Results of laparoscopic Heller myotomy and Dor fundoplication in treatment of achalasia

Tieu Loan Quang Lam, Lam Viet Trung

Department of GI Surgery, Cho Ray hospital

Keyword:
Achalasia, laparoscopic Heller myotomy, fundoplication

Contact:
Lam Viet Trung M.D, Ph.D.,
Department of GI Surgery, Cho Ray hospital,
201 B Nguyen Chi Thanh St., District 5 Ho Chi Minh City, Vietnam
Mobile: 0913753595
Email: drlamviettrung@yahoo.com

Receiving date: 31/8/2018
Approving date: 06/9/2018
Publishing permission date: 10/9/2018

Abstract

Introduction: Achalasia is a primary esophageal motor disorder, which is relatively rare. Patients usually start silently and detect late for months to years. Therefore, laparoscopic Heller myotomy is now considered the surgical procedure of choice for treating achalasia. Anti-reflux procedure usually performed by surgeons is a Dor procedure because of its many advantages, and it is easy to perform in laparoscopic surgery.

Purpose: The objectives of this study is to determine the incidence and complications of laparoscopic Heller myotomy and Dor fundoplication and determine percentage improvement dysphagia after surgery.

Material and Methods: Patients diagnosed achalasia and underwent laparoscopic Heller myotomy and Dor fundoplication at the Digestive Surgery Department of Cho Ray hospital from January 2011 to May 2017.

Results: 23 patients with achalasia were operated on for laparoscopic Heller myotomy and Dor fundoplication. 95.7% of patient have dysphagia, regurgitation: 39.1%, and weight loss: 46%. The grade of patients with the highest diameter of the esophagus: 13.04% degree I, 52.18% degree II, 13.04% degree III, 21.74% degree IV. Average surgery time was 150.22 ± 35.63 minutes. Complication in surgery: esophageal perforation occurred in about 13.04% cases, there was 4.35% of bleeding reported. Quality of life after surgery was good and very good at 91.3%.

Conclusion: The results of laparoscopic Heller myotomy and Dor fundoplication were effective, most patients satisfied the results of surgery. However, the size of this study is limited so it is necessary to follow up with other studies with larger sample size.

Introduction

Achalasia is a primary esophageal motor disorder, which is relatively rare. This is acquired disease increasing with age [1]. Achalasia is also called achalasia cardia or esophageal peristalsis. Patients usually start silently and detect late for months to years with the common signs and symptoms including dysphagia, heartburn, chest pain, weight

loss and no esophageal mobility detected as well as no simultaneous dilation of lower esophageal sphincter and swallowing mobility. Thomas Willis described achalasia firstly in 1674. In 1927, Arthur Hurst noted that lower esