Assessment of The Outcome After Stapled Cardioplasty for Recurrent and Advanced Cardiac Achalasia

Original Article

Amir Hany Ali Elsayed Salem, Hisham El-Akkad, Ahmed Ain Shoka, Ayman Hossameldin Abd El monaem, Mohammed Abdalmegeed Hamed

Department of General Surgery, Faculty of Medicine, Ain Shams University, Cairo, Egypt.

ABSTRACT

Background: Achalasia is a primary esophageal motor disorder with unknown etiology, characterized endoscopically by a dilated esophagus with retained saliva and undigested food in the absence of stricture or tumor, radiographically by oesophageal dilatation with minimal LES opening, and manometrically by ineffective peristalsis and insufficient relaxation of the LES.

Aim:

To assess the outcome of stapled cardioplasty in the management of recurrent and advanced cardiac achalasia regarding improvement of the symptoms and incidence of complications.

Patients and Methods: Conducted at Ain Shams University Hospitals, this cohort study began in July 2022 and included a single group of 15 patients. These patients met strict inclusion criteria: they presented with recurrent achalasia following failed previous interventions, or advanced achalasia with an esophageal diameter greater than 6cm. Patients unfit for general anesthesia (ASA III—V) were excluded.

Results: The study demonstrated significant improvement in symptoms among patients undergoing stapled cardioplasty for recurrent and advanced cardiac achalasia. The median preoperative Eckardt score of 8.0 significantly decreased to 3.0 postoperatively ($P< 0.001$). None of the patients experienced postoperative complications such as infection or anastomotic leakage. Hospital stays were brief, ranging between 2 and 3 days. Only 6.7% of patients showed appreciable symptoms of reflux postoperatively. Additionally, dysphagia recurrence was observed in only one (6.7%) patient.

Conclusion: The study confirms that stapled cardioplasty is a highly effective and safe surgical option for managing recurrent and advanced achalasia. The procedure achieves significant improvement in dysphagia with minimal complications, showcasing its viability as an esophagus-preserving alternative to more invasive options like esophagectomy. Selective incorporation of fundoplication proved effectiveness in minimizing gastro-oesophageal reflux disease without impeding esophageal emptying. These findings add valuable evidence to the limited literature on advanced achalasia interventions, offering a practical solution for patients with challenging presentations.

Key Words: Advanced achalasia, Recurrent achalasia, Stapled cardioplasty.

Received: 06 January 2025, **Accepted:** 23 January 2025, **Published:** 1 July 2025

Corresponding Author: Amir Hany Ali Elsayed Salem, MSc, Department of General Surgery, Faculty of Medicine, Ain Shams University, Cairo, Egypt. **Tel.:** 01060018291, **E-mail:** amirhanyalisalem@gmail.com

ISSN: 1110-1121, July 2025, Vol. 44, No. 3: 976-984, © The Egyptian Journal of Surgery

INTRODUCTION

Radiographically, achalasia is characterized by esophageal dilatation with a minimal LES opening "bird-beak" appearance; manometrically, by ineffective esophageal peristalsis and insufficient relaxation of the LES; and endoscopically, by a dilated oesophagus with retained saliva, liquids, and undigested food particles without mucosal stricture or tumour[1]. Based on radiological results, the condition has been clinically divided into three stages: early achalasia (esophageal diameter< 4cm), moderate achalasia (esophageal diameter 4–6cm), and severe or advanced achalasia (esophageal diameter> 6cm)[2].

Relieving symptoms, enhancing esophageal emptying, and halting more esophageal dilatation are the aims of achalasia treatment. The current therapeutic options have to be customized for each achalasia patient according to the clinical stage of the disease[1].

There are three types of achalasia, usually differentiated through esophageal motility and high-resolution manometry study. The response of the different types to the different modalities of treatment varies. Nevertheless, not only does the type of achalasia decide the proper modality, but more importantly, the clinical stage of disease progression[3].

DOI: 10.21608/EJSUR.2025.350880.1347

Clinical suspicion of achalasia is based on symptoms, and diagnostic testing confirms the diagnosis. Esophageal manometry is the gold standard for diagnosing achalasia, and upper gastrointestinal endoscopy and barium swallow are indicative of the disease[3].

About 90% of achalasia patients have shown significant long-term outcomes following Heller myotomy[4]. Therefore, surgery is considered the "first-line" treatment for patients under the age of 40 and as the definitive treatment for achalasia[4]. Up to 10% of patients experience recurrent dysphagia following Heller myotomy, which is regarded as therapy failure[5].

