

Heller Cardiomyotomy With or Without Intra Operative Upper Endoscopy in The Management of Cardiac Achalasia: A Prospective Randomized Study

Original Article

Mohamed Abdel Hamid Abdel Aziz¹, Ashraf Kamal Abdallah², Mohamed Ibrahim Hasan², Mohammed Abdalmegeed Hamed²

Department of General Surgery, Faculty of Medicine, ¹Alexandria University, ²Ain Shams University, Egypt.

ABSTRACT

Background: Esophageal achalasia is an inflammatory illness characterized by esophageal aperistalsis and lower esophageal sphincter failure.

Aim: To compare laparoscopic Heller's cardiomyotomy with or without intraoperative endoscopy in managing achalasia, focusing on the impact of endoscopy on myotomy adequacy, benefits, and complications.

Patients and Methods: This prospective randomized investigation has been conducted at Ain-Shams University Hospitals and involved twenty cases. A total of ten cases underwent Heller's cardiomyotomy with Dor fundoplication, while an additional ten cases underwent the same procedure with intraoperative endoscopic guidance.

Results: In every instance, preoperative, intraoperative, and postoperative data were evaluated methodically. Twenty patients (100%) had dysphagia, seventeen (85%) had regurgitation, fifteen (75%), and ten (50%) had chest discomfort following meals as preoperative symptoms. Thirteen patients (65%) lost weight. Eight patients (40%) declined balloon dilations, one patient (5%) tried botulinum toxins, and twelve patients (60%) underwent two to three pneumatic dilations. Preoperative.

Conclusion: In addition to serving as a guide to ensure an appropriate myotomy, Heller's cardiomyotomy with endoscopic guidance is crucial for limiting the extent of the myotomy and so minimizing reflux symptoms after surgery.

Key Words: Achalasia, dysphagia, endoscopy, fundoplication, heller's myotomy.

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Corresponding Author: Mohamed Abdel Hamid Abdel Aziz, MD, Department of General Surgery, Faculty of Medicine, Alexandria University, Egypt. **Tel.:** 01033855581, **E-mail:** mohm00047@gmail.com

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INTRODUCTION

"Achalasia" comes from the Greek word "khalasis," meaning "failure to relax." With a yearly incidence of 1.8–12.6 per 100,000 people, it is extremely uncommon^[1]. Although the exact cause is unknown, it is thought to be related to an autoimmune reaction brought on by a virus and is caused by the death of inhibitory ganglion cells in the myenteric (Auerbach's) plexus. Muscle specimen histology usually shows a varying degree of chronic inflammation and a reduction in the number of ganglion cells^[2].

Postprandial chest discomfort, regurgitation of undigested food, and dysphagia to both liquids and solid meals are the primary symptoms of esophageal achalasia. A barium exam, which may reveal a dilated esophagus and the distinctive parrot's peak sign, esophageal manometry, and upper gastrointestinal tract endoscopy, confirms the diagnosis^[3].

Numerous methods are used to treat achalasia, however none of them are curative. In order to enable proper esophageal emptying, these techniques aim to lessen the lower esophageal sphincter's contractility. Medical therapies include endoscopic pneumatic dilatation, calcium channel blockers, injections of botulinum toxin, and endoscopic and surgical myotomy^[5].

A very effective treatment for achalasia symptoms, especially dysphagia, is Heller's cardiomyotomy^[4]. This study compared the outcomes of laparoscopic Heller's cardiomyotomy with or without intraoperative endoscopy in the treatment of achalasia in order to determine if endoscopy affects the myotomy's adequacy and any additional advantages or disadvantages.

PATIENTS AND METHODS

This is prospective randomized research using closed envelope technique that had been performed at Ain-Shams University Hospitals. The study was started in July 2022 and had been continued to December 2024 till the total number of patients had been recruited in the research with a minimal monitoring of 6 months.

Inclusion criteria:

All patients presenting with achalasia, whether primarily diagnosed or after failed endoscopic balloon dilatation.

Exclusion criteria:

- Patients who are unfit for general anesthesia (ASA III- V).
- Advanced cases with sigmoid esophagus where esophagectomy is indicated.

