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Long-term outcome for achalasia in patients who underwent laparoscopic Heller myotomy with Dor fundoplication

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Abstract

Introduction: Achalasia is a rare esophageal motility disorder that can require surgical intervention in some cases. This retrospective cross-sectional study aims to evaluate the clinical symptoms of patients with advanced achalasia who underwent laparoscopic Heller myotomy (LHM) and Dor fundoplication.

Materials and Methods: The study included 86 patients (38 men, 48 women) diagnosed with achalasia between 2010 and 2020, of which 20 patients with advanced achalasia underwent LHM and Dor fundoplication. The median follow-up time was 48 months.

Results: The study found that LHM and Dor fundoplication surgery improved dysphagia in 12 patients, with four patients showing improvement in solid food dysphagia and two patients showing improvement in semi-solid dysphagia. Nocturnal cough and slow emptying sensation also improved in 16 cases. Additionally, barium stasis decreased significantly in 14 patients. However, two patients who underwent esophagectomy had hospital mortality.

Conclusion: This study highlights the effectiveness of LHM and Dor fundoplication in reducing dysphagia, nocturnal coughing, regurgitation, and other obstructive symptoms in patients with advanced achalasia. However, the study also underscores the potential risks associated with esophagectomy, suggesting that surgical treatment for achalasia should be carefully considered on a case-by-case basis.

Keywords: Achalasia, Dysphagia, Heller myotomy, Fundoplication, Gastroesophageal reflux

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Introduction

Achalasia is an uncommon but quintessential esophageal motility disorder that occurs equally in men and women (1). Achalasia characterized by reduced relaxation of the lower esophageal sphincter (LES) and absence of esophageal peristalsis resulted in impaired bolus transit, demonstrated with symptoms including dysphagia, retrosternal pain, regurgitation, and weight loss (2).

The disease's pathogenesis is unclear and often misdiagnosed (3). Still, it is suggested to happen because of a virus-related inflammatory neurodegenerative process triggered by an autoimmune and chronic inflammatory process, especially in patients with genetic susceptibility (4). However, at the time of diagnosis, the number of decreased neurons led to significant dysfunction and symptoms. Therefore, the first step of diagnosis is performing endoscopy or radiology, but the gold standard diagnostic method for achalasia is high-resolution manometry (HRM) (5).

According to Chicago classification, achalasia is classified into three subtypes, type I (classic achalasia) refers to the one without any significant pressurization in esophageal, type II is achalasia with compression, which there is no peristalsis and contractile activity, and pan-esophageal pressurization >30 mmHg, and type III is spastic achalasia with rapidly propagated pressurization attributable to an abnormal lumen obliterating contraction (6).

As achalasia progresses, dilation of the esophagus worsens and can resemble a sigmoidal shape. In the end stage of achalasia, patients present dilation of the esophagus with a sigmoid shape (7). Unfortunately, there is no promising treatment for achalasia due to its unknown pathogenesis, and standard treatment options include pharmacological therapy (nitrates and calcium channel blockers), pneumatic dilation, endoscopic myotomy (2,3), Botulinum toxin (Botox) (8), surgical myotomy, and esophagectomy (2,3).

Surgical treatment of achalasia has evolved dramatically over the past 13 years. Since the first report of laparoscopic Heller myotomy by Cuschieri and thoracoscopic Heller myotomy by Pellegrini, minimally invasive surgery has become the gold standard for treating achalasia (9). More recently, the laparoscopic management of esophageal achalasia has achieved widespread acceptance and is now the first line of therapy for patients with achalasia. The satisfactory short-term results of this procedure are well documented in several large series.

Esophagectomy is more aggressive and associated with more significant morbidity/mortality than laparoscopic Heller myotomy (LHM) and Dor fundoplication (10). In this regard, we study the post-surgical side effects and clinical symptoms of patients in two groups who underwent LHD and Dor fundoplication in patients with achalasia.

Materials and Methods

This retrospective cross-sectional study was conducted on 86 patients with achalasia in Razi Hospital, Rasht, Iran, from October 2010 to September 2020. The achalasia was confirmed by clinical findings (endoscopy, radiology, and HRM results). In addition, all demographical data and clinical characteristics of patients were recorded from the patient's archive in the hospital.

