

Initial outcomes of laparoscopic heller myotomy and dor fundoplication for (esophageal) achalasia at Nghe An Friendship General Hospital

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Abstract

Introduction: The aim of this study is to evaluate the outcomes, feasibility and safety of laparoscopic Heller – Dor method in treatment of esophageal achalasia or achalasia .

Material and Methods: it's a descriptive cross-sectional study. The patients diagnosed an achalasia and underwent laparoscopic Heller myotomy and Dor fundoplication from 2014 to July 2019 enrolled.

Results: 12 patients diagnosed an achalasia were operated on by laparoscopic Heller myotomy and Dor fundoplication. Age mean 40.8 ± 4.2 (18 -65), male 58.3% and female 41.7%. 83.3% of patients have dysphagia, mean dysphagia time 12.8 ± 5.2 (2-60) months, vomiting: 41.7% and weight loss: 100%, average weight loss was 6.7 ± 5.5 (3-15) kg ???.=> does not make sense ! X-ray with contrast of esophageal revealed bird beak sign: 41.7%, sigmoid form 16.7% normal or slight dilation 41.6%. ?? The average operation time was $138.8 \pm 9,4$ (77-180) mins. The complication occurred during the surgery (bleeding converted to open surgery). No other complications such as perforation occurred during and after the surgery. The average length of postoperative hospital stay was 7.5 ± 0.5 (5-11) days. Quality of life after surgery was very good and good in 83.3% and average 16.7%.

Conclusion: Laparoscopic surgery in treatment of achalasia by Heller – Dor technique was safe and effective, with less postoperative pain, fast recovery and short hospital length stays. Almost patients satisfied with the results of this procedure. However, due to the sample size of this study is small so it is necessary to conduct other studies with larger sample size.

I. Introduction

Achalasia is a primary mobility disorder of esophageal muscle (the lower esophageal sphincter fails to relax in synchronization with the swallowing movement), and it is a relatively rare disease. It was first described by Thomas Willis in 1674. In 1927, Arthur Hurst found that the lower sphincter failed to relax when a swallowing movement was presented,

and named the disease Achalasia [1], [4].

The disease has an insidious progression during a long period (1 to 6 years) before being definitely diagnosed. During the early period, patients are usually misdiagnosed as gastritis or gastro-esophageal reflux and thus receive medical management for long periods of time. Definitive diagnosis is usually based on clinical symptoms (for

example, dysphagia, vomiting, and weight loss), gastro-esophageal endoscopy, contrast studies or computer tomography... According to Bonavina [6], about 40% of the diagnosis of Achalasia were in late. There are multiple treatment proposed to manage were : medical treatment to reduce the lower esophageal sphincter pressure, botulinum toxin (Botox) injection, esophageal dilation, Heller myotomy, or peroral endoscopic myotomy (POEM). The fundoplication after the esophageal sphincter myotomy include Dor, Toupet or Nissen-Rossetti procedures. Nowadays, the most commonly performed fundoplication procedure is Dor fundoplication [4,5,13,15]. At Nghe An Friendship General Hospital, laparoscopic surgery for achalasia using Heller – Dor method has been applied since 2014, thus we conducted this study with the following purposes:

1. To assess the feasibility of laparoscopic surgery in the treatment of achalasia using Heller – Dor method.
2. To assess the result of laparoscopic surgery in the treatment of achalasia using Heller – Dor method”.

II. Objects and method

Objects: 12 patients diagnosed achalasia were treated with laparoscopic surgery using Heller – Dor and follow-up for a period from 2014 to July 2019.

Method: (1) Descriptive cross-sectional study was conducted. (2) Clinical features: age, sex, duration of disease from onset and previous treatment, weight loss, dysphagia, chest pain or regurgitation. (3) Para-clinical features: esophageal endoscopy, radiography and computer tomography. (4) Variables about operating results: operation time, myotomy length, complications, nasogastric intubation time and length of hospital stay.