Investigations:

1. Upper GI endoscopy for all patients.
2. Barium swallow.
3. Esophageal high resolution manometry for indefinite diagnosis when a pressure over 40mmHg of LES is considered diagnostic for achalasia.

After the exclusion of patients who are unfit for general anesthesia (ASA III- V), advanced cases with sigmoid esophagus where esophagectomy is indicated. Two groups of patients with cardiac achalasia had been subjected to laparoscopic Heller's cardiomyotomy with or without intraoperative upper endoscopy. The ethical committee of the Department of Surgery at Ain-Shams University provided ethical permission for this research. Following a comprehensive explanation of the surgery, including its advantages, disadvantages, and realistic expectations, as well as the potential for conversion to open surgery and all potential intraoperative, early, and late postoperative complications, each case signed a written consent. The same surgical team conducted surgeries throughout the duration of the research. The closed envelope technique was utilized to randomize all cases. The cases were separated into two groups: Group A, which consisted of ten cases who had undergone laparoscopic Heller's cardiomyotomy with intraoperative upper endoscopy, and Group B, which consisted of ten cases who had undergone laparoscopic Heller's cardiomyotomy without intraoperative upper endoscopy.

Surgical technique:

Under general anesthesia, cases were placed in a supine posture with a split leg and in the reverse Trendelenburg position. Palmer's point was used to insufflate the abdomen using a Veress needle. Four operating ports—

two ten millimeter and the other two five millimeters—will be used to install the scope. The remaining ports will be visible from the outside. The liver retractor was inserted through the S-shaped epigastric port. In Group A (Laparoscopic Heller's Cardiomyotomy with intraoperative upper endoscopy): (Figure 1) show Dissection was started through the pars flaccida using the LigaSure™ Blunt Tip, Medtronic, Minnesota, USA, and the peritoneum and pharyngoesophageal ligament covering the abdominal esophagus were separated while maintaining both vagi nerves as in Figure (2).

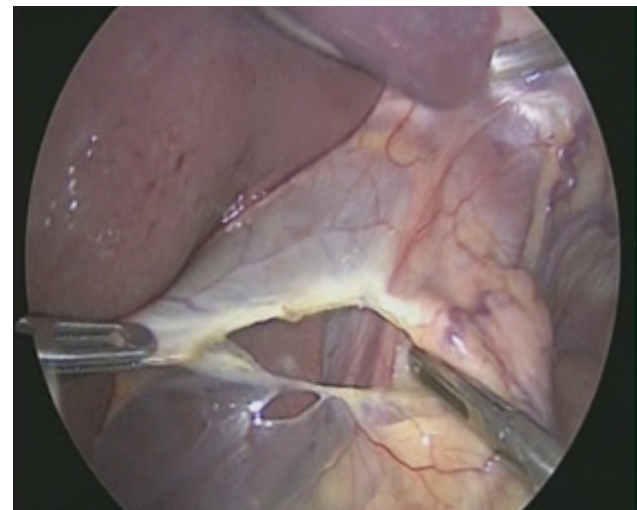


Fig. 1: Dissection through the pars flaccida.

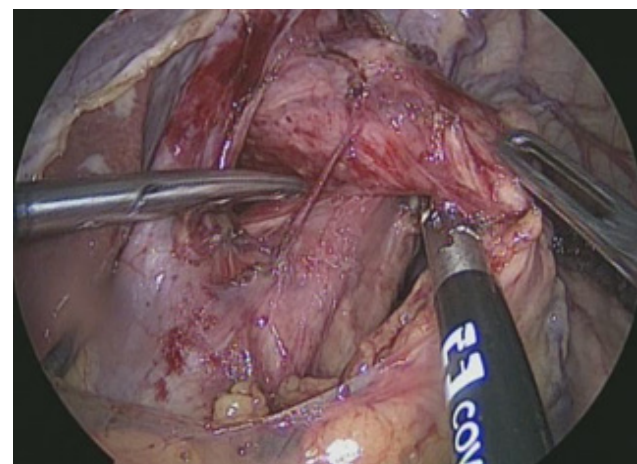


Fig. 2: Dissection of abdominal esophagus.

The left diaphragmatic crus are seen near the splenic inferior pole, where the division of the short gastric arteries begins. The distal portion of the mediastinal esophagus was then mobilized after the fundus was made mobile by disconnecting the small gastric arteries and their fundal attachments.

Myotomy has been performed on the stomach wall for two to three centimeters and the front wall of the esophagus

for seven centimeters using blunt dissection, hook, or LigaSure™, Medtronic, Minnesota, United States of America, after the fat at the gastroesophageal junction has been removed.

The longitudinal muscles were initially separated, followed by the circular muscles, until mucosal bulging occurred. Myotomy was carried out till endoscopic evidence of complete myotomy was seen, also for assessment of mucosal integrity and to avoid the difficulty of identifying the appropriate length of the gastric end of the myotomy at the gastroesophageal junction. Subsequently, the gastroesophageal hiatus has been posteriorly closed with 2 interrupted Ethibond 2-0 sutures as in Figure (3).

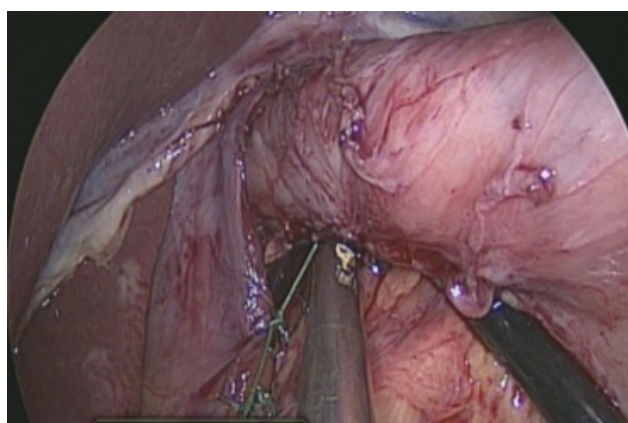


Figure 3: Cardiomyotomy and hiatal closure.

Intraoperative endoscopy:

In cases with endoscopic guidance, the endoscopy was undertaken per os by an expert endoscopist. We had used a PENTAX endoscope, USA. The endoscopy has an outer diameter of 10.1 millimeters. The endoscope has been introduced under the vision and passed through the gastroesophageal junction with gentle pressure, allowing for an assessment of the stomach and duodenum. After the stomach's liquids and air were fully aspirated, the gastroesophageal junction was located endoscopically and used as a reference point to start the myotomy. Gentle air insufflation made it easy to dilate the sphincter and lower esophagus through the endoscope with the aid of endoscopic guiding. After the phrenoesophageal membrane was released, the esophagus was kept in place with tape and dissected.

The myotomy was done proximally to the esophageal part and distally along the gastric part. The myotomy was done firstly using a hook diathermy and ligasure device through muscle splitting followed by blunt dissection with bulging of the underlying mucosa. Although myotomy was generously carried out to the esophageal part up to 5cm, the distal extent was limited to 2 cm through the cardia in the cases that we had not used endoscopic guidance. In Group B (Laparoscopic Heller cardiomyotomy without intraoperative endoscopy):

The scope was then withdrawn slightly and then advanced again to ensure the adequacy of myotomy with the intraluminal transillumination of the scope along the myotomized segment

Figure (4). An air bubble test was done utilizing the air insufflation of the scope and immersion of the gastroesophageal junction in saline, and if any perforation was detected, suturing the site of perforation was done with two stitches of vicryl 2-0.