The surgery approach was LHM (8 cm over the esophagus and 3 cm over the stomach) and Dor fundoplication (Figure 1). All remnant food was aspirated to prevent pulmonary aspiration after induction of general anesthesia with a tracheal tub. Before the surgery, 16 of the patients had undergone previous dilatations or Botox injections. Longitudinal and circular muscle of the esophagus was cut on the last 8 cm of the esophagus and extended three cm on the gastric wall musculature. Dor fundoplication was performed in all patients. In our study, the perforation and complete myotomy were checked after completion of cardiomyotomy with an ambo-bag, and via a tube in the esophagus air inflate. Postoperative assessments include clinical, radiologic, manometric, and endoscopic evaluation was performed.

A flap of the stomach for coverage was fixed to prevent diverticula formation in the motorized site. Pre and post-operative assessment included symptoms, esophageal emptying observation with barium esophagogram, HMR, and endoscopic evaluation in all patients. The barium esophagogram was obtained under fluoroscopic control.

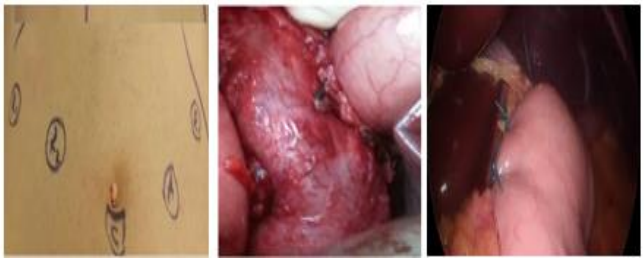

Figure 1. Laparoscopic Heller myotomy in patients with achalasia.

The surgical technique for laparoscopic Heller myotomy was after the pharyngoesophageal ligament that divided the fat pad excised and exposing the anterior gastroesophageal junction; the myotomy was performed by incising the distal 4 to 6 cm of esophageal musculature. Then, the myotomy was extended 2 to 3cm onto the gastric cardia using cautery scissors with an intraesophageally tube; when the EJ junction closed, the esophagus was inflated, mucosal perforations were detected, and the myotomy added a Dor anterior hemifundoplication. Routinely, a contrast swallow was performed on the second day of postoperative in all patients to rule out an occult leakage. For patients with no leak, a clear liquid diet was started on the second postoperative day, and all patients were discharged four days postoperatively. The results were reported in number and percentage.

Results

Among a total number of 86 patients (38 males, 48 females) with a median age of 46 years old, patients had advanced achalasia including lumen dilatation of esophagus between 6 to 12 cm, moderate to severe intra luminal stasis of barium, severe tortoise, recurrent pulmonary aspiration, and recurrent pulmonary infection; and underwent laparotomy for achalasia. These patients failed in pneumatic dilatation and Botox treatment. Dysphagia presented in all patients, and 20 patients experienced an average weight loss of 10 kg before surgery. Pre-surgical clinical characteristics of patients are demonstrated in Table 1.

Table 1. Pre-surgical clinical characteristics of patients with achalasia.

Variables Patients number: 20		Number
Dysphagia	Dysphagia to solid	8
	Dysphagia to liquid	12
Patients with weight lose		14
Regurgitation		20
Nocturnal cough		16
Sigmoid esophagus		8
Size of dilatation		6-10 cm
Pervious intervention	Botox injection	4
	Dilatation	12
Heller myotomy		18
Esophagectomy		2
Duration of hospitalization		8 (8-10) days

Two patients expired, one during operation and another one in five days after surgery due to pneumonia and reparatory failure. Two patients required reoperation for bleeding and gastric herniation. Six patients experienced minor postoperative morbidity, including atelectasis (3n), atrial tachyarrhythmia (4n), and wound infection (3n). The median follow-up days were 30 months (10–48 months).

According to our results, stasis was reported in all patients before the operation. The LES gradient decreased from 32 to 12 mmHg. Endoscopy and biopsy findings demonstrated grade I esophagitis in four patients. Radiological findings represented that barium stasis decreased from 92% to 22%. The post-surgery diameter of the esophagus lumen was 8 cm (8–12 cm), which fell to 6 cm (6-10 cm). Body weight increased after the myotomy [preoperative: 58 kg (38–83 kg), postoperative: 66 kg (48–86 kg)]. No diverticular formation was observed in the motorized zone. Short and long-term functions and symptom improvement in patients with achalasia are illustrated in Table 2.

Table 2. Short and long-term functions and symptom improvement in patients with achalasia.

