Results of laparoscopic Heller - Toupet surgery for achalasia

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Abstract

Background: Currently Heller - Toupet procedure is the main method for achalasia. The aim of this study was to evaluate surgical outcomes of laparoscopic Heller - Toupet surgery for achalasia.

Materials and methodology: This is a retrospective case series conducted at Gastrointestinal Department - Viet Duc Hospital University and Department of General Surgery - Hanoi Medical University Hospital between January 2015 and August 2020, including 71 patients with achalasia who underwent laparoscopic Heller - Toupet surgery. The research contents included clinical and paraclinical features, surgical techniques, perioperative and postoperative complications, and long-term outcomes.

Results: In total, 71 patients with achalasia were underwent laparoscopic Heller - Toupet surgery, male and female rate accounted for 52.1% and 47,9%, respectively. The average age of the cohort was 44,9±13,9. The incidence of symptomatic dysphagia was 100%. Esophageal dilatation grades I, II, III, IV are 7.0%, 76.1%, 15.5% and 1.4%, respectively. The severity of the disease: Stage 0, I, II, III are 2.8%, 57.7%, 33.8% and 5.6%, respectively. The mean of myotomy length was 5.7 ± 1.6 cm. The operative duration was 124.3 ± 27.4 minutes. There was no conversion, as well as intra- and post-operative morbidity. Long-term outcomes: Good (no or very mild dysphagia) was 89.9%, moderate (moderate dysphagia) was 10.1% and clinical incidence of reflux syndrome was 16.7%. There was no case requiring intervention or re-operation.

Conclusions: Laparoscopic Heller - Toupet procedure is safe, low rates of morbidity, and provides good long-term outcomes for achalasia.

Introduction

Achalasia is a rare motility disorder of the esophagus with mean incidences of 0.4- 0.6 per 100.000 people. Achalasia occurs with equal frequency in men and women at all ages. Since its first description in 1674 by Thomas Willis, although its cause remains largely unknown, an inflammation has been proposed to underlie the loss of esophageal intrinsic neurons.

Recently, there are four treatment strategies of achalasia, including pharmacological compounds such as calci-channel blockers (CCBs), botulinum toxin

injection, per-oral endoscopic myotomy (POEM), and lower esophageal myotomy (Heller's surgery).

Heller myotomy procedure/surgery was first introduced by Ernst Heller in 1913s, has been widely used and still the standard treatment nowadays, ever since. In the last decades, the advent of minimally invasive surgery has profoundly changed the approach to Heller myotomy. Cushieri and Shimi initially described a laparoscopic approach for myotomy in 1991. Laparoscopic Heller myotomy for achalasia is safe, less pain, faster recovery time, and mini invasion, which is why it is widely applied for achalasia. [1,2,3,4].

An issue that is still being discussed is whether an anti-reflux valve is needed in Heller surgery and what is the most effective method of valve creation? The majority of authors advocate the creation of anti-reflux valves. The 270 degree valve according to the Toupet and the 180 degree according to the Dor are commonly used because of their anti-reflux effects and less post-operative esophageal stricture.

Since 2014s, we have performed laparoscopic Heller myotomy procedure at Gastrointestinal Surgery Department- Viet Duc Hospital University and had a report to evaluate short-term outcomes of this procedure [5]. Since 2015s, we have continued to implement this procedure at Department General Surgery- Hanoi Medical University Hospital. During the period of 5 years from January 2015 to August 2020, we have performed 71 cases of laparoscopic Heller-Toupet surgery.

Therefore, the aim of this study was to evaluate surgical outcomes of laparoscopic Heller- Toupet surgery for achalasia.

Patients and methods

This is a retrospective case series implemented at Gastrointestinal Surgery Department- Viet Duc Hospital University and Department of General Surgery- Hanoi Medical University Hospital between January 2015 and August 2020. All patients diagnosed achalasia based on clinical findings and confirmed by radiographic, endoscopic and manometric evaluations underwent Laparoscopic Heller myotomy and Toupet fundoplication. Preoperative features included ages, sexes, clinical and paraclinical findings, Eckardt Symtom Scores (ESS) and preoperative severity were well noted.