Most patients with recurrent dysphagia will seek re-intervention, either by dilation or by reoperation. Many reports of re-operative therapy for achalasia treatment failure consider esophagectomy as the principal procedure. There exist limited reports of reoperation with esophageal preservation in such patients[5]. Consequently, the purpose of the study is to assess the outcome of stapled cardioplasty in the management of recurrent and advanced cardiac achalasia as regards improvement of the symptoms, esophageal emptying, and incidence of complications.

PATIENTS AND METHODS:

After ethical committee approval and written consents from the patients, this cohort study was conducted at Ain Shams University Hospitals and began in July 2022 to October 2024 and included a single cohort group of 15 patients. These patients met strict inclusion criteria: they presented with recurrent achalasia following failed endoscopic (e.g. balloon dilatation) or surgical (e.g. Heller's myotomy) interventions, or advanced achalasia characterized by a sigmoid esophagus with an esophageal diameter greater than 6cm. Patients unfit for general anesthesia (ASA III–V) or those who refused surgery were excluded. This study was approved by the Institutional Review Board, Research Ethics Committee, Faculty of Medicine, Ain Shams University, according to the WMA Declaration of Helsinki (FWA 000017585): Approval Number MD64/2019.

Study procedures: All participants were subjected to the following:

Patients were assessed clinically via History and Examination using the Eckardt scoring system[6]: The most widely used grading scheme for assessing symptoms, phases, and the effectiveness of achalasia therapy is the Eckardt symptom score. From 0 to 12, it assigns points (0–3) to each of the four illness symptoms (dysphagia, regurgitation, retrosternal pain, and weight loss). Clinical stage 0 is represented by scores of 0–1, stage I by scores of 2–3, stage II by scores of 4–6, and stage III by scores more than 6 (Table 1).

Table 1: Eckardt score for symptomatic evaluation in achalasia:

Score	Weight loss (kg)	Dysphagia	Retrosternal pain	Regurgitation
0	None	None	None	None
1	<5	Occasional	Occasional	Occasional
2	5–10	Daily	Daily	Daily

The 6-item, user-friendly gastro-oesophageal reflux disease (GERD) questionnaire (GerdQ)[7] was created primarily as a primary care diagnostic tool for GERD and was used to evaluate GERD after surgery.

Investigations

a. Upper GI endoscopy for all patients.

b. Barium swallow for doubtful cases regarding clinical data and upper GI endoscopy.

c. Esophageal high-resolution manometry.

Procedure

All patients were operated on under general anesthesia in the reverse Trendelenburg position with the surgeon standing between the abducted lower limbs. Standard upper gastrointestinal laparoscopic ports were placed, with a 12mm port in the left upper quadrant to permit passage of the endo GIA stapler. The liver was retracted with a Nathanson liver retractor and a 30° telescope was used. Adhesions between the left lobe of the liver and any previously constructed fundoplication were divided in the group of patients who had done previous myotomy with fundoplication. About 5–8cm of the lower esophagus was dissected. A 3–5cm gastrotomy was done on the anterior wall of the body of the stomach approximately 5cm below the gastroesophageal junction. A 60mm linear stapler was introduced with one limb in the distal esophagus and the other in the adjacent gastric fundus (Figure 1). The stapler was closed; its position in the esophagus was confirmed using intraoperative endoscopy (Figure 2) and it was then fired to create a lateral opening between esophagus and fundus across the cardia. The gastrotomy was closed by direct sutures. The endoscope was introduced after stapling to assess anastomotic and staple line integrity.

Partial fundoplication was done in nine of the patients with the residual redundant gastric fundus (Figure 3). Intraperitoneal tube drain was used.

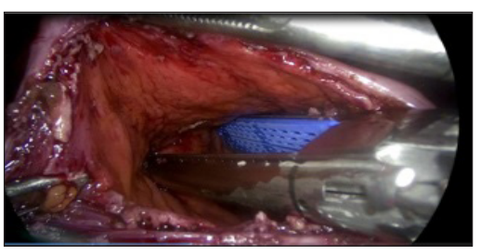

Figure 1: During anastomosis, one jaw of the stapler is in the esophagus and the other in the fundus.