(5) Operating procedure: The patient under general anesthesia was inserted a nasogastric prior the surgery. The patient was in supine position with the spread legs. The position of the operating crew are : The surgeon stands on the left, the first assistant

stands on the right, and the camera assistant stands between the legs of the patient. The scrub nurse stands on the left, and to the left of the surgeon.

Step 1: 5 trocars are placed: 2 10-mm trocars (sub-umbilical and left subcostal) and 3 5-mm (right lateral, right and left subcostal) are placed.

Step 2: Assess the lesion and associated pathologies (if any).

Step 3: Approach the esophageal hiatus and expose both crus of diaphragm as well as the anterior half of the esophagus up toward the thorax above the stricture to easily mobilize the esophagus

Step 4: Expose the stomach cardia and fundus, mobilize the fundus to the level of splenic hilum

Step 5: Perform a cardio-esophageal myotomy from the cardio-esophageal line (Z line), 4 – 6cm or more upward depends on the thickening of the sphincter, incise downward below the Z line for 2 – 3cm, dissect and expose ½ of the esophageal mucosal diameter. Flush some air through nasogastric tube to check the esophageal mucosa, whether mucosal perforation occurred and whether the diameter and length of the exposed mucosa is enough.

Step 6: Perform a fundoplication using Dor procedure: stitch and wrap a part of the fundus 180° anterior to the esophagus.

Step 7: Clean the abdomen, check the dissection margin and close the trocar ports.

Data processing: Data is processed using the software SPSS 16.0

III. Results

From 2014 to July 2019, we operated 12 patients with achalasia by Heller – Dor laparoscopic surgery. The results are described below.

1. Clinical and para-clinical features

Age, sex:

Average age is 40.8 ± 4.2 (18 to 65 years old), the most common age group of this disease is <40 years old, accounts for 50%. 58.3% (7) of the patients are male, and 41.7% (5) are female, the male/female ratio is 1.4.

Table 1: Clinical symptoms

Symptoms	N	Rate %
Dysphagia	10/12	83.3
Vomiting	5/12	41.7
Weight loss	12/12	100
Retrosternal pain, heartburn	4/12	33.3

83.3% of the patients had dysphagia, 100% of the patients had weight loss, average amount of weight loss is $6.7 \pm 5.5\text{kg}$ (3 – 15kg). The average duration of dysphagia is 12.8 ± 5.2 months, ranging from 2 months to 60 months.

History

11 patients (91.7%) had a long-term treatment for gastritis – gastric ulcer.

5 patients (41.7%) were diagnosed with achalasia prior to the surgery and were treated with endoscopic esophageal dilation. Among those, 2 patients were dilated 2 times, 1 patient was dilated 3 times, 1 patient was dilated 5 times, and 1 patient was dilated 6 times. All these patients had recurrent dysphagia after 3 to 6 months.

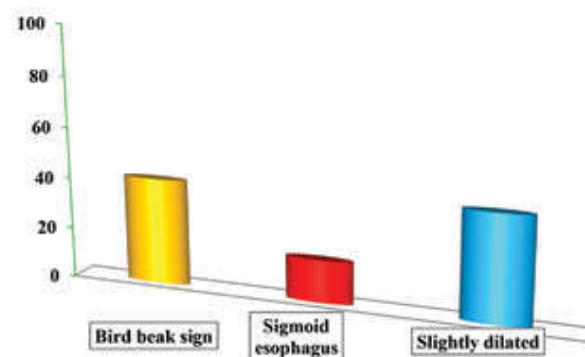
Para-clinical features

Table 2: Features on esophageal endoscopy

Symptoms	N	Rate %
Mild achalasia, easy endoscope passage	1/12	8.3
Food and fluid stasis	11/12	91.6
Dilated esophagus	9/12	75.0
Severe achalasia, difficult endoscope passage	3/12	25.0

91.6% of the patients had foods stasis, 75% had dilated esophagus, 25% had severe achalasia with difficult endoscope passage.

Graph 1: Patient distribution based on contrast radiograph



In our study, 41.7% (05) of the patients had dilated esophagus and ended with bird beak sign, only 02 patients (16.7%) had sigmoid esophagus, also had the longest duration of disease (36 months and 60 months). 100% of the patient had no gastric bubble on unprepared radiograph.

