

ORIGINAL ARTICLE

Improving Digestive and Nutritional Status of Patients with Achalasia after Laparoscopic Heller Myotomy Surgery

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ABSTRACT

Background: Nowadays laparoscopic Heller Myotomy (LHM) with partial fundoplication is recommended as the first line of therapy for esophageal achalasia. This study aimed to determine the early efficacy of LHM as the achalasia treatment.

Methods: A retrospective study was performed on patients diagnosed with achalasia from 2012 to 2019. Each patient underwent LHM with fundoplication. The clinical success of the surgery was defined as the Eckardt score < 3. Symptoms such as dysphagia, regurgitation, retrosternal pain, regurgitation, and weight loss have been measured pre- and post-operation.

Results: A total of 28 patients entered the study including 40% women (11) and 60% men (17). Ten patients underwent LHM following Toupet and 18 patients underwent Dor as a fundoplication. Participants were followed by the Eckardt symptom scoring system. Totally, 89.2% of patients demonstrated improvement after LHM.

Conclusion: LHM with fundoplication was shown to be an effective surgical method to improve achalasia symptoms regardless of the type of fundoplication as about 90% of the patients who underwent LHM illustrated fewer symptoms.

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Introduction

Achalasia is an uncommon motility disorder of the esophagus (1, 2). This rare disease with a prevalence that annually reaches up to 1 per 10,000 individuals is due to esophageal outflow obstruction (3, 4). The obstruction is caused by impaired relaxation of the lower esophageal sphincter (LES) and also the absence of peristaltic movements (5). Dysfunctional LES leads to dysphagia, especially of solid

nourishment which is a hallmark symptom of this incurable disease (6). As this condition is incurable, most treatments available are concentrated on the relaxation of LES by pharmacological therapies and interventions to reduce the patient's symptoms such as dysphagia, heartburn, and regurgitation. Pharmaceutical treatments such as beta-adrenergic agonists, nitrates, theophylline, anticholinergics, and calcium channel blockers are mostly for

selected patients who cannot undergo surgery (7, 8). Surgical interventions such as Laparoscopic Heller Myotomy (LHM), Pneumatic Dilation (PD), Per Oral Endoscopic Myotomy (POEM), and Botulinum toxin injection (BoT) are current surgical treatments available for achalasia (9, 10). The choice of selecting each surgical option is based on the patient's condition and desire (11).

LHM is one of the best available surgical treatments for achalasia and more than 80% of patients are likely to become symptom-free with this treatment (12). However, gastroesophageal reflux disease (GERD) is a complication of LHM that almost always occurs (13-15). To prevent GERD as a complication, fundoplication is usually added to LHM. There are two options for fundoplication, the first is the anterior parietal option (Dor, 180) and the second is the posterior one (Toupet, 270) (12). A comparison between the outcomes of these two surgical options is not yet specified and the best approach has not been determined. So the purpose of this study was to determine the early efficacy of LHM as a treatment for achalasia in a referral center in Shiraz, Iran.

Materials and Methods

This retrospective cohort study was conducted on a total of 28 patients with achalasia who had undergone LHM over five years from 2012 to 2019 in Mother and Child Hospital affiliated to Shiraz University of Medical Sciences, Shiraz, Iran. Inclusion criteria were decided based on the diagnosis made by manometry, endoscopy, and barium swallow. Patients with a history of surgeries other than LHM as the treatment of achalasia were excluded from the study. Shiraz University of Medical Science's institutional review board approved this study protocol (ethical code: IR.SUMS.MED.REC.1401.106). To implement the protocol, the Helsinki Declaration as amended in Seoul 2008 was used. Patients who met the inclusion criteria signed informed consent to participate in the study.

LHM was performed in a supine split-leg position and insufflation was done by Veress needle. The first port was inserted in the supra umbilical area followed by the insertion of four other ports (two right subcostal ports, one left subcostal port, and one subxiphoid port). The esophagus was released from the pharyngoesophageal ligament. Blunt dissection

of the muscles from the esophageal mucosa was done under the guidance of the Boogie dilator. Myotomy was performed for about 5-8 cm (at least 2 cm below gastroesophageal junction) and then a Dor or Toupet 180-degree fundoplication was applied. A liquid diet was started on the first post-operation day for clinically stable patients. Operative and postoperative findings such as esophageal perforations, post-op fever, and vital signs were recorded for each patient. All patients were on a liquid diet for three weeks post-surgery. The patients' data were gathered by telephone interview to complete a checklist 6-72 months after the procedure.

