Laparoscopic Heller's Myotomy for Achalasia Cardia: One-Time Treatment in Developing Countries?

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Abstract Laparoscopic Heller's myotomy (LHM) and endoscopic balloon dilation are two main treatment modalities for achalasia cardia. The best treatment modality in Indian setting, however, is still unknown. Here, we present the early results of LHM in achalasia. Hospital data from January 2009 to October 2013 was analyzed. Preoperative assessment included Eckardt's scoring, esophagogastroduodenoscopy, barium swallow examination, and esophageal manometry. Thirty-five patients (19 males and 16 females, median age 31 years, range 12–65) underwent LHM with partial fundoplication (with intraoperative endoscopy). All patients had dysphagia (median duration 48 months, range 1–240), and eight (22.8 %) had chest pain. Four (11 %) patients had recurrent achalasia. Most of the patients (80 %) came from rural areas, and 68.5 % were ≤40 years of age. Fundoplication was added in all except four patients (megaesophagus in one, left lobe hepatomegaly in one, and postsurgical recurrent achalasia in two). The median operative time was 180 min (range 120–300). Intraoperative complications included esophageal mucosal injury ($n=2$) and pleural breach ($n=3$) with one conversion. The median postoperative stay was 7 days (range 4–27) with a morbidity of 5.7 % (leak in one and subphrenic collection in one patient) and a mortality of 1 % (due to myocardial infarction). After a median follow-up of 9.5 months (range 1–47 months),

four (11.4 %) patients had recurrent dysphagia and three (8.5 %) had gastroesophageal reflux. Most of the patients (six of eight) had relief in chest pain. To conclude, predominance of rural, young, and male patients in this study suggests that LHM might be the first-line treatment for achalasia in developing countries like India where predominant population is still rural that prefers one-time treatment, though it needs to be compared with a newly described procedure per oral endoscopic myotomy (POEM).

Keywords Motility disorder · Dysphagia · Esophagus · Myotomy

Introduction

Achalasia cardia is a rare primary motility disorder of the esophagus. It is a chronic, benign, but incurable disorder, and treatment, surgical or medical, is palliative and aims at decreasing the lower esophageal sphincter (LES) pressure.

Endoscopic pneumatic dilation (PD) and laparoscopic Heller's myotomy (LHM) are two main modalities to treat achalasia. Which modality is superior, however, is debatable [1] as both the modalities have been shown to be equally effective in randomized controlled trials [2]. A tailored approach has been suggested based on many factors like age, sex, patient preference, and availability of the expertise. Most of the data pertaining to the treatment of achalasia has been reported from developed countries, while little is known about the most appropriate treatment modality for patients in developing countries like India. This is important as still most of the population in India is rural with limited access to medical care, and multiple visits to health-care facility might not be feasible; thus, these patients usually prefer one-time treatment.

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Hereby, we report our initial experience of LHM as the first-line treatment modality for achalasia cardia with special emphasis on its suitability in the Indian context.

Materials and Methods

Patients

Retrospective analysis of prospectively collected data of patients with achalasia cardia who underwent LHM between January 2009 and December 2013 was performed. Data was reviewed for demographics, perioperative outcomes, and symptomatic outcomes. Demographic data was also analyzed for residential pattern (rural vs urban) of patients. Diagnosis of achalasia was based on clinical symptoms, barium swallow studies, and esophagogastroduodenoscopy (EGD). Esophageal manometry was included in the workup lately.

Symptom evaluation was performed pre- and postoperatively using Eckardt's scoring system [3]. Eckardt's score was calculated based on dysphagia, regurgitation, weight loss, and chest pain [3]. Dysphagia was graded as follows: grade 1, normal swallowing; grade 2, the patient requires liquids with meals; grade 3, dysphagia to solids, the patient can swallow semisolids; grade 4, dysphagia to semisolids, the patient can swallow liquids; grade 5, dysphagia to liquids but can swallow saliva; and grade 6, absolute dysphagia [4].