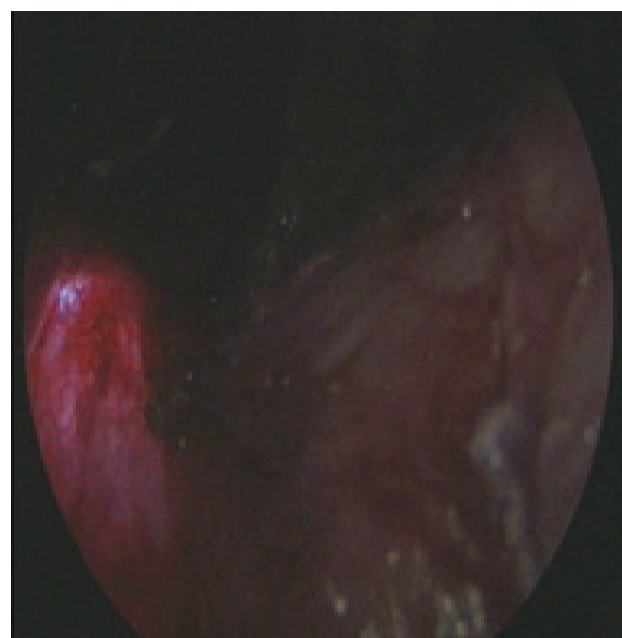


Fig. 4: Endoscopic intraluminal transillumination along the myotomized segment.

Dor fundoplication technique:

The larger curvature of the stomach's fundus was gripped anteriorly and sutured to the left edge of the esophageal myotomy, followed by the right edge with three interrupted sutures on each side as in Figure (5).

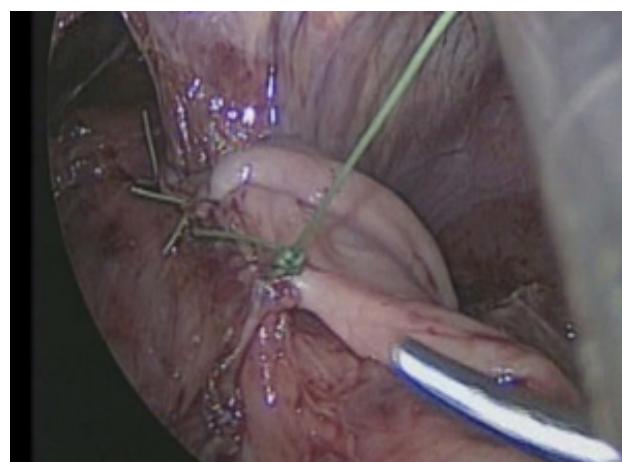


Fig. 5: Partial anterior wrap fundoplication.

This procedure was performed in both groups (A and B). After that, a single Ethibond 2-0 suture was used to secure the wrap to the left crus.

Postoperative management and follow-up:

The cases were closely monitored following surgery to ensure that they were receiving adequate pain control, urine output, and blood gas levels. Daily observation of the vital signs (temperature, pulse, respiration, abdominal distension). The drain was inserted in all patients and was removed on the 2nd-4th day postoperatively. A gastrografin swallow contrast study was done on the 4th postoperative day to assess the esophageal mucosal integrity. Patients were instructed to attend for follow up for 12 months was done, the follow-up schedule was twice per month for 2 month then monthly for 4 months then every 2 months for 6 months. Our follow-up was based on The Eckardt Symptom Score served as the foundation for our follow-up (Table 1).

Table 1: Eckardt Symptom Score greater than or equal to 4 is shown as failure of symptom relief (failure of treatment), and a score less than or equal to 3 has been revealed as treatment success:

score	Dysphagia	Regurgitation	Retrosternal pain	Weight loss (kg)
0	none	none	none	none
1	Occasional	Occasional	Occasional	Less than 5kg
2	daily	daily	daily	5-10kg
3	Each meal	Each meal	Each meal	More than 10kg

The scoring system is defined as 0: None; 1: Occasionally; 2: Daily; 3: Each meal for signs/symptoms; 0: None; 1: Less than 5-kilogram; 2: 5–10 kilogram; 3: More than 10 kilogram for current weight loss (six months).

Statistical methods:

IBM SPSS statistics (Statistical Package for Social Sciences) software version 28.0, IBM Corp., Chicago, USA, 2021, was used to code, tabulate, and statistically analyze the gathered data. The Shapiro-Wilk test was used to check for normality in quantitative data. If the data were normally distributed, they were described as mean±SD (standard deviation), and the independent *t*-test was used to compare them. If not, they were described as median (1st–3rd Interquartiles), and the Mann Whitney and Wilcoxon signed ranks tests were used to compare them. Fisher's Exact test is used to compare qualitative data that is expressed as numbers and percentages. When the *p*-value was less than 0.050, it was considered significant; otherwise, it was considered non-significant.