Short and long-term functions and symptom		Number
Dysphagia improvement (16 n)	<10 month	6
	>48 month	10
Heartburn present	<10 month	8
	>48 month	6
Regurgitation	<10 month	14
	>48 month	4

Slow emptying improvement	<10 month	8
	>48 month	10
Esophagitis post operation	<10 month	4
	>48 month	2
Nocturnal cough improvement	<10 month	12
	>48 month	6

Discussion

Achalasia is a rare esophageal motility disorder for which there is no known etiology, making treatment options challenging. The main goal of treatment is to reduce LES pressure, improve dysphagia and regurgitation, enhance esophageal emptying, and prevent the development of megaesophagus. Surgical management of advanced achalasia is challenging, and esophagectomy is associated with a high incidence of postoperative respiratory complications such as pneumonia. Our results aillustrated that LHM is an effective treatment with a higher patient survival rate and fewer complications.

Previous studies have reported that higher LES resting pressure is associated with better relief of dysphagia after myotomy. The LHM–Dor procedure provides satisfactory long-term results with low morbidity (11,12). Esophagectomy was associated with a high incidence of postoperative respiratory complications, including pneumonia, while LHM is more effective with a higher patient survival rate (13,14). Arain et al. reported that higher LES resting pressure is associated with better relief of dysphagia after myotomy (15). A study demonstrated that extending myotomy three cm over the stomach reduces the postoperative pressure on the LES with no significant difference in reflux when added an anti-reflux procedure (16). Also, Liu et al. reported that esophageal myotomy for achalasia could reduce the resting pressures of the esophageal body and LES and improve esophageal transit and dysphagia (17).

Dor fundoplication added to myotomy reduces the risk of pathologic gastroesophageal reflux, and our study showed that it could be performed in all patients with a low incidence of reflux. Studies have reported favorable responses in more patients even after a long term of follow-up. LHM and Dor fundoplication balance emptying and reflux and could be the selected surgical treatment for patients with achalasia (12,18). In an investigation on a series of 73 patients treated with LHM, favorable responses were reported in more than half of the patients, even after over six years of follow-up (19). Siow et al. demonstrated in their study that LHM and anterior Dor fundoplication are both safe and effective as a definitive treatment for treating achalasia cardia with high patient satisfaction with minimum complications (20). A study by Finley et al. reported that 24 patients who underwent LHM without fundoplication had more significant improvement in esophageal clearance time (21).

Rice et al. represented that the addition of Dor fundoplication decreases the capability of LHM without impairing emptying and reduces reflux. LHM and Dor fundoplication balance emptying and reflux, which could be the selected surgical treatment for patients with achalasia (22). Kummerow et al. illustrated no statistical difference between patient-reported dysphagia or reflux scores in those who underwent an LHM with and without Dor fundoplication (23). In this present study, reflux was reported in nine patients with Do fundoplication. Also, end-stage achalasia treated by LHM with Dor fundoplication showed reduced LES gradient, decreased obstructive symptoms, and improved esophageal emptying.

Performing LHM is an effective treatment with good dysphagia relief and a low incidence of esophageal mucosal perforation (24). Abovementioned studies reported that LHM is an effective treatment with good dysphagia relief and a low incidence of esophageal mucosal perforation. While manometry is sometimes essential for good surgical outcomes, long-term follow-up on dysphagia relief and patient satisfaction is necessary to ensure the effectiveness of therapy. Overall, our study showed that LHM and Dor fundoplication are safe and effective treatments for advanced achalasia, providing significant improvement in obstructive symptoms, decreased LES gradient, and improved esophageal emptying.

Limitations

The limitation of this study was the limited access to the history of patients' underlying disease and incomplete data on individuals' diets and lifestyles.

Conclusions

LHM provided satisfactory symptom improvement in patients with advanced achalasia with promising outcomes. Also, further investigations are required to demonstrate the most effective methods in patients with severe achalasia.

Author contribution

MTA and **MA** wrote the main manuscript text and designed the study. **MSES** and **ASh.** cooperated in data collecting and analysis. All authors reviewed the manuscript.

Conflict of interest

The authors reported no potential conflict of interest.

Ethics approval

Relevant ethical guidelines and regulations were performed for all experiments. This study was done according to the Declaration of Helsinki ethical standards and consent and agreement was obtained from all the patients and was confirmed and approved in the surgery department.

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