

The Current Surgical Management of Achalasia Cardia: Review Article

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Abstract: The surgical management of achalasia cardia has been evolving over the past decade since the introduction of Heller's myotomy. Laparoscopic Heller's myotomy is the current gold standard for the surgical management of achalasia cardia, and it is accompanied by a partial fundoplication. The robotic Heller's myotomy is slowly emerging since the introduction of robotic surgery. The thoracoscopic myotomy is now seldom performed, and esophagectomy is only performed for patients with end-stage achalasia cardia. In this review, we will look at the various surgical operations that are performed for achalasia cardia, looking at the advantages and complications of them.

Keywords: "Achalasia", "Myotomy", "Esophagectomy", "Open", "Thoracic", "Heller's", and "Laparoscopic".

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INTRODUCTION

Achalasia Cardia is a rare motility disorder of the esophagus characterized by the absence of the myenteric neurons in the lower esophagus. It is seen in 0.5 to 1 case per 100,000 population and is idiopathic, although infection with *Trypanosoma cruzi*, which causes Chagas disease, and is endemic in South America, has been known to cause achalasia. The classical clinical presentation is that of dysphagia to solids and liquids and central chest pain. Reflux esophagitis is also a common symptom that patients present with (G. E. Boeckxstaens *et al.*, 2014; G. E. E. Boeckxstaens, 2007; Walzer & Hirano, 2008). Achalasia cardia is diagnosed by esophagogastroduodenoscopy, barium swallow, and esophageal manometry. Esophagogastroduodenoscopy will demonstrate a dilated lower esophagus with remnants of undigested food particles, while barium swallow will present the classical bird beak appearance of the lower esophagus with a dilated esophagus. Esophageal manometry will demonstrate the lack of peristalsis and the absence of relaxation of the lower esophageal sphincter during swallowing (Riccio *et al.*, 2022; Slim & Williamson, 2023).

The management of Achalasia Cardia can be divided into medical and surgical management. Medical management can be divided into botulinum toxin injection and pneumatic dilatation. The surgical

management can be divided into Heller's myotomy can be performed as a thoracic or abdominal approach. The abdominal approach can be done as an open or laparoscopic approach. The introduction of robotics has now seen a trend towards Heller's myotomy being performed robotically. The thoracic approach can be performed as an open or thoracoscopic approach (Katada *et al.*, 2012; Mustian & Wong, 2025; Oddsdbttir, 1996.; Richards *et al.*, 2005). The abdominal Heller's myotomy is accompanied by a fundoplication to reduce the symptoms of reflux, and this is done via a Dor or Toupet method of fundoplication. Included under the surgical management of achalasia cardia is per-oral endoscopic myotomy (POEM), which is an endoscopic myotomy where the myotomy is performed via a mucosal incision and tunneling, although some may consider this an endoscopic therapy. A subtotal esophagectomy is considered for patients who have end-stage achalasia cardia (Abir *et al.*, 2004; Familiari *et al.*, 2015).

The American College of Gastroenterology (ACG), in its guidelines for the diagnosis and management of achalasia, has recommended a tailored approach for the surgical management of achalasia cardia. For patients who are fit to undergo surgical therapy, a laparoscopic Heller's myotomy with a partial fundoplication is recommended (Vaezi *et al.*, 2013). The European Guideline on the management of Achalasia has

also recommended the use of the laparoscopic Heller's myotomy with a partial fundoplication, with the choice of what type of therapy will depend on the patient's comorbidities and the manometric findings. They have also recommended that an esophagectomy should be considered as a last resort for treatment after all other modalities have failed (Oude Nijhuis *et al.*, 2020).