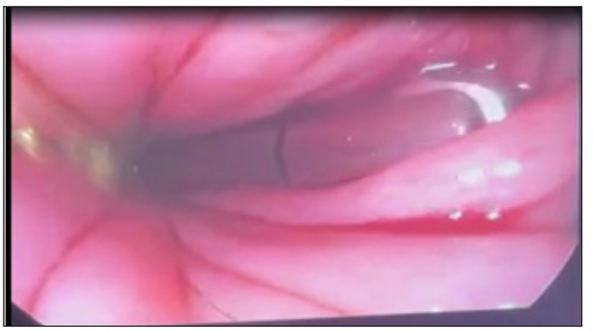

Figure 2: View of intraoperative endoscopy ensuring proper alignment of the stapler.

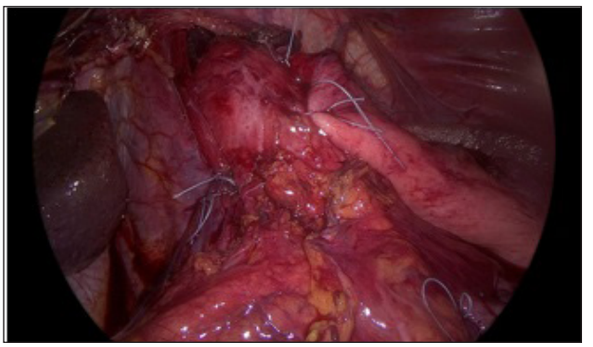

Figure 3: View showing the Partial fundoplication.

Outcome measures: The results of the surgeries were assessed as regards the following endpoints:

a. Evaluation of improvement of the dysphagia through the Eckardt symptom score postoperative.

b. Assessment of incidence of reflux symptoms and its degree using the GERD questionnaire (GerdQ).

c. Upper GIT contrast radiology postoperative.

d. Changes in the upper GI endoscopy after 3 months postoperative Figure.

Ethical considerations: The patient information was anonymous. Patient confidentiality was maintained, and data was presented by diagnosis rather than by patient name. Every participant gave their informed consent, which was verified by date and time and was in Arabic. By giving the patient's initials a number that only the investigator knew, confidentiality was maintained.

Statistical analysis

The collected data was coded, tabulated, and statistically analyzed using IBM SPSS statistics (Statistical Package for Social Sciences) software version 28.0, IBM Corp., Chicago, USA, (2021). Quantitative data can be examined for normalcy using the Shapiro–Wilk test. The mean SD and the ranges minimum and maximum are used to characterize data that is regularly distributed. If not, it is referred to as the range's lowest and maximum as well as the median (1^{st}–3^{rd} interquartile). The results are compared using the Wilcoxon signed-rank test (two dependent variables) and the Mann–Whitney test (two independent groups). When comparing qualitative data that is presented as percentages and figures, Fisher's Exact test is utilized. A *P* value was deemed significant if it was less than 0.050; if not, it was deemed nonsignificant.

RESULTS:

Fifteen participants were enrolled in the study after 22 patients had their eligibility evaluated. Two patients declined to participate in the study, while five of the eligible patients were disqualified from it due to the inclusion criteria. The data from 15 patients who had stapled cardioplasty due to recurrent or advanced cardiac achalasia ultimately served as the basis for the analysis.

Table (2) showed that demographic characteristics among the studied cases. Mean±SD of age (years) and BMI (kg/m^2) was 41.4±7.9 and 19.9±1.6, respectively. The participants were males and females (40.0 and 60.0%, respectively). 20.0% were smokers. ASA grades were I and II (60.0 and 40.0%, respectively). Achalasia characteristics among the studied cases. Achalasia types we re I, II, and III (40.0, 46.7, and 13.0%, respectively). The indications were failed previous operation (53.3%) and late achalasia 46.7%). Operative characteristics among the studied cases. Fundoplication was done in 60.0% of cases. Mean±SD of operation duration (min) and blood loss (ml) was 45.8±6.0 and 213.3±81.2, respectively. Postoperative findings among the studied cases. None experienced postoperative complications (infection and leakage). Hospital stay was 2 days (53.3%) and 3 days (46.7%). Eckardt score among the studied cases. Eckardt score significantly decreased after the operation. Median (1^{st}–3^{rd} IQ) of Eckardt score preoperative, postoperative, and change was 8.0(7.0–8.0), 3.0(3.0–4.0), and –5.0(–5.0—4.0), respectively. Incidence of GERD according to "GerdQ" Questionnaire; 0, 50, and 75 percent likelihood of GERD were 66.7, 26.7, and 6.7%, respectively. Recurrence of dysphagia was infrequent (6.7%). Improvement of cardiac narrowing and esophageal dilatation were 86.7 and 53.3%, respectively

Table (3) showed that age and preoperative Eckardt score were significantly lower in cases with recurrent achalasia. Eckardt score significantly decreased in both indications. Improvement of esophageal dilatation was significantly more frequent in cases with recurrent achalasia.

Table (4) showed that no significant differences according to fundoplication regarding operative& postoperative characteristics and outcomes. Eckardt score significantly decreased in both conditions of fundoplication (Figure 4).

Table 2: Comparison according to indication of operation:

Variables	Mean±SD Median (1st–3rd IQ) *N*		Range %
Demographic characteristics			
Age (years)	41.4±7.9		30.0–56.0
BMI (kg/m^2)	19.9±1.6		18.0–23.0
Sex			
Male	6		40.0
Female	9		60.0
Smoking	3		20.0
ASA			
I	9		60.0
II	6		40.0
Preoperative findings			
Type of achalasia			
I	6		40.0
II	7		46.7
III	2		13.3
Indication of operation			
Failed previous operation	8		53.3
Late achalasia	7		46.7
Operative findings			
Fundoplication	9		60.0
Operation duration (min)	56.8±6.0		49.0–71.0
Blood loss (ml)	213.3±81.2		100.0–300.0
Postoperative findings			
Complications (Infection/leakage)	0		0
Hospital stay			
2 days	8		53.3
3 days	7		46.7
Clinical outcomes			
Eckardt score			
Preoperative	8.0(7.0–8.0)		6.0−10.0
Postoperative	3.0(3.0–4.0)		2.0−6.0
#Change	−5.0 (−5.0–-4.0)		−6.0—1.0
^*P* value (pre vs. postoperative)		<0.001*	
GERD grades			
0% likelihood of GERD	10		66.7
50% likelihood of GERD	4		26.7
79% likelihood of GERD	1		6.7
Recurrence of dysphagia	1		6.7
Postoperative upper GI endoscopy			
Improvement of cardia narrowing	13		86.7
Improvement of esophageal dilatation	8		53.3

IQ: Interquartile; #Change: Post preoperative, negative values indicate reduction; ⌂: Wilcoxon signed-rank test; *: Significant.

Table 3: Comparison according to indication of operation:

	Indication of operation		
Variables	**Recurrent achalasia (Total= 8) [*n*(%)]**	**Late achalasia (Total= 7) [*n*(%)]**	***P* value**
Demographic characteristics			
Age (years)	35.6±3.3	48.0±6.1	^<0.001*

Variables	Indication of operation		*P* value
	Recurrent achalasia (Total= 8) [*n*(%)]	Late achalasia (Total= 7) [*n*(%)]	
BMI (kg/m^2)	19.6±1.4	20.2±1.9	^0.505
Sex			
Male	5 (62.5)	1 (14.3)	§0.119
Female	3 (37.5)	6 (85.7)	
Smoking	2 (25.0)	1 (14.3)	§0.999
ASA			
I	6 (75.0)	3 (42.9)	§0.315
II	2 (25.0)	4 (57.1)	
Achalasia characteristics			
Type of achalasia			
I	2(25.0)	4(57.1)	
II	4(50.0)	3(42.9)	§0.413
III	2(25.0)	0	
Operative findings			
Fundoplication	5(62.5)	4(57.1)	§0.999
Operation duration (min)	57.8±7.2	55.7±4.5	^0.529
Blood loss (ml)	193.8±86.3	235.7±74.8	^0.336
Postoperative findings			
Hospital stay			
2 days	5(62.5)	3(42.9)	§0.619
3 days	3(37.5)	4(57.1)	
Clinical outcomes			
Eckardt score			
Preoperative	7.0(7.0–7.5)	8.0(8.0–9.0)	0.004¤*
Postoperative	3.0(2.0–3.0)	4.0(3.0–4.0)	0.063¤
#Change	−4.5(−5.0–−4.0)	−5.0(−5.0–−4.0)	0.248¤
⌂P value (pre vs. postoperative)	0.010*	0.016*	
GERD grades			
0 % likelihood of GERD	5(62.5)	5(71.4)	
50 % likelihood of GERD	3(37.5)	1(14.3)	§ 0.569
79 % likelihood of GERD	0	1(14.3)	
Recurrence of dysphagia	1(12.5)	0	§ 0.999
Postoperative upper GI endoscopy			
Improvement of cardia narrowing	6(75.0)	7(100.0)	§0.467
Improvement of esophageal dilatation	7(87.5)	1(14.3)	§ 0.01.0*

#Change: Post preoperative, negative values indicate reduction; ^: Independent *t*-test; ¤: Mann–Whiteny test; ⌂: Wilcoxon signed-rank test; §: Fisher's Exact test;*: Significant.

Table 4: Comparison according to fundoplication regarding operative and postoperative characteristics and outcomes:

Variables	Fundoplication		*P* value
	Done (Total= 9) [*n*(%)]	Not done (Total= 6) [*n*(%)]	
Operative findings			
Operation duration (min)	57.2±7.5	56.2±2.9	^0.750
Blood loss (ml)	222.2±79.5	200.0±89.4	^0.622
Postoperative findings			
Hospital stay			
Two days	6(66.7)	2(33.3)	§0.315
Three days	3(33.3)	4(66.7)	

Variables	Fundoplication		*P* value
	Done (Total= 9) [*n*(%)]	Not done (Total= 6) [*n*(%)]	
Clinical outcomes			
Eckardt score			
Preoperative	8.0(7.0–8.0)	8.0(6.8–8.5)	0.800¤
Postoperative	3.0(2.5–3.5)	3.5(2.8–4.5)	0.313¤
#Change	−5.0(−5.0–−4.0)	−4.5(−5.3–−3.3)	0.695¤
⌂*P* value (pre vs. postoperative)	0.006*	0.027*	
Gerd grades			
0% likelihood of GERD	7(77.8)	3(50.0)	
50% likelihood of GERD	1(11.1)	3(50.0)	§0.235
79% likelihood of GERD	1(11.1)	0	
Recurrence of dysphagia	0	1(16.7)	§0.400
Postoperative upper GI endoscopy			
Improvement of cardia narrowing	9(100.0)	4(66.7)	§0.143
Improvement of esophageal dilatation	5(55.6)	3(50.0)	§0.999

#Change: Post preoperative, negative values indicate reduction; ^: Independent t-test; ¤: Mann–Whiteny test; ⌂: Wilcoxon signed-rank test; §: Fisher's Exact test;*: Significant.

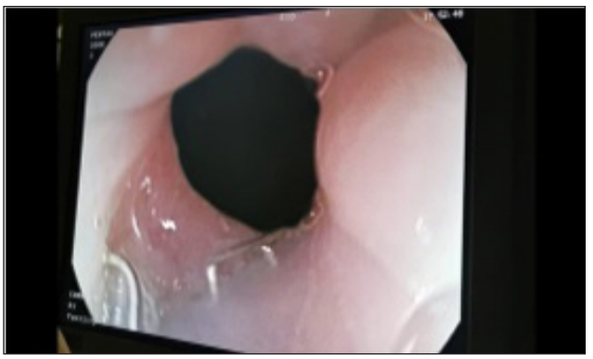

Figure 4: Postoperative follow-up endoscopy showing improvement of cardial narrowing.

DISCUSSION

Heller's myotomy combined with partial fundoplication is considered the gold standard surgical management for achalasia, with satisfactory results in the majority of patients. However, 10–20% of the patients will develop symptom recurrence, thus requiring further treatment[8,9].

Redo cardiomyotomy, balloon dilatation of the gastro-oesophageal junction, peroral endoscopic myotomy, and, in extreme situations, esophagectomy are the available treatment options for Heller's myotomy failure. After prior interventions have failed and the illness has progressed radiologically and clinically, esophagectomy is recommended for individuals with end-stage or recurrent achalasia. However, there are substantial rates of morbidity and mortality (32.4 and 5.4%, respectively) linked to esophagectomy. Esophagectomy is usually advocated in patients with a massively dilated esophagus measuring more than 6cm, where dysphagia is unlikely to be resolved by dilatation or standard myotomy[10].

Primary treatment failure of achalasia by pneumatic dilatation or Heller's myotomy may occur because of inadequate myotomy or fibrosis. The cause of failure cannot always be established with certainty. Typical case series are small and revisional myotomy usually leaves a small number of patients who require further revisional surgery or dilatation[11].

Using laparoscopic stapled cardioplasty (LSC) as an alternative to failed pneumatic dilatation and laparoscopic Heller's myotomy, where esophagectomy has previously been the only surgical option, was highlighted as a major point of interest because different surgical approaches for managing achalasia represent significant conflict and are frequently associated with complications[12].

As a result, our study's strength is that, to the best of our knowledge, it is the first to evaluate the effectiveness of stapled cardioplasty with partial fundoplication in the treatment of recurrent and advanced cardiac achalasia in terms of symptom improvement, esophageal emptying, and the incidence of complications.

Regarding demographic data, 15 patients were enrolled in our study, including those with advanced achalasia (esophageal diameter > 6cm) and those who had recurrent achalasia following unsuccessful interventions. The majority of cases were after unsuccessful prior interventions (53.3%), while late achalasia accounted for the remaining 46.7% of

the patients. The procedure was assessed during an 18-month follow-up, with a mean age of 41.4 years. This wider inclusion reflects the complexity of the real world; in contrast, Dehn *et al*.,[12] only focused on recurrent achalasia in seven patients following failed procedures such cardiomyotomy or pneumatic dilations. Griffiths *et al*.,[13] meanwhile, explored a more niche population of three patients with end-stage achalasia who underwent LSC. Senra *et al*.,[14] enrolled four patients undergoing laparoscopic hand-sewn cardioplasty, including one as a "rescue" procedure after complications during myotomy. Both alternative studies emphasized end-stage achalasia cases requiring advanced surgical solutions.

Ezz and Sabry[15], conducted a cohort study that focused on 23 patients who underwent LSC who experienced recurrent achalasia after failed primary treatments, such as pneumatic dilation, peroral endoscopic myotomy, or Heller's myotomy. This cohort exclusively comprised patients requiring redo surgery, with a specific focus on restoring esophageal function. This inclusion highlights the versatility of our approach, addressing a wider range of achalasia presentations compared to Ezz and Sabry's narrower focus.

Regarding operative characteristics, our study reported a mean operation duration of 56.8±6.0min with no significant complications like infection or leakage. Griffiths *et al*.,[13] noted longer operative times (90–210min), attributed to the complexity of creating a wide esophageal-stomach anastomosis. Meanwhile, Senra *et al*.,[14] highlighted the precision of hand-sewn techniques, offering enhanced control over anastomosis, though procedural times were not explicitly detailed.

The surgical approaches also reveal notable distinctions. Ezz and Sabry[15], reported a mean operative time of 62min for laparoscopic cardioplasty, closely similar to the 56.8±6.0min observed in our study. However, the inclusion of partial fundoplication in our technique.

Interestingly, fundoplication was performed selectively in our study (60%) and revealed no significant differences in operative or postoperative characteristics between patients with and without fundoplication. Both groups experienced significant symptom reduction, as evidenced by comparable decreases in Eckardt scores. GERD incidence and dysphagia recurrence rates were low and statistically insignificant across subgroups, suggesting that its role may be situational rather than universally necessary, whereas Griffiths *et al*.,[13], Dehn *et al*.,[12], and Senra *et al*.,[14] avoided fundoplication, citing concerns about its potential to hinder esophageal emptying in patients with significant dilatation. Dehn *et al*.,[12] employed a minimally invasive approach with a single or double stapler firing to achieve gastroesophageal continuity. Griffiths *et al*.,[13] adapted the procedure for end-stage achalasia, utilizing an angulated stapler while deliberately avoiding fundoplication due to limited gastric fundus availability.

Regarding postoperative outcomes, in our study, the Eckardt score, a critical measure of achalasia severity, demonstrated a significant median reduction from 8.0 preoperatively to 3.0 postoperatively ($P<0.001$). This underscores the procedure's efficacy in alleviating dysphagia and regurgitation, which are hallmark symptoms of achalasia. This aligns with Griffiths *et al*.,[13] where all three patients treated with LSC reported sustained symptom relief and improved esophageal emptying during follow-up periods ranging from 5 to 24 months. Similarly, Senra *et al*.,[14] reported significant swallowing improvement ($P= 0.03$), confirming the efficacy of hand-sewn cardioplasty. Moreover, Dehn *et al*.,[12] reported dysphagia relief in 85.7% of patients, with notable weight gain in all cases.

In concordance with our study, Ezz and Sabry[15], achieved complete dysphagia resolution in 100% of their cases, confirmed through contrast dye studies and manometry, and no anastomotic leaks were reported. Similarly, our study recorded a 93.3% dysphagia resolution rate, with significant improvements in the Eckardt score (median reduction of –5.0) and esophageal emptying.