Presenting signs and symptoms were scored for dysphagia, retrosternal pain, regurgitation, and recent weight loss based on the Eckardt Symptom Score (Table 1). Scores ≥ 4 were indicated as treatment failure and scores ≤ 3 were indicated as the success of the treatment. For signs/symptoms, the scoring system was defined as 0=none, 1=occasionally, 2=daily, and 3=each meal, and for recent (past 6 months) weight loss; 0=none, 1=less than 5 Kg, 2=5-10 Kg, and 3=more than 10 Kg (16). Moreover, patients' satisfaction based on their self-expression was asked and filled in the checklist. Data analysis was carried out by SPSS software (version 16, SPSS Inc., Chicago, IL, United States). Quantitative data were presented as mean $\pm$ standard deviation, and qualitative data were presented as frequency. McNemar's test was used to compare pre- and post-operative reflux and the Willcoxon test was utilized to assess the Eckardt scoring system variables before and after the operation. The level of significance was considered as $\alpha=0.05$ in all tests.

Results

A total of 28 achalasia patients who underwent LHM including 11 women (40%) and 17 men (60%) were considered in the study with a mean age of 37.14 ± 12.06 years. The most prevalent presented symptoms were dysphagia ($n=23$, 82.10%), pain ($n=2$, 7.1%), regurgitation ($n=2$, 7.1%), and weight loss ($n=1$, 3.5%). Participants were all evaluated for operative factors, postoperative outcomes, and correlation of other clinical factors with outcomes (Table 2). Fourteen patients (50%) reported reflux manifestations before the procedure, and five of them became symptom-free post-surgically.

Table 1: Eckardt scoring system (16).

Score	Weight loss	Dysphagia	Retrosternal pain	Regurgitation
0	None	None	None	None
1	Less than 5 kg	Occasionally	Occasionally	Occasionally
2	5-10 kg	Daily	Daily	Daily
3	More than 10 kg	Each meal	Each meal	Each meal

Table 2: Characteristics of the participants.

Variable	(n=28)
Age (year)	37.14±12.06
Gender, n (%)	
Male	17 (60.7%)
Female	11 (39.2%)
Balloon, n (%)	12 (44.4%)
Most common manifestation	
Dysphagia, n (%)	23 (82.1%)
Retrosternal pain, n (%)	2 (7.1%)
Regurgitation, n (%)	2 (7.1%)
Wight loss, n (%)	1 (3.5%)

Twelve patients (42.9%) reported a history of balloon dilatation with a mean interval of 48 months (ranging from 2 to 96 months) between the last dilatation and surgery; while five of them underwent a couple of dilatation procedures. One participant was given a botulinum toxin injection and the other patient was a known treated case of Hochkin disease as one and five years before the surgery, respectively.

Results driven from the Eckardt Symptom Scoring system showed that 25 (89.2%) patients had improvement in overall symptoms (Eckardt score≤3) and 3 (10.7%) patients remained unchanged (Eckardt score>4) who were categorized as cases of treatment failure. Dysphagia which was reported in 28 patients pre-operatively subsided completely in five patients and relatively in 20 patients after going through the operation. However, the remaining three patients reported no difference in their post-meal and daily dysphagia symptoms between the pre- and post-operative phases. Taking all those observations together, there was a statistically significant ($p=0.001$) improvement in dysphagia symptoms in 89.2% of

the cases. Retrosternal pain was another complaint recorded in 12 patients before the operation with eight reports in post-operative complete recovery and only three reports in occasional retrosternal pain following the surgery ($p<0.003$). Regurgitation was reported in 20 patients among them, 14 experienced a complete recovery and five relative recoveries at least 6 months following the operation ($p=0.001$).

Twenty two patients out of the total 28 cases presented a weight loss history of varying degrees before the operation ranging from less than 5 kg in 6 patients, 5 to 10 kg in four patients, and more than 10 kg in 12 patients. In the postoperative period, no weight loss was recorded in the majority of 24 patients (out of 28 cases); while only a minority of 4 patients reported weight loss of 5-10 or less than 5 kg ($p<0.001$) (Table 3). Overall, based on patients' self-expression, almost all (92.8%) patients expressed satisfaction following the surgery, except for two cases whose were dissatisfied with the surgical results (7.1%) due to a relapse of pre-operative symptoms. It was shown that patients underwent two different methods for fundoplication including 10 in Toupet fundoplication and 18 in Dor fundoplication.

Discussion

The pharmacological treatment of dysphagia, retrosternal pain, regurgitation, and reflux has been described before (17, 18). In this study, it was demonstrated that LHM accompanying fundoplication is an effective surgical procedure. LHM was shown to significantly reduce symptoms such as weight loss, dysphagia, retrosternal pain, regurgitation, and reflux and most patients had complete recovery after the surgery regardless of the

Table 3: Participants' clinical symptoms before and after the operations.