In this review, we will look at the surgical management of achalasia cardia, especially looking into Heller's myotomy. We will also investigate the thoracoscopic, and laparoscopic methods that are used to perform this procedure. We will also look at the role of robotic Heller's myotomy and the role esophagectomy plays in the management of end-stage achalasia. We conducted a literature review using PUBMED, Cochrane database of clinical reviews, and Google Scholar, looking for clinical trials, observational studies, cohort studies, systematic reviews, and meta-analyses from 1980 to 2025. We used the following keywords: "Achalasia", "open", "thoracic", "laparoscopic", "Myotomy", "Heller's", and "esophagectomy". All articles were in the English language only. Further articles were obtained by manually cross-referencing the literature. Case reports and studies with fewer than 10 patients and editorials were excluded. Adult male and female patients were included in this study, and pediatric patients were excluded.

DISCUSSION

Laparoscopic Heller's Myotomy

Laparoscopic cardio myotomy is the most common surgical operation for achalasia cardia. Since its introduction in the 1990s, it has gradually replaced the open and thoracic approaches. The patient is placed in the modified French position, and the ports are placed: the supraumbilical port for the camera and three ports over the left and right hypochondria. The right and left phrenoesophageal ligaments are incised, and the lower esophagus is mobilized. The anterior vagus nerve is identified and retracted, and the myotomy is performed by incising the circular and longitudinal muscle to expose the mucosa, extending up to 6cm above the gastroesophageal junction and 3cm below. A partial fundoplication is then performed by either an anterior (Dor) or posterior (Toupet) method. The most common intraoperative complications are esophageal perforation and bleeding (McCarthy *et al.*, 2022; Rajdev & Hunter, 2020; Valverde *et al.*, 2018).

The efficacy of the laparoscopic Heller's myotomy was assessed by Rosemurgy *et al.*, who followed up 505 patients over a period of 31 months, and more than 86% had improved symptoms of dysphagia (Rosemurgy *et al.*, 2010). A similar study by Kaman *et al.*, which looked at the efficacy of laparoscopic Heller's myotomy, also concluded the same (Kaman *et al.*, 2013). The long-term outcomes of laparoscopic Heller's myotomy were investigated by Bonatti *et al.*, A total of 75 patients who underwent laparoscopic Heller's

myotomy were followed up for 5.3 years, and the success rate was 84% with the rate of reflux esophagitis being 11%(Bonatti *et al.*, 2005). Parise *et al.*, also followed up 137 patients who had undergone laparoscopic Heller's myotomy for achalasia cardia. The patients were followed up for 65 months, and the success rate was 94% and the rate for reflux esophagitis was 11%(Parise *et al.*, 2011). Chen *et al.*, looked at the clinical outcomes of laparoscopic Heller's myotomy for achalasia cardia. A total of 125 patients were followed up to 5 years, and 73% had symptomatic relief and no symptoms of reflux (Chen *et al.*, 2010). Cowgill *et al.*, looked at the outcomes of laparoscopic Heller's myotomy after 10 years. A total of 337 patients were followed up over 10 years, and there was one mortality, but overall, there was a significant improvement in the symptoms of dysphagia and heartburn (Cowgill *et al.*, 2009). Costantino *et al.* looked at the outcomes of laparoscopic Heller's myotomy after 22 years, and the success rate was at 82% with no significant symptoms of dysphagia, regurgitation, or reflux esophagitis (Costantino *et al.*, 2020).

One of the controversies of laparoscopic Heller's myotomy is the indication of performing a fundoplication. The introduction of a fundoplication can improve the symptoms of reflux esophagitis and stricture formation. Partial fundoplication, like the anterior (Dor) or posterior (Toupet), is associated with reduced symptoms of dysphagia and improves the success rate of laparoscopic Heller's myotomy(Little, 2008; Ramacciato *et al.*, 2005). A systematic review and meta-analysis comparing the anterior (Dor) and posterior (Toupet) fundoplication for Heller's myotomy for achalasia cardia was conducted by Subramaniya *et al.*, A total of 7 studies with 486 patients were included in this study, and both the Dor and Toupet fundoplication were associated with comparable and effective outcomes and similar postoperative outcomes, and length of hospital stay (Siddaiah-Subramanya *et al.*, 2019). A systematic review and Bayesian meta-analysis of randomized controlled trials comparing the Dor and Toupet fundoplication was conducted by Aiolfi *et al.*, A total of 3 studies with 174 patients were included in this study, and operative time, post-operative dysphagia, symptoms of reflux, and length of hospital stay were similar between both groups(Aiolfi *et al.*, 2020).

