional de-identified information may be made available from the corresponding author upon request and subject to institutional and ethical requirements regarding patient confidentiality.

Author contribution

Mukhuba VA contributed to patient management, data collection, literature review, and preparation of the full manuscript.

Currie CM contributed to the literature review, manuscript construction and revision, and critical appraisal of the scientific content.
Mogane PN contributed to manuscript supervision, review, and final approval of the submitted version.
All authors read and approved the final manuscript.

Author biography

Dr Mukhuba Anza Vanessa is a medical officer in anaesthesiology at Chris Hani Baragwanath Academic Hospital (CHBAH) and is due to commence a registrar post in the near future. Her clinical and academic interests include paediatric anaesthesia, peri-operative anaesthesia, and pain management.
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List of abbreviations

ASA – American Society of Anesthesiologists
BMI – Body Mass Index
ETT – Endotracheal Tube
GA – General Anaesthesia
HRM – High-Resolution Manometry
LES – Lower Oesophageal Sphincter
LOS – Lower Oesophageal Sphincter
NGT – Nasogastric Tube
NMB – Neuromuscular Blockade
POEM – Peroral Endoscopic Myotomy
PONV – Postoperative Nausea and Vomiting
RSI – Rapid Sequence Induction
SALAD – Suction-Assisted Laryngoscopy and Airway Decontamination

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