All patients had a standard five-port laparoscopic approach, beginning with dissection of the left crus wide enough for esophageal myotomy. A long esophageal myotomy was performed on the anterior wall of the esophagus with division of all longitudinal and circular muscle fibers, extending 4-5 cm cephalic from the gastro-esophageal junction and 2 - 3 centimeters caudal on to the gastric wall. We gently inflated air through nasogastric tube to assess for completeness of myotomy and check for air leak. The crural closure was approximated to prevent a postoperative hiatal hernia by 1- 2 interrupted sutures using vicryl 2-0. The two short gastric vessels were divided routinely by a harmonic scalpel, following by creation of 270 degree fundus posterior to the esophagus (Toupet fundoplication). We sutured the gastric flaps to the both edges of the esophageal myotomy by vicryl 3-0. Finally, the fundoplication was secured to the right crural with separated sutures by vicryl 2-0.



Figure 1. Lower esophageal sphincterotomy

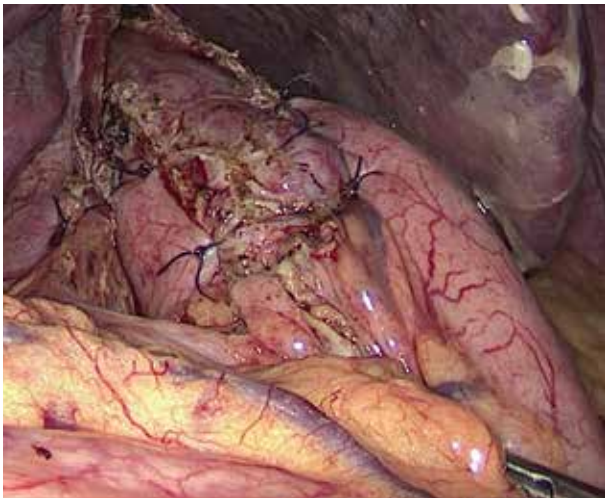


Figure 2. Heller - Toupet procedure

Intra - and post-operative complications, conversion and short-term outcomes were evaluated. Follow-up was completed by examination to access the long-term outcomes.

All calculations were performed using commercial statistics software (SPSS 20.0). Quantitative data are presented as mean and standard deviation (SD), and qualitative data are described as frequencies and percentages.

Results

In total, 71 patients with achalasia were underwent laparoscopic Heller- Toupet procedure in Viet Duc Hospital University and Hanoi Medical University Hospital, male and female rate accounted for 52.1% and 47,9%, respectively. The average age of the cohort was 44,9±13,9 (range 21- 71 years old). Clinically, 100% patient had symptomatic dysphagia for solids or liquids.

On radiological examination findings, esophageal dilatation grades I, II, III, IV was 7.0%, 76.1%, 15.5% and 1.4%, respectively. Ten patients underwent High-Resolution Mamometry (HRM), diagnosis of achalasia was based on The Chicago classifications type I, II, III was 3, 5 and 2 patients, respectively.

ESS was used to evaluate the clinical severity of achalasia. Presenting features are detailed in Table 1.

Table 1. Pre-operative ESS

	N	%	Frequency	n	%
Dysphagia	71	100	None	0	0
			Occasionally	3	4.2
			Daily	3	4.2
			Each meal	65	91.5
Regurgitation	17	23,9	None	54	76.1
			Occasionally	5	7.0
			Daily	5	7.0
			Each meal	7	9.9
Chest pain	6	8,5	None	65	91.5
			Occasionally	3	4.2
			Daily	3	4.2
			Each meal	0	0
Weight loss	16	22,5	None	55	77.5
			< 5 kg	2	2.8
			5-10 kg	3	4.2
			>10 kg	11	15.5

Clinical severities are described in Table 2

Table 2. Pre-operative clinical severity grading

	n	%
Grade 0 (ESS 0-1đ)	2	2.8
Grade 1 (ESS 2-3đ)	41	57.7
Grade 2 (ESS 4-6đ)	24	33.8
Grade 3 (ESS >6đ)	4	5.6
Total	71	100.0

* A majority of the patients has severity Grade 1 or Grade 2.