RESULTS

Figure (6) showed that: Twenty-six cases were enrolled in order to recruit the required cases, 6 cases were excluded (4 did not meet inclusion criteria and 2 refused to participate). The required 20 cases were equally randomized into with endoscopy and without endoscopy

groups, no loss to follow up and then all cases were analyzed.

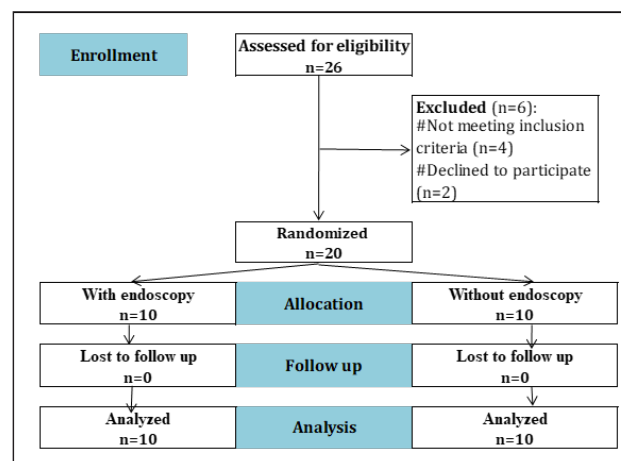


Fig. 6: Study flow diagram (CONSORT).

Table (2) showed that: Mean±SD of age (years) in with endoscopy and without endoscopy groups was 35.8±5.9 and 39.7±7.6 respectively, while Mean±SD of BMI (kg/m²) was 21.5±2.5 and 22.1±3.6 respectively. Male sex was 30.0% and 40.0% respectively, smoking was 30.0% and 20.0% respectively. ASA I was 80.0% and 50.0% respectively, the differences were non-significant regarding age, BMI, sex, smoking and ASA (*p*= 0.218, 0.694, 0.999, 0.999 and 0.350 respectively). Types of achalasia I and II in with endoscopy group and without endoscopy group were 90.0% and 10 respectively. All cases had degree II. Indication of operation; early achalasia and residual achalasia (cases of failed balloon dilatation) in with endoscopy group was 30.0% and 70.0% respectively, while in without endoscopy group were 40.0% and 60.0% respectively. the differences were non-significant regarding types of achalasia and indication of operation (*p*= 0.999 for both).

Table (3) showed that: Operation duration (min) was significantly (*p*= 0.021) longer in with endoscopy group than in without endoscopy group (152.0±20.4 versus 127.4±22.9 respectively). No significant (*p*= 0.574) difference between with endoscopy group and without endoscopy group regarding blood loss (mL) (200.0±117.9 versus 175.0±71.7 respectively). Bleeding and leakage in with endoscopy group were 10.0% and 0.0% respectively, while in without endoscopy group were 10.0% and 20.0% respectively, the differences were non-significant (*p*= 0.999 for both). Infection did not occur in either group. Hospital stay (days) was significantly (*p*= 0.040) shorter in with endoscopy group than in without endoscopy group (2.5±1.0 versus 3.4±0.8 respectively).

Table (4) that: Median (1st–3rd IQ) of preoperative, postoperative and change in Eckardt score in with endoscopy group was 8.0(7.8–9.0), 2.5(2.0–3.8) and

-5.5(-7.0—2.8) respectively, while in without endoscopy group was 8.0 (7.0–8.3), 5.0 (3.8–6.0) and -3.0 (-4.0—2.0) respectively. The difference was non-significant preoperatively ($p= 0.655$), was significantly ($p=0.030$) lower in in with endoscopy group postoperatively, while was significantly ($p= 0.038$) more reduced in in with endoscopy group. GERDQ grades were non-significantly ($p= 0.350$) lower in with endoscopy group; 0, 50 and 79 percent were 80.0%, 20.0% and 0.0% respectively in with endoscopy group, while were 50.0%, 40.0% and 10.0%

respectively in without endoscopy group. Recurrence was non-significantly ($p=0.999$) less frequent in with endoscopy group (0.0%) than in without endoscopy group (10.0%). Improvement of cardia narrowing and improvement of esophageal dilatation were less frequent in with endoscopy group (90.0% and 80.0% respectively) than in without endoscopy group (80.0% and 60.0% respectively), the differences were non-significant ($p= 0.999$ and 0.628 respectively).

Table 2: Comparison between the study groups regarding demographic and baseline achalasia characteristics

Demographic characteristics		With endoscopy (Total=10)	Without endoscopy (Total=10)	<i>p</i> -value
Age (years)	Mean±SD	35.8±5.9	39.7±7.6	^0.218
	Range	28.0–45.0	30.0–50.0	
BMI (kg/m²)	Mean±SD	21.5±2.5	22.1±3.6	^0.694
	Range	19.0–26.7	17.8–26.9	
Sex	Male	3(30.0%)	4(40.0%)	§0.999
	Female	7(70.0%)	6(60.0%)	
Smoking		3(30.0%)	2(20.0%)	§0.999
ASA	I	8(80.0%)	5(50.0%)	§0.350
	II	2(20.0%)	5(50.0%)	
Achalasia characteristics				
Type of achalasia	I	9(90.0%)	9(90.0%)	§0.999
	II	1(10.0%)	1(10.0%)	
Degree	II	10(100.0%)	10(100.0%)	NA
Indication of operation	Early achalasia	3(30.0%)	4(40.0%)	§0.999
	Residual achalasia	7(70.0%)	6(60.0%)	

NA: Not applicable; ^: Independent *t*-test; §: Fisher's Exact test.

Table 3: Comparison between the study groups regarding operative findings, postoperative complications and hospital stay

Operative findings		With endoscopy (Total=10)	Without endoscopy (Total=10)	<i>p</i> -value
Operation duration (min)	Mean±SD	152.0±20.4	127.4±22.9	^0.021*
	Range	120.0–180.0	90.0–150.0	
Blood loss (mL)	Mean±SD	200.0±117.9	175.0±71.7	^0.574
	Range	100.0–500.0	100.0–300.0	
Postoperative complications				
Bleeding		1(10.0%)	0(0.0%)	§0.999
Leakage		1(10.0%)	2(20.0%)	§0.999
Infection		0(0.0%)	0(0.0%)	NA
Hospital stay (days)	Mean±SD	2.5±1.0	3.4±0.8	^0.040*
	Range	2.0–5.0	3.0–5.0	

^: Independent *t*-test; §: Fisher's Exact test; ^: Independent *t*-test; *: Significant.

Table 4: Comparison between the study groups regarding pre and postoperative clinical and endoscopy findings:

Clinical findings		With endoscopy (Total=10)	Without endoscopy (Total=10)	p-value
Eckardt score	Preoperative	8.0(7.8–9.0)	8.0(7.0–8.3)	□0.655
	Postoperative	2.5(2.0–3.8)	5.0(3.8–6.0)	□0.030*
	#Change	-5.5(-7.0–2.8)	-3.0(-4.0–2.0)	□0.038*
	△p-value	<0.001*	<0.001*	
GERDQ grade	0 percent	8 (80.0%)	5(50.0%)	§0.350
	50 percent	2(20.0%)	4(40.0%)	
	79 percent	0(0.0%)	1(10.0%)	
Recurrence		0(0.0%)	1(10.0%)	§0.999
Postoperative upper GI endoscopy				
Improvement of cardia narrowing		9(90.0%)	8(80.0%)	§0.999
Improvement of esophageal dilatation		8(80.0%)	6(60.0%)	§0.628

#Change: Post – preoperative, negative values indicate reduction; □: Mann-Whitney test; △: Wilcoxon signed ranks test; §: Fisher's Exact test; *: Significant.

DISCUSSION

The main goal of surgical treatment for esophageal achalasia is to decrease the gastroesophageal junction's outflow resistance, which is caused by a malfunctioning lower esophageal sphincter. Laparoscopic Heller's cardiomyotomy (LHM) has been the gold standard of care for most patients of esophageal achalasia^[7,8].