2. Operating results

Table 3: Operating time

Time	< 120	120 - 149	150 - 180	>180	Total
N	2	5	5	0	12
Percentage %	16.7	41.7	41.7	0.0	100

The average operating time is 138.8 ± 9.4 minutes (77 to 180 minutes).

Surgical technique: The average cardio-esophageal myotomy length is 7.2 ± 1.4 cm (6 to 10 cm). The myotomy line was extended 5 – 7cm above the squamocolumnar junction and 2- 4 cm below the squamocolumnar junction, circling $\frac{1}{2}$ circumference of the esophagus.

Average nasogastric tube kept : 2.7 ± 1.3 (2 - 5) days.

Average time until oral feeding: 3.2 ± 1.6 (3 - 6) days.

Average length of hospital stays: 7.5 ± 1.8 (5 - 11) days.

Intraoperative complication: In our study, 1 patient (8.3%) had bleeding from hepatic vein due to a large left liver, before approaching the cardio-esophageal junction, during dissection to mobilize the liver from the diaphragm, the hepatic vein was damaged causing massive bleeding, thus it was converted to open surgery. There was no case of mucosal perforation or other complications.

There was no postoperative complication.

Long-term results

Table 4: Symptoms on post-operative follow-up

Symptoms	N	Rate %
Mild dysphagia	2/12	16.7
Vomiting	0/12	0.0
Retrosternal pain, heartburn	2/12	16.7
Good contrast passage by radiograph check	12/12	100
Good esophageal mobility on endoscopy without stenosis	12/12	100

At follow-up in June 2019, we found that 16.7% of the patients had mild dysphagia when consuming solid food and retrosternal pain or heartburn during weather changes.

Table 5: Patient satisfaction based on Likert scale

Symptom	N	Rate %
Very good	04	33.3
Good	06	50.0
Average	02	16.7

We assessed patient satisfaction based on their subjective assessment using Likert scale with 5 levels: Very good, Good, Average, Acceptable and Unacceptable. 83.3% had very good and good results, while 16.7% had average results.

Table 6: Comparison of dysphagia and vomiting before and after the surgery

Symptoms	Preoperative	Postoperative	P
Dysphagia	10 (83.3%)	2 (16.7%)	$P < 0.005$
Vomiting	05 (41.7%)	1 (8.3%)	$P = 0.219$
Trung bình	02	16.7	

There is a marked difference in preoperative and postoperative dysphagia. This difference is statistically significant based on McNemar's test.

IV. Discussion

Achalasia can be encountered in all ages, according to national studies by Le Chau Hoang Quoc Chuong [1], Dang Thanh Phu [3] and international studies, for example by Palanivelu [15], commonly encountered age is from 20 to 40 years old. Our study similar results, with the average age of 40.8 ± 4.2 years old, ranging from 18 to 65 years old. The group between 20 to 40 years old accounts for the most, which is about 50%. Tieu Loan Quang Lam [4], Rawlings [15], Sawas [17], Tebaibia [19] reported that those between 41 to 60 years of age constitute the common age group who had the disease. Duffield [9] reported an average age of >60 years old, far higher than any other authors. Perhaps the variation in average age or age group depends on the researched races and location of each individual study.

Table 8: Comparison of average age in those with achalasia

Authors	Population	N	Average age
Palaniveiu (2007) [14]	India	226	36.4
Rawlings (2011) [15]	America	85	48.8
Tebaibia (2014) [21]	Algeria	1256	43.3
Dufftefd (2017) [9]	Australia	350	62.1
Sawas (2017) [17]	America	150	43
Our study (2019)	Vietnam	12	40.8