Santoro *et al.*, conducted a systematic review and meta-analysis comparing Heller's myotomy with Heller's myotomy and fundoplication in patients with achalasia. A total of 6 studies with 576 patients were included in this study, and patients who had undergone Heller's myotomy were associated with a slightly higher risk of dysphagia, but overall, there were no statistically significant differences between the two groups (Santoro *et al.*, 2022).Kummerow *et al.*, looked at the long -term symptomatic follow-up of a prospective randomized controlled trial comparing Heller's myotomy and Heller's myotomy with Dor fundoplication. The patients

were followed up for 11 years, and the postoperative symptoms of dysphagia and reflux were similar between the two groups (Kummerow Broman *et al.*, 2018). A prospective randomized double-blind clinical trial comparing Heller's myotomy and Heller's myotomy with fundoplication was conducted by Richards *et al.*, A total of 43 patients were included in this study, and there were no significant differences with the outcomes from surgery, but the Heller myotomy group was associated with a 47.6% rate of reflux against 9.1% of the Heller myotomy and fundoplication group (Richards *et al.*, 2004).

Robotic Heller's Cardio Myotomy

The robotic Heller's myotomy is a variant of the laparoscopic repair where the robot is used to perform the myotomy and fundoplication. The patient is placed supine with the arms extended, leg abducted, and in a 20-25-degree reverse Trendelenburg position. A total of 4 to 6 ports may be used, which may range from 12mm to 5mm. The robot is then docked, and instruments that are used include the liver retractor, energy devices like the harmonic scalpel, and dissecting instruments like the Maryland forceps. The myotomy and fundoplication are then performed, with the Dor fundoplication being the most performed procedure. The robotic Heller's myotomy is associated with a reduced risk of esophageal perforation when compared to laparoscopic Heller's myotomy (Palomba *et al.*, 2023; Shemmeri & Wee,

2021). The robotic Heller's myotomy offers the advantage of enhanced visualization and better ease of dissection, but the major disadvantage is the cost and the advanced training that will be required to perform it (Afaneh *et al.*, 2015).

Nevins *et al.*, performed the robotic Heller's cardio myotomy for achalasia in 13 patients, and there was no postoperative morbidity, and the patients had good symptomatic relief from dysphagia (Nevins *et al.*, 2024). A similar study by Uzunoglu *et al.*, who performed robotic surgery for achalasia cardia, also reported similar outcomes (Uzunoglu *et al.*, 2022). A systematic review with meta-analysis comparing robotic and laparoscopic myotomy for achalasia cardia was conducted by Milone *et al.*, A total of 6 studies with 2625 patients were included in this study, with 338 undergoing robotic repair with 2287 undergoing laparoscopic repair. Both procedures were associated with similar postoperative morbidity, symptoms of reflux, and length of hospital stay, but the robotic repair was associated with a much lower rate of esophageal perforation (Milone *et al.*, 2019). Another systematic review and meta-analysis comparing laparoscopic and robotic Heller's myotomy by Xie *et al.*, also concluded that robotic myotomy was associated with a reduced esophageal perforation rate when compared to laparoscopic repair (Xie *et al.*, 2021).

Table 1

Study	Study Type	Year	N=numbers	Odd Ratio (95% confidence interval)	Weightage (%)
Milone <i>et al.</i> ,	Systematic review & meta-analysis	2019	360	0.13	100%
Xie <i>et al.</i> ,	Systematic review & meta-analysis	2021	233	0.11	100%

Table showing the odds ratio for esophageal perforation following robotic Heller's myotomy

Thoracoscopic Heller's Myotomy

The thoracoscopic Heller's myotomy is performed in the left lateral decubitus position and intubation with a double-lumen endotracheal tube. Usually, 3 to 4 ports are positioned, and once the lung on the left side is deflated and collapsed, the esophagus is dissected from the surrounding structures, and a myotomy is performed proximally and distally towards the gastroesophageal junction. The use of an esophagoscope to inspect the esophageal mucosa aids in performing the myotomy. Once the myotomy is completed, a chest drain is inserted once the ports are removed (Pellegrini *et al.*, 1992.; Rea *et al.*, 1999.)