The efficacy in symptom relief across all studies underscores the potential of cardioplasty techniques to address severe dysphagia caused by end-stage achalasia or recurrent disease, validating their role as esophagus-preserving alternatives to esophagectomy.

Regarding GERD, our study revealed that GERD risk was remarkably low, with 66.7% of patients demonstrating a 0% likelihood of GERD, and only one (6.7%) patient presenting with a high GERD probability. The low GERD incidence aligns with the esophageal structural improvements observed, as evidenced by the 86.7% improvement in cardia narrowing and 53.3% enhancement in esophageal dilatation by upper GI endoscopy. The lower GERD incidence in our study may be attributed to the selective use of partial fundoplication (60% of cases), which likely reduced reflux while maintaining esophageal emptying efficiency.

Our study's incorporation of fundoplication resulted in minimal GERD incidence (6.7%) compared with the higher rates seen in Dehn *et al*.,[12] (57%) and Griffiths *et al.,*[13] (67%). These findings underscore

the importance of antireflux measures, particularly in procedures that alter the gastroesophageal junction's anatomy.

In contrast, Senra *et al*.,[14] reported GERD in all patients postoperatively, managed effectively with proton pump inhibitors. Griffiths *et al*.,[13] also noted antireflux medication use in two out of three patients. This disparity may reflect differences in procedural design, with fundoplication potentially mitigating GERD in our study.

Conversely, the avoidance of fundoplication in both Griffiths *et al*.,[13], Dehn *et al*.,[12] and Senra *et al*.,[14] was based on concerns about impairing esophageal emptying in patients with severe dilation. This contrast highlights a critical debate: whether antireflux measures such as fundoplication provide a protective advantage or hinder outcomes in patients with achalasia. Our findings suggest that selective fundoplication can achieve a balance, but this requires further validation in larger cohorts.

While Ezz and Sabry[15], preferred not to perform fundoplication, relying on medication to manage postoperative GERD, our study included fundoplication in 60% of cases. This strategy resulted in significantly lower GERD incidence (6.7%) compared to their 17% reflux rate, demonstrating the advantage of addressing reflux prophylactically during surgery rather than reactively through medication, an essential aspect of long-term quality of life for achalasia patients.

Regarding postoperative complications, our study results reported a lack of postoperative complications, including infection or leakage, which further emphasizes the safety profile of this procedure. Similarly, Griffiths *et al.,*[13] and Senra *et al.,*[14] reported no anastomotic leaks or intraoperative adverse events, highlighting the robustness of both laparoscopic stapled and hand-sewn approaches. The shorter hospital stay in our cohort (2–3 days) versus Dehn *et al.,*[12] (≤5 days) may reflect streamlined perioperative protocols which also highlight the procedure's feasibility and minimal perioperative burden. Similarly, Ezz and Sabry[15], reported no major complications or mortality and Hospital stays were comparable, averaging 2.6 days in Ezz and Sabry's study and 2–3 days in ours.

Subgroup analysis revealed nuanced findings. Patients with recurrent achalasia showed a higher rate of esophageal dilatation improvement (87.5 vs. 14.3%, P= 0.010), indicating that prior surgical or endoscopic treatments may help to keep some of the esophageal contractility. While age and preoperative Eckardt scores were lower in the recurrent achalasia group, both recurrent and late achalasia groups achieved comparable symptomatic relief. This demonstrates the versatility of stapled cardioplasty in addressing diverse disease stages.

Furthermore, our study uniquely evaluated additional metrics such as esophageal dilation improvement (53.3%) and cardia narrowing (86.7%), providing a more comprehensive analysis of the procedure's success.

Overall, our stapled cardioplasty approach offers significant advantages over previous operations, combining adaptability with improved safety, efficiency, and postoperative outcomes. By addressing GERD through fundoplication, managing both recurrent and advanced achalasia, and streamlining the surgical process, our technique emerges as a superior option for achalasia management. These strengths position our operation as a cornerstone for future refinements and broader adoption in clinical practice.

Strengths

Our study demonstrated significant advancements in the management of recurrent and advanced cardiac achalasia through stapled cardioplasty. One major strength lies in its robust design, employing a cohort study to evaluate outcomes in 15 patients with a minimum follow-up period of 18 months. The clear inclusion and exclusion criteria ensured a focused assessment of appropriate candidates, thereby enhancing the reliability of the findings. The significant symptomatic improvement, reflected in a median reduction in Eckardt score from 8.0 to 3.0 (P< 0.001), underscores the procedure's efficacy in relieving dysphagia and improving esophageal function. Furthermore, the absence of postoperative complications such as infection or leakage highlights the safety and feasibility of this intervention. Selective use of fundoplication (60%) to mitigate GERD, combined with an average operative time of 56.8±6.0 min, demonstrates procedural efficiency without compromising patient outcomes.