Twenty participants were participated in the study after 26 patients had their eligibility evaluated. Two patients declined to participate in the trial, while four of the eligible patients were disqualified from it due to the inclusion requirements. The data from 20 patients with cardiac achalasia who had laparoscopic Heller's cardiomyotomy, either with or without intraoperative upper endoscopy, served as the basis for the study.

Regarding Demographic data, ten patients in our research had Heller's cardiomyotomy with Dor fundoplication, and ten more had the same treatment done under intraoperative endoscopic supervision. Generally speaking, 65 percent of the population was female. The age range was 23–49 years old, with a mean of 39.7±14 years. Preoperative complaints included heartburn in 15(75%) patients, regurgitation and vomiting of undigested food in 17(85%) patients, weight loss in 13(65%) patients, and dysphagia to solids and fluids in 20(100%) patients. A total of 12(60%) patients had tried two to three pneumatic dilatations, 1(5%) patient had tried botulinum toxins, and 8(40%) patients had refused any balloon pneumatic dilation to avoid any possibility of perforations. Esophageal manometry and pH metry have been done before and six months after whenever the patient was symptomatic.

Regarding operative characteristics, our study reported a mean Operation duration (min) was significantly ($p=0.021$) longer in with endoscopy group than in without endoscopy group (152.0±20.4 versus 127.4±22.9 respectively). No significant ($p=0.574$) difference between with endoscopy

group and without endoscopy group regarding blood loss (mL) (200.0±117.9 versus 175.0±71.7 respectively). with no significant complications Bleeding and leakage in with endoscopy group were 10.0% and 0.0% respectively, while in without endoscopy group were 10.0% and 20.0% respectively, the differences were non-significant ($p=0.999$ for both). Infection did not occur in either group. Hospital stay (days) was significantly ($p=0.040$) shorter in with endoscopy group than in without endoscopy group (2.5±1.0 versus 3.4±0.8 respectively).

Regarding Postoperative Outcomes, in our study, The Eckardt score, a critical measure of achalasia severity, demonstrated Median (1st–3rd IQ) of preoperative, postoperative and change in Eckardt score in with endoscopy group was 8.0(7.8–9.0), 2.5(2.0–3.8) and -5.5 (-7.0–2.8) respectively, while in without endoscopy group was 8.0(7.0–8.3), 5.0(3.8–6.0) and -3.0(-4.0–2.0) respectively. The difference was non-significant preoperatively ($p=0.655$), was significantly ($p=0.030$) lower in in with endoscopy group postoperatively, while was significantly ($p=0.038$) more reduced in in with endoscopy group.

This underscores the procedure's efficacy in alleviating dysphagia and regurgitation, which are hallmark symptoms of achalasia. This aligns with our results in the non-endoscopic group showed marked improvement of dysphagia and regurgitation in up to 90% and 90%, respectively. The findings align with those of Hunter *et al.*,^[9] who assessed the outcomes of 40 patients' myotomy with fundoplication. In 36(90%) and 38(95%) of the patients, dysphagia and regurgitation improved. Compared to Mirsharifi *et al.*,^[6] who found that symptoms improved in 74.2% of patients following myotomy and fundoplication and remained unaltered in 25.8% of patients, our results demonstrated a significant improvement in symptoms. Ellis came to the conclusion that either inadequate muscle fiber division or fibrosis at the myotomy site was the cause of the ongoing symptoms following the procedure Ellis^[10].

Our results on the endoscopic group showed marked improvement of dysphagia, up to 98%, and regurgitation, up to 96%. The reflux symptoms in our nonendoscopic group was 9.5% after 12 months of follow-up, which is highly comparable to the study of Falkenbach and colleagues who showed 14.5% of abnormal reflux symptoms. The abnormal reflux symptoms in our endoscopic group were only 4.5% and the results emphasize the advent of the usage of intraoperative endoscopy. Kiudelis *et al.*,^[11]