Barium swallow findings suggestive of achalasia were dilated esophagus with smooth "bird's beak" tapering of its lower end and holdup of the contrast. Megaesophagus was defined as a maximum diameter >6 cm. EGD was performed primarily to exclude the mechanical cause of dysphagia. High-resolution manometry was performed lately, and achalasia was classified according to the Chicago classification [5].

Surgical Management

All patients underwent LHM using standard a five-port method in lithotomy (French) position. Salient features of LHM were complete mobilization of the gastroesophageal junction and lower end of the esophagus safeguarding the pleura, routine division of short gastric vessels, routine use of intraoperative endoscopy to assess the completeness of the myotomy and to detect any mucosal injury, and posterior partial 270° Toupet fundoplication/anterior Thal-Dor fundoplication. Myotomy was performed for ~6 cm on the esophagus and ~2 cm on the gastric wall. Postoperative gastrografen swallow was performed on the second postoperative day or as early as possible thereafter to rule out any leak or obstruction. Patients with a satisfactory gastrografen study are started on liquid diet followed by soft diet for 2–3 weeks and then resumption of normal diet.

Follow-up

Postoperative follow-up was performed at 1 month, 3–6 months, and every year thereafter or as necessary and when required. Telephonic evaluation was performed for patients who did not come in outpatient clinic for follow-up. At follow-up, symptom evaluation was performed for persistence/recurrence of dysphagia, chest pain, and regurgitation and for gastroesophageal reflux and with Eckardt's score. Score >3 was considered as treatment failure [3]. Further evaluation with EGD and barium swallow was performed if required.

Statistical Analysis

Statistical analysis was performed using SPSS version 12. Continuous data was presented as mean $\pm$ SD, and median (range), and categorical data was presented as proportion. Data was analyzed using Student's *t* test. A two-tailed *p* value <0.05 was considered statistically significant.

Results

Patient Characteristics

A total of 35 patients (19 males, median age 31 years, range 12–65) underwent LHM (Table 1). All patients had dysphagia at presentation. Two patients had anemia requiring preoperative blood transfusion. Megaesophagus was present in two patients. Four patients had recurrent achalasia after previous

Table 1 Patient demographics

Total no. of patients (<i>n</i>)	35
Age (years, median (range))	31 (12–65)
M/F	19:16
Residential pattern (<i>n</i> (%))	Rural, 28 (80) Urban, 7 (20)
Symptoms (<i>n</i> (%))	
1. Dysphagia	35 (100)
• Duration (months, median (range))	48 (1–240)
• Grade (median (range) [4])	4 (2–4)
2. Chest pain	8 (22.8)
3. Regurgitation	14 (40)
4. Chronic constipation	1 (2.8)
5. Upper respiratory tract infection	1 (2.8)
Megaesophagus	2
Prior treatment (<i>n</i> (%))	4 (11.4)
Pneumatic dilatation	2
Transthoracic myotomy	2
Eckardt score (mean, range)	3.37 $\pm$ 1.41
LES pressure (mmHg, mean, range) (<i>n</i> = 11)	37.6 $\pm$ 17.4

transthoracic myotomy ($n=2$, myotomy performed 3 and 5 years back) and endoscopic balloon dilatation ($n=2$, twice in the last 2 years).

Two patients had associated symptomatic cholelithiasis and were managed by laparoscopic cholecystectomy at the time of LHM using the same ports. One patient underwent transabdominal properitoneal mesh hernioplasty of the right indirect inguinal hernia at the time of LHM with an additional 5-mm port.

Two patients had chronic constipation, and one of them developed barolith after a barium swallow study. He presented with lump in the abdomen with impacted barium in the sigmoid colon. Associated colonic hypomotility (aganglionosis) was suspected; however, rectal biopsy and anorectal manometry were found to be normal. He was managed symptomatically with laxatives and enemas.

Most of the patients (80 %) came from rural areas for treatment (Table 2). However, no difference in the duration of dysphagia and its severity and in Eckardt's score was found between patients from rural or urban areas.