Kesler *et al.*, performed thoracoscopic-assisted Heller's myotomy for the treatment of achalasia in 57 patients, and the conversion to open thoracotomy was seen in 11% of the cases, but the thoracoscopic procedure was associated with reduced postoperative morbidity, reduced operative time, and faster recovery (Kesler *et al.*, 2004). Codispodi *et al.*, also performed thoracoscopic

Heller's myotomy on 25 patients with achalasia, and there were no mortalities or esophageal perforation in this group of patients. Symptoms of reflux esophagitis were seen in 12.5% of the cases, but overall, the thoracoscopic Heller's myotomy was well tolerated (Codispodi *et al.*, 2003). Cade *et al.*, looked at both the thoracoscopic and laparoscopic Heller's myotomy, and both methods were associated with good outcomes regarding symptoms of dysphagia and heartburn, and the length of hospital stay was almost similar between both groups. The choice of which procedure will often be decided by the operating surgeon (Cade, 2000.).

Esophagectomy for Achalasia Cardia

Esophagectomy is reserved for patients with end-stage achalasia following failure of other forms of therapy. It is done in 5% of patients with achalasia cardia due to progression of the disease. The esophagectomy can be performed as a trans hiatal or transthoracic method, and the anastomosis is usually performed in the neck. The stomach is the most common organ to be used as a conduit, followed by the colon and small bowel (Felix, 2016; Molena & Yang, 2012; Waters *et al.*, 2022). Devaney *et al.*, performed a retrospective study on

93 patients who had undergone esophagectomy for achalasia cardia. Most of the patients had undergone an esophagectomy due to megaesophagus, and the most common complications were anastomotic leak at 10% and recurrent laryngeal injury in 5% of the cases (Devaney *et al.*, 2001). Tank *et al.*, had conducted a retrospective study on 20 patients who had undergone esophagectomy for achalasia cardia, with a trans hiatal technique for esophagectomy was performed and the stomach was the conduit that was chosen. The mortality rate was 10% and there were no deaths (Tank *et al.*, 2009).

A systematic review and meta-analysis on esophagectomy for end-stage achalasia was conducted by Aiolfi *et al.*, A total of eight studies with 1307 patients were included in this study. The transthoracic approach was the most common, and the postoperative anastomosis leakage rate was 7% and the mortality rate was 2%. This study showed that esophagectomy was safe and effective for the management of end-stage achalasia (Aiolfi, Asti, Bonitta, *et al.*, 2018). Aiolfi *et al.*, also conducted a retrospective study on esophagectomy for stage 4 achalasia. The morbidity rate was 33% but there were no anastomotic leaks or deaths in the group. This study shows that esophagectomy can be offered to patients with end-stage achalasia (Aiolfi, Asti, Riva, *et al.*, 2018).

CONCLUSION

The surgical management of achalasia cardia has evolved from the open Heller's myotomy to the laparoscopic Heller's myotomy, which has become the gold standard. The robotic Heller's myotomy is slowly emerging as an alternative to laparoscopic myotomy, but the cost and training may slow its progress. The thoracoscopic myotomy is not as popular as the laparoscopic approach, due to special anesthetic requirements like the use of a double-lumen endotracheal tube and the expertise that is required for this procedure. Esophagectomy is often a procedure that is performed as a last resort for patients with end-stage achalasia. The treating surgeon will often employ a tailored approach when deciding what is the best surgical management for a patient with achalasia.

Conflict of Interest: There is no conflict of interest.

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