LIMITATIONS

Despite its promising findings, our study has several limitations. The small sample size (15 patients), on view that achalasia is rather a low-incidence disease, restricts the generalizability of the results and limits the statistical power to detect rare complications or nuanced differences between patient subgroups. Additionally, while the follow-up period of 18 months provides insight into short- to mid-term outcomes, it does not allow for the evaluation of long-term issues such as recurrence of symptoms, progression of GERD, or the development of complications like Barrett's esophagus.

CONCLUSION

The study confirms that stapled cardioplasty is a highly effective and safe surgical option for managing recurrent and advanced achalasia. The procedure achieves significant improvement in dysphagia and esophageal emptying with minimal complications, showcasing its viability as an esophagus-preserving alternative to more invasive options like esophagectomy. The selective incorporation of fundoplication proved effective in minimizing GERD without impeding esophageal emptying. These findings add valuable evidence to the limited literature on advanced interventions for achalasia, offering a practical solution for patients with challenging presentations.

CONFLICT OF INTEREST

There are no conflicts of interest.

REFERENCES

1. Michaela M. (2015). Impact of high-resolution manometry on achalasia diagnosis and treatment. Ann Gastroenterol; 28:3–9.

2. Duranceau M., Liberman J., Martin P., Ferraro P. (2012). End-stage achalasia. Dis Esophagus; 25:319–330.

3. Amit P., Ami P., Faiz AM., Soudagar S., Sayuk GS., Gyawali CP. (2016). Achalasia symptom response after Heller myotomy segregated by high-resolution manometry subtypes. J Gastroenterol; 51:112–118.

4. Gockel I., Timm S., Sgourakis GG., Musholt TJ., Rink AD., Lang H. (2010). Achalasia—if surgical treatment fails: analysis of remedial surgery. J Gastrointest Surg; 14(Suppl 1):S46–S57.

5. Pallati PK., Mittal SK. (2011). Operative interventions for failed Heller myotomy: a single institution experience. Am Surg; 77:330–336.

6. Eckardt VF., Stauf B., Bernhard G. (1996). Chest pain in achalasia. J Am Coll Cardiol; 28:690–693.

7. Jones R., Junghard O., Dent J., Vakil N., Halling K., Wernersson B., Lind T. (2009). Development of the GerdQ, a tool for the diagnosis and management of gastro-oesophageal reflux disease in primary care. Aliment Pharmacol Ther; 30:1030–1038.

8. DeSouza M. (2023). Surgical options for end-stage achalasia. Curr Gastroenterol Rep; 25:267–274.

9. Capovilla G., Salvador R., Provenzano L., Valmasoni M., Moletta L., Pierobon ES., Merigliano S., Costantini M. (2021). Laparoscopic revisional surgery after failed Heller myotomy for esophageal achalasia: Long-term outcome at a single tertiary center. J Gastrointest Surg; 25:2208–2217.

10. Zaninotto G., Bennett C., Boeckxstaens G., Costantini M., Ferguson MK., Pandolfino JE., *et al*. (2018). The 2018 ISDE Achalasia guidelines. Dis Esophagus; 31:1–29.

11. Csendes Juhasz A., González Arestizábal T., Lanzarini Sobrevia E. (2022). Management of End-Stage Achalasia. Foregut; 2:409–422.

12. Dehn TC., Slater M., Trudgill NJ., Safranek PM., Booth MI. (2012). Laparoscopic stapled cardioplasty for failed treatment of achalasia. Br J Surg; 99:1242–1245.

13. Griffiths EA., Devitt PG., Jamieson GG., Myers JC., Thompson SK. (2013). Laparoscopic stapled cardioplasty for end-stage achalasia. J Gastrointest Surg; 17:997–1001.

14. Senra F., Navaratne L., Acosta-Mérida A., Gould S., Martínez-Isla A. (2021). Laparoscopic hand-sewn cardioplasty: an alternative procedure for end-stage achalasia. Langenbecks Arch Surg; 406:1675–1682.

15. Ezz R., Sabry K. (2022). Laparoscopic cardioplasty for failed primary treatment of achalasia. Dis Esophagus; 35(Suppl 2):doac051–549.