Perioperative Outcomes

All patients had LHM with one conversion (Table 3, operative details). Intraoperative complications (11.4 %) included esophageal mucosal injury in three patients (two were managed with laparoscopic repair with 3-0 Vicryl with anterior fundoplication and one with open repair due to extensive tear) and left pleural breach in three patients. Fundoplication was added in all except four patients (megaesophagus in one, recurrence after prior surgery in two, large left lobe liver in one). Postoperative morbidity (5.7 %) included esophageal leak ($n=1$, managed conservatively) and left subphrenic abscess ($n=1$, managed with percutaneous drainage). There was one postoperative mortality on day 2 due to massive myocardial infarction.

Follow-up

After a median follow-up of 9.5 months, most of the patients (88.6 %) were dysphagia free while three (8.5 %) developed symptomatic gastroesophageal reflux (Table 4). A significant

Table 3 Perioperative outcomes ($n=35$)

Operative time (min, median, range)	180 (120–300)
Conversion rate (n (%))	1 (2.8)
Fundoplication ^a (n (%))	31 (88.5)
Posterior	29 (93.5)
Anterior	2 (6.5)
Intraoperative complications (n (%))	4 (11.4)
Mucosal injury (esophageal)	2 (5.7)
Pleural breach	3 (8.5)
Postoperative complications (n (%))	2 (5.7)
Leak	1
Subphrenic collection	1
Postoperative hospital stay (days, median, range)	7 (4–27)
Mortality (n (%))	1 (2.8) ^b
Associated surgeries (n (%))	3 (8.5)
Laparoscopic cholecystectomy	2
Laparoscopic right inguinal hernioplasty (TAPP)	1

^a Fundoplication was not done in four patients due to prior surgical myotomy (one), megaesophagus (two), and technical difficulty due to large left lobe liver (one)

^b Myocardial infarction

decrease in Eckardt's score was observed (mean 3.37 vs 1.36, $p=0.002$) after LHM. Median postoperative Eckardt's score was 1 (range 0–5) with one patient having a score of 5 indicating treatment failure. Barium swallow and EGD were found to be normal in this patient.

Discussion

Treatment of achalasia cardia mainly aims at relieving functional obstruction at the gastroesophageal junction. Two main treatment modalities, endoscopic graded pneumatic dilatation (PD) and surgical myotomy (LHM), act by disrupting muscle fibers from inside the lumen or dividing them from outside the lumen. Which modality is superior in terms of relieving dysphagia and having sustained response has been a matter of debate [1, 6]. A recent multicenter European randomized controlled trial has shown an equivalent success rate of PD and LHM at 1 year (90 vs 93 %) and at 2 years (86 vs 90 %).

Table 2 Patient demographics with respect to residential pattern ($n=35$)

	Urban	Rural	<i>p</i> value
<i>N</i> (%)	7 (20)	28 (80)	
Age	41.6 ± 23.7	33 ± 14.2	0.42
Sex (M/F)	3/4	16/12	1.00
Duration of dysphagia (months, mean ± SD)	72 ± 84.8	66.11 ± 55.43	0.87
Grade of dysphagia (mean ± SD)	3.5 ± 0.83	3.44 ± 0.80	0.88
Eckardt score (mean ± SD)	2.83 ± 0.98	3.62 ± 1.62	0.14
Chest pain (n (%))	1 (14.2)	7 (25)	1.00

Table 4 Follow-up results ($n = 16$)

Follow-up (months, median, range)	9.5 (1–47)
Late complications	
Recurrent dysphagia (n (%))	4 (11.4)
Gastroesophageal reflux (n (%))	3 (8.5)
Relief in chest pain (n (%))	6/8 (75)
Eckardt score (mean $\pm$ SD)	1.36 $\pm$ 1.68
Pre-op vs post-op	3.37 vs 1.36 ($p = 0.002$)

However, follow-up is short and there are several limitations related to surgical treatment [6].

A recent meta-analysis based on three randomized controlled trials including the one alluded to before, however, favors LHM as a primary treatment for achalasia cardia [7]. At 1 year, the overall response rate was significantly higher after LHM than PD (86 vs 76 %), and the reintervention rate for major mucosal injury was significantly less after LHM than PD (0.6 vs 4.8 %) with no difference in gastroesophageal reflux rates. Results of this meta-analysis need to be interpreted cautiously due to small numbers of trials included with reporting of short-term results only.