Regarding GERD, our study revealed that GERDQ grades were non-significantly ($p= 0.350$) lower in with endoscopy group; 0, 50 and 79 percent were 80.0%, 20.0% and 0.0% respectively in with endoscopy group, while were 50.0%, 40.0% and 10.0% respectively in without endoscopy group. Recurrence was non-significantly ($p= 0.999$) less frequent in with endoscopy group (0.0%) than in without endoscopy group (10.0%). So searching for the best anti-reflux procedure with Heller cardiomyotomy had showed upto 35% of reflux symptoms for the patients who had Heller cardiomyotomy with Dor fundoplication as compared with 11% for those who had Toupet fundoplication. The abnormal reflux symptoms in our endoscopic group were seen in only 4.5% and the results emphasize the advent of the usage of intraoperative endoscopy. In our study, we used intraoperative endoscopy to assess the extent of the myotomy along the gastric part so the extent was limited to achieve satisfactory results without affecting the antireflux function and sono need for total fundoplication and if partial fundoplication was done as antireflux procedure, it is supported with the endoscopic guided limited myotomy of the gastroesophageal junction by doing unnecessary more myotomy. We use the light of the scope to show intraluminal transillumination of the myotomized segment which ensures complete myotomy. Air insufflation of the scope was also used for the leak test after immersion of the myotomized segment on saline. Our results had showed better results of achalasia cardiomyotomy with intraoperative endoscopy. The same was confirmed by Bloomston *et al.*,^[12] who concluded that intraoperative endoscopy is crucial for such procedure and highly beneficial.

Prior to the patient leaving the theater, four essential requirements must be achieved for a videoscopic Heller's myotomy to be became technically successful. The endoscope must first gently inflate the lower esophageal sphincter to allow for easy distension. Second, the endoscope and videoscope must both see a bright transillumination of the myotomized part. Third, the endoscope has to enter the stomach with ease. Finally, examination for perforation must be done both directly, using the endoscope to observe, and indirectly, using the endoscope to insufflate while the myotomized segment is submerged and using the videoscope to look for air bubbles. The operating surgeon must confirm the aforementioned requirements, despite the temptation to rely on the endoscopist to assess the sufficiency of the myotomy^[12].

For a patient with achalasia, alleviation of regurgitation, dysphagia, outlet blockage, and chest discomfort is the most crucial result. Recent research on Heller myotomy-treated achalasia patients has demonstrated an 85–95% improvement in dysphagia. Hey Arain,^[13] Following a myotomy, dysphagia and regurgitation significantly decreased in frequency and severity in the current research. There has been debate on the need of combining an anti-reflux treatment with a myotomy^[14]. However, following a laparoscopic Heller myotomy, the majority of surgeons do either a Dor fundoplication or a Toupet fundoplication as the main anti-reflux procedure^[15]. The methods did not vary in their ability to alleviate chest discomfort, regurgitation, or dysphagia^[13]. additionally, both required proton pump inhibitor medication following surgery. However, more intricate anti-reflex measures might not be required since Dor fundoplication is both simpler and easier than Toupet fundoplication. Furthermore, Dor fundoplication helps heal possibly undetectable wounds and shields the exposed mucosa^[16].

Regarding postoperative complications, our study results reported a lack of Post-operative complications, including infection further emphasizes the safety profile of this procedure but leakage had been involved in 3 cases which were detected postoperatively and were managed with esophageal stenting after primary repair failure, El-Sayed Abou El-Magd mentioned that 52 cases (12.6%) had mucosal injuries. A lot of risk factors for mucosal injuries have been found, including advanced age, prolonged illness, low levels of albumin, and an esophageal transverse diameter more than six cms. While residual risk factors like advanced age and a sigmoid-shaped esophagus should be treated by skilled surgeons in high-volume institutions, correctable factors like low serum albumin should be considered before surgery^[17]. Also One patient of the endoscopic group had postoperative bleeding that necessitated laparoscopic exploration. Bleeding of one of the short gastric vessels was detected and secured with a ligasure device after the blood clots were aspirated.

CONCLUSION

In addition to serving as a guide for achieving a suitable myotomy, Heller's cardiomyotomy with endoscopic guidance is crucial for limiting its length, which will reduce reflux symptoms after surgery and maintain mucosal integrity.

CONFLICT OF INTERESTS

There is no conflict of interests.

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