Studies by Torquati et al [20] (200 patients, 53.5% male, 46.5 female), Tebaibia et al [19] studied 1256 patients in 25 years, with 48% were male and 52% were female. Sawas et al [17] studied 150 patients, among these 48.7% were male and 51.3 were female. Bowman et al [6] while researching 634 patients, reported 52% male and 48% female. However, other studies showed a higher rate of male, such as studies by Rawlings et al [15] (85 patients, 69.4% male and 30.6% female) and Palanivelu et al [14] (226 patients, 64.6% male and 35.4% female). Some studies, on the other hand, the rate of female is higher than male, for example, Romero-Heraandez et al [16], with 114 researched patients, have reported 64% female and 36% male, Niebisch et al [12] reported 54% female and 46% male among 527 patients. In Vietnam, Le Chau Hoang Quoc Chuong [1] reported a 2:1 female:male ratio (35 patients, 23 females and 12 males), Dang Thanh Phu [3] researched 89 patients and reported 56 female and 33 male patients. Tieu Loan Quang Lam [4] reported a female:male ratio of 1.9:1. In our study, male patients account for 58.3% (7 patients) while female patients account for 41.7% (5 patients). The male/female ratio is 1.4, quite similar to several Vietnamese and international studies.

The average duration of dysphagia is 12.8 ± 5.2 months, ranging from 2 to 60 months. The

long duration of this symptom may be explained by misdiagnosis with other more commonly encountered medical diseases in previous medical centers. Most of the time, when the patients firstly examined in the hospital, the disease was severe with clear symptoms. The duration of disease in our series is similar to other domestic and international studies.

Dysphagia: In our study, the rate of dysphagia is 83.3%, this figure may be less than some authors, perhaps because of our small sample size. However, this is still the predominant symptom. This proves that dysphagia is the most common symptom of achalasia and is the main reason for the patients to come to the hospital.

Table 9: Comparison of dysphagia rate with other authors

Authors	N	Rate %
Tebaibia (2016) [19]	1243/1256	98.9
Niebisch (2017) [12]	457/527	86.7
Sawas (2017) [17]	147/150	98.0
Tieu Loan Quang Lam (2017) [4]	22/23	95.7
Our study (2019)	10/12	83.3

Other authors reported a higher rate of vomiting, from 81.4% to 88.6%. This rate is much higher than in our study, possibly because vomiting was not as commonly noticed by the patients as dysphagia. Vomiting is also seen in other diseases and thus it is not as specific as dysphagia.

Table 10: Comparison of vomiting rate with other authors

Authors	N	Rate %
Tebaibia (2016) [19]	1042/1256	82.96
Palaniveiu (2007) [14]	184/226	81.4
Niebisch (2017) [12]	437/527	82.9
Tieu Loan Quang Lam (2017) [4]	9/23	39.1
Our study (2019)	5/12	41.7

Weight loss: In our study, 100% of the patients had weight loss problem, average the amount of weight loss was 6.7 ± 5.5 kg, ranging from 3 to 15kg. This result is also similar to several Vietnamese and international studies.

Para-clinical features: In our study, 5 patients had bird beak sign (41.7%), sigmoid esophagus was seen in 2 patients (16.7%), slight esophageal dilation was seen in 3 patients (33.3%). The typical image of achalasia is dilated esophagus, immobility and the tapering of the inferior esophagus causing the bird beak sign. Our results prove that patients with achalasia usually come to the hospital at late stage with the majority of them had a large dilated esophagus (83.3%), rarely did we see a normal esophagus. This is consistent with findings from Le Chau Hoang Quoc Chuong [1], Do Minh Hung [2] who suggested that normal esophagus on X-ray image only accounts for 0 – 14.3%. Medical literature from other countries have also shown that most of the patients with achalasia have bird beak sign, and this is suggested to be the characteristic image in the diagnosis of achalasia [4].

According to the diagnosis and treatment guideline for achalasia by American Society of Gastroenterology, all patients with achalasia must receive esophagus endoscopy. This is to assess the level of food stasis in the esophagus, to assess lower esophageal sphincter activity and to eliminate the malignant diseases [15]. In our study, food stasis occurred in 91.6% of the patients, 75% had dilated esophagus, 25% had sphincter contractile which prevented the endoscope from passing, 8.3% had mild esophageal contractile. Our results are similar to those of Tieu Loan Quang Lam (2017), with 91.3% of the patients had food and fluid stasis, and 4.3% had mild contractile [4]. These results are also the same with other domestic and international authors [1], [11], [19].