Variable		Preoperative (n=28)	Postoperative (n=28)	P value
Weight loss, n (%)	None	6 (21.4%)	24 (85.7%)	<0.001
	<5 kg	6 (21.4%)	2 (7.1%)	
	5-10 kg	4 (14.3%)	2 (7.1%)	
	>10 kg	12 (42.9%)	0	
Dysphagia, n (%)	None	0	5 (17.8%)	<0.001
	Occasionally	0	20 (71.4%)	
	Daily	3 (10.7%)	1 (3.5%)	
	Each meal	25 (89.3%)	2 (7.1%)	
Retrosternal pain, n (%)	None	16 (57.1%)	25 (89.2%)	<0.003
	Occasionally	9 (32.10%)	3 (10.7%)	
	Daily	2 (7.1%)	0	
	Each meal	1 (3.6%)	0	
Regurgitation, n (%)	None	8 (28.6%)	23 (82.1%)	<0.001
	Occasionally	9 (32.1%)	5 (17.8%)	
	Daily	4 (14.3%)	0	
	Each meal	7 (25.0%)	0	
Reflux symptoms, n (%)		14 (50%)	9 (32.1%)	<0.03

type of fundoplication. One of the best treatments for achalasia is considered to be LHM with fundoplication as a result of its advantages such as low re-intervention rates, sufficient reproducibility, and excellent clinical results (1, 12). Campos *et al.* reported that GERD incidence in patients with LHM alone was 31.5% in comparison to 8.8% in patients with complete fundoplication (Nissen, 360 degrees) (19).

Fundoplication is an anti-reflux therapy recommended with LHM for the prevention of GERD. (19). Recent studies revealed that 81.7% of LHM with fundoplication had clinical success during a 24-month follow-up (20). In our findings, 89.2% of patients showed improvement for symptoms after LHM with fundoplication and the Eckardt symptom scoring system, and only 10.7% of patients were considered as a case of treatment failure. This higher outcome in our results is most likely due to the lower number of participants in our study. Both partial fundoplications (Dor and Toupet) and complete fundoplication (Nissen) were effective in postoperative GERD (21). The results of an RCT performed by Håkanson *et al.* suggested that although partial and total fundoplication could be recommended for the treatment of GERD, partial fundoplication might be superior due to causing less dysphagia (22). The choice between partial or complete fundoplication is yet a debate for future studies. In this study, 50% of the cases had reflux before the operation but, it reduced to 32% post-treatment.

Siddaiah-Subramanya *et al.* reported that both partial Dor and Toupet fundoplication were equally effective in decreasing the rate of postsurgical dysphagia, postoperative reflux, treatment failure and postoperative complication rates (23). An RCT suggested that an upper percentile of the patients who underwent Dor fundoplication had abnormal 24-h pH test results in comparison to those who underwent Toupet fundoplication. Nevertheless, LHM with any fundoplication resulted in improvement in patient symptoms such as regurgitation and dysphagia (24). Existing interventions for the treatment of achalasia were reported as LHM, PD, POEM, and BoT injection (11). The comparison between the different approaches in achalasia, LHM and POEM showed similar outcomes and both methods had a higher efficacy when compared to PD (1, 12). POEM and LHM with partial duplication can be considered the first line of treatment for achalasia (19). In a systematic review by Schlottmann *et al.*, short-term results demonstrated that POEM was more efficient in relieving dysphagia than LHM, however, it was correlated with a higher incidence of pathologic

reflux (25). Another meta-analysis by Mundre *et al.* found no differences between POEM and LHM in outcomes of achalasia symptoms and the choice of the best surgical approach was based on suitability for intervention, depending on local expertise, and patient choice (26).

The efficacy of botulinum toxin injections for achalasia treatment was reported to be 40.6% when compared to 68.2% in PD (19). In a meta-analysis by Drick *et al.*, the injection of BoT at the esophagogastric junction (EGJ) as a therapeutic choice was considered, but its downfall was the need for recurrent injections due to the relapse of symptoms in 40% of patients in the first year after injection (27). In general, it was shown that no definitive best surgical choice between POEM and LHM and the controversy is still in need of further investigation.

Conclusion

Our study showed that around 90% of patients demonstrated fewer symptoms such as retrosternal pain, regurgitation, and weight loss after LHM regardless of the type of fundoplication. As a result, LHM with fundoplication can be considered an effective surgical procedure as the first choice for the treatment of achalasia due to its early efficacy in patients' symptom relief.

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Authors' Contribution

NM and MA designed the study and its protocol. FA and BR gathered the data. AKe and AKa provided the draft. All authors approved the manuscript.

Conflict of Interest

No conflict of interest to declare.

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