Peri-operative outcomes

There were no intraoperative complications such as mucosal perforation, and no conversion. The mean myotomy length was 5.7 ± 1.6 cm, extending 5,8±1,6 cm cephalic from the gastro-esophageal junction and 2,5±0,6 cm caudal on to the gastric wall. The operative duration was 124.3 ± 27.4 min.

There was no post-operative morbidities. Acute hepatitis was noted in one case, and the patient was discharged from hospital after 10 days with medical treatment. The mean hospital stay was 5.3 ± 5.4 day.

Long-term outcomes

Follow-up was complete in 100% of patients, at a mean of 26.6 ± 19.2 months postoperatively (range 1–66 months). Repeated assessment of functional status over the postoperative follow-up demonstrated a significant improvement as shown by the increased number of patients with excellent and satisfactory results assessed on overall clinical score. Among 71 patients underwent a complete post-operative workup, functional improvement demonstrated by the decreasing median clinical dysphagia score (89.9% had no or very mild dysphagia for solids) and revealing good emptying in the barium swallow x-rays. Only 10.1% patients had moderate dysphagia and delayed emptying in the water-soluble contrast swallow x-rays. Weight gain, unchanged and weight loss were observed respectively of 77.8%, 11.1% and 11.1%.

The symptomatic gastro-esophageal reflux (GER) rate was 16.7%; those cases were successfully managed with medicines. No patient had post-operative esophageal stricture requiring intervention or re-operation.

Discussion

Cardiomyotomy, initially described as a double myotomy by Ernest Heller in 1913, is the gold standard in the treatment of esophageal achalasia. These operations were performed by laparotomy and thoracotomy until approximately three decades ago, when minimally invasive approaches to Heller myotomy were reported by Cuschieri and Shimi in 1991s. Laparoscopic Heller myotomy had rapidly assumed a major role for idiopathic esophageal achalasia. Several studies reported laparoscopic Heller myotomy had been a safe and effective procedure with several peri-operative advantages over open surgery but long-term results were equals to open surgery [1,2,3,4,6]. Additionally, a numbers of published study suggested that laparoscopic Heller had the benefits of minimally invasive surgery including less post-operative pain, fewer wound complications, early oral feeding, shortened hospital stay, faster recovery times and smaller incision. Since these advantages, laparoscopy Heller myotomy had been considered the standard approach to the management of esophageal achalasia and largely replaced other surgical options, including open abdominal and thoracic approaches.

According to the operative notes and follow-up results, 100% had no complication (including intra-and post-operative complications). Mucosal perforation was considered the most common intra-operative complication with varying rates reported in the literature ranging from 4 to 15% [2,3,4,7]. Perforations usually occur in the lower part of myotomy line, caudal on to the gastric wall. Anatomically, three muscle layers in this area are thin and strongly adherent with the mucosal layer makes it difficult to dissection muscle fibers from mucosa and perforation occurs. If a mucosal perforation was identified intra-operatively, 5.0 absorbable sutures (5.0 Maxon or 5.0 Dexon) were performed laparoscopically. Additionally, several surgeons performed Dor fundoplication with the anterior part of the fundus and sutured to the edges of the myotomy with three stitches on each side. We found none of this complication in our study. Our experienced surgeons usually perform the muscular opening from the lower part of esophagus, with careful dissection of all longitudinal and circular muscle fibers to the sub-mucosal layers by hook electrocautery and scissors. When reaching sub-mucosal layer, both edges of the esophageal myotomy were raised and pulled to the sides,

following by gently dissection of muscle fibers from mucosal layer by a harmonic scalpel and dissector. Then, myotomy was extended upward until set proximally about 5-6 cm above the gastroesophageal junction. We found that the dissection and cutting of the muscle fibers with a harmonic scalpel ensures smooth myotomy edges, bleeding control and preventing burned. The myotomy was extended distally about 2–3 cm onto the gastric wall, with all of the muscle bundles were cut one-by-one by hook electrocautery; and especially careful when cutting fibers close to the mucosa. It should be noted that when bleeding in small sub-mucosal vessels, do not use electrocautery to stop bleeding immediately. We usually use endoscopic gauze with tight pressing and be patient until the bleeding stops on its own. We routinely perform intra-operative leak testing to minimize the risk of a potential missed injury, as well as to assess for completeness of myotomy. This is easily performed by inflation of air down a nasogastric tube by our anesthesiologist, the adequate completion of myotomy is confirmed by bulging of mucosa with none of remaining muscle fibers, and any air leak is recognized and repaired laparoscopically.