Castrinin et al (1985) [4] suggested that obstruction occurs because the lower esophageal sphincter does not contract in synchronization with the swallowing movement, thus a myotomy is

needed to remove this part of the lower sphincter, and the myotomy should extend to the cardia for 1 to 2cm more. Oelshlager et al [13] (2003) proposed a myotomy length of 6 – 8cm and this incision should extend toward the cardia for 1.5 to 2 cm. In 2016, El Kafsi et al [10] suggested a 5 to 7cm esophageal myotomy extending about 2 to 3cm toward the cardia. Tieu Loan Quang Lam (2017) [4] reported an average myotomy length is 7.48 ± 1.62 cm (5.5 to 12cm). Our esophageal and cardiac myotomy length is 7.2 ± 1.4 cm, with the shortest being 6cm and the longest being 10cm, similar to domestic and international studies. The length of myotomy depends on the level of esophageal stenosis and the thickness of the sphincter. Usually the incision is at the middle or to the left, at the surgeon's convenience.

Intraoperative complication: The most serious intraoperative complication is esophageal mucosal perforation, especially during laparoscopic surgery because the manipulation of surgeon is more limited than open procedure. Tieu Loan Quang Lam (2017) [4] reported mucosal perforation in 13.04% of the cases, resolved by closing the damaged mucosa and the myotomy incision, and another myotomy was done at the right side of the esophagus. The author reported 4.37% of the patients had intraoperative hemorrhage because of a ruptured branch of the esophageal vein. Sharp [19] while performing laparoscopic surgery on 50 cases reported a mucosal perforation rate of 16.44%. Tsuboi [21] reported that 1% of the cases had uncontrollable bleeding from a short gastric artery and had to be converted to open surgery and had blood transfusion. Le Chau Hoang Quoc Chuong [1] reported that 2.9% of the cases had bleeding from left gastric artery and 2.9% had gastric perforation. Deb [8] report 1% of the case with pneumothorax, 0.5% with bleeding from ruptured splenic capsule, 0.5% with bleeding from short gastric arteries and 2% of the case had to be converted to open surgery. In our study, 1 patient (8.3%) had bleeding from a branch of hepatic vein because this patient had a large left liver, when

mobilized the liver from the diaphragm, the hepatic vein was damaged causing massive bleeding, needed to convert to open surgery. There was no case of mucosal perforation or any other complication.

Post-operative quality of life: Assessment of patient satisfaction is based on their subjective assessment, according to Likert scale with 5 levels. 83.3% of the patients reported good or very good results, while 16.7% of the patients had average results.

In 2004, Abir et al [5] had analyzed 12 studies to assess the effectiveness of Heller – Dor surgery, with 88 to 100% of the patients had good or very good results.

In our study, 2 cases (16.7%) occasionally had dysphagia after the operation, usually when trying to eat fast or when they were anxious, sometimes this interfered with their work. 04 cases had nearly negligible dysphagia and 6 cases were completely cured, without any report of postoperative dysphagia.

Table 11: Comparison of the rate of postoperative dysphagia

Authors	N	Rate %
Oelschlager (2003) [12]	52	17
Tieu Loan Quang Lam (2017) [4]	23	21.7
Our study (2019)	12	16.7
Tieu Loan Quang Lam (2017) [4]	9/23	39.1
Our study (2019)	5/12	41.7

The rate of postoperative dysphagia depends on sample size, time of the study and the ability to completely resolve the lower sphincter during the surgery. There is a statistically significant difference in the preoperative and postoperative rate of dysphagia ($p < 0.005$).

V. Conclusion

Achalasia is a rare disease, with a long period suffering from problem, easy misdiagnosed with

other diseases such as gastritis or gastro-esophageal reflux.

Heller – Dor surgery in the treatment of achalasia is a safe and effective technique, the patients could be recovered quickly, less post-operative pain, short length of hospital stay and good cosmetic aspect. However, our sample size is small and our follow-up time is not long enough, thus we need another studies with a larger sample size and longer follow-up time for a good long-term result.

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