Amidst the ongoing controversy, it is important to remember the inherent limitations of each therapy, especially PD, and other factors that may help in choosing appropriate modality for a particular patient. This understanding is important as the latest American College of Gastroenterology (ACG) guideline suggests a tailored approach with the choice of initial therapy based on age, sex, preference, and local institutional experience [8].

Young patients (<40 years of age) and male sex are consistently found to be negative predictors of PD [2, 3, 9]. Similarly, type I achalasia (based on high-resolution manometry) has shown to be less response to PD than LHM [10]. Prior endoscopic treatment, severe dysphagia at presentation, low initial LES pressure, and type III achalasia are found to be negative predictors after LHM [3, 7]. In the current series, most of the patients were male (54 %) and young (≤ 40 years, 68.5 %). Similarly, all the patients with type I achalasia were more suitable for LHM than PD.

In addition, PD requires multiple sessions to be successful. In European RCT, all patients underwent at least two dilations [2]. In a study, in Indian setting, 29 % of the patients required greater than or equal to one session, while 14 % required greater than or equal to two sessions for therapy to be successful [11]. This requires repeated hospital visits. This has an implication in developing countries, like India, where still majority of population (68.8 %, 2011 census) lives in rural areas far from a tertiary health-care facility making repeated visits difficult if not impossible. Minor symptomatic improvement by single dilatation poses the risk of not seeking advice for long

before they develop more advanced disease. In addition, with each session, the patient is exposed to the same risk of PD-related complication, e.g., perforation. LHM, on the other hand, is a single-time treatment. In the current study, 80 % of the patients were from rural areas making LHM more suitable for them.

It is important to remember that previous PD may increase operative difficulty [12]. It may be argued that patients from rural areas may present late for their symptoms and with more severe disease, but this was not found in our analysis where patients from rural areas presented with dysphagia of similar severity for the same duration compared to patients from urban areas. Patients from rural areas had higher Eckardt's score than those from urban patients though it was not significant (3.62 vs 2.83, $p = 0.14$).

In this series, intraoperative esophageal mucosal injury rate (5.7 %) was similar to that reported in the literature (0–33 %) [12]. Postoperative stay (median 7 days) is longer as we discharge these patients only after oral gastrografin swallow that may take some time due to dependency on radiodiagnosis department. Short-term results show a success rate of 88 % at a median of 9.5 months with the development of gastroesophageal reflux in 8.5 %, similar to that described in the literature (~ 8 %) [12].

Most of the evidence for the management of achalasia has come from western countries, and relatively few data is from developing countries [11, 13–18]. Which modality suits patients in developing countries where majority of the population lives in rural with poor access to health care? Whether PD that requires multiple sessions with higher failure rates in young and male patients or LHM with inherent surgical morbidity should be the first-line treatment, is not clear.

Predominance of young and male patients, the majority of those who belong to rural areas with surgical outcome similar to others may suggest LHM as the first-line treatment in Indian setting, a developing country.

There are, however, few limitations of this study. The sample size is small, cost analysis of the treatment and financial loss of the patient due to loss of working days has not been performed, follow-up is short (median 9.5 months), and only 16/35 (45 %) patients were available for follow-up. Later point, rather, favors LHM as patients from far-off areas are more prone to lost to follow-up, a problem common in India. In addition, direct head-to-head comparison between PD and LHM has not been done, and in four patients, LHM was performed as the second-line treatment after failure of previous intervention.

To conclude, predominance of rural patients, young (<40 years) and male patients in this study suggest that LHM might be the first-line and one-time treatment for achalasia in developing countries like India where predominant population is rural that prefer one-time treatment. However, LHM needs to be compared with the

recently described POEM longitudinally and in a randomized manner before the final conclusions can be reached as far as an Indian scenario is concerned.

Compliance with Ethical Standards

Conflict of Interest All authors declare that they have no conflict of interest.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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