Splenic injury was reported with a rate ranging from 1 to 5%, during short gastric vessels dividing and usually found in the early stages of procedure [1,8]. There was no splenic injury complication in our series.

The rate of conversion reported in the literature ranging from 0 to 13%, and the most common reason are large mucosal perforation or excessive bleeding that cannot be control laparoscopically [1,2,6]. No conversion was in this study, as well as no intra-operative incidents.

Post-operative complication rates with the current reports in the medical literature of an overall morbidity ranging from 1 to 13%. One serious complication was peritonitis due to secondary mucosal necrosis, which is considered the result from mucosal burned during cutting muscle by electric hook [2,3]. With the experience and technique of the surgeon getting better, the rates of intra- and post-operative complications are decreasing rapidly. There was no postoperative mucosal perforation complications in this study. We were very careful with using the hook electrocautery, especially when dissecting muscle fibers close to the gastric mucosa.

Whether or not to perform an anti-reflux procedure along with myotomy had been debated in the early of this procedure, and most recently published series support the need for anti-reflux protection because of interruption of the lower esophageal sphincter mechanism. Richards et al. reported a prospective randomized double-blind clinical trial in the 43 patients with achalasia underwent Heller myotomy procedure. The rates of GER when performing a Dor fundoplication were 9%, lower significantly than those obtained Heller myotomy without any anti-reflux procedure (48%) [9].

There are two types of partial wrap are commonly employed in achalasia patients after Heller myotomy: the posterior 270 fundoplication (Toupet) and the anterior 180 fundoplication (Dor). There have been no published reports of randomized controlled trials demonstrating a significant difference between two procedures in terms of antireflux barrier. Several published reports had demonstrated that the Dor fundoplication is easier than a Toupet fundoplication, and it may protect against potential leaks that could result from injuries to the mucosa. Others believed that the Toupet fundoplication have the added benefit of keeping the edges of the myotomy distracted, preventing postoperative recurrent dysphagia that may result from healing of the myotomy borders. In a prospective randomized controlled trial that compared Dor procedure (36 patients) to Toupet procedure (24 patients), A. Rawlings et al. showed that there is no significant difference between two methods in terms of recurrent symptomatic dysphagia with 6- and 12-month follow-up. Although the rates of abnormal 24-h pH testing was higher in the former group (42% and 21%, respectivelly), these differences did not

reach statistical significance because of the small sample size and the following-up was incomplete [10]. Additionally, in a randomized controlled clinical trial examining differences associated with the Dor and Toupet fundoplications in the setting of Heller myotomy, the data showed there is no statistically significant difference in the incidence of postoperative re-flux was seen between the groups [11]. The complete 3600 wrap (Nissen fundoplication) have observed an unacceptable rate of postoperative dysphagia long-term and therefore a partial fundoplications is generally preferred.

As a numbers of other authors, we preferred performing the posterior 270 fundoplication (Toupet), since it is beneficial from keeping the edges of the myotomy distracted, preventing postoperative recurrent dysphagia that may result from adhesiolysis of the myotomy borders.

Postoperative global esophageal symptom scale reveal that 90- 93% of patients were improved compared to their preoperative status [2,4,7,8]. Persistent dysphagia in the short-term follow-up considered due to incomplete of myotomy. In this study, 89,9% of patient had no or very mild postoperative dysphagia, and only 10,1% had moderate dysphagia with solid food.

Post-operative outcomes of Heller myotomy procedure are persistent at long-term follow-up. Douard et al. in their published prospective studies with the mean 51-month following-up, reported that none of persistent or recurrent dysphagia. Spechler et al. reported the incidence of excellent outcomes in the 1- and 2-year follow-up respectively of 93% and 90%, may be due to distal esophageal stricture caused by gastroesophageal reflux or healing and fibrosis of the distal portion of the myotomy [7].

Conclusion

Our results clearly show that, laparoscopic Heller-Toupet operation with its safety and low rates of morbidity, provides significant improvement for long-term follow-up in the treatment of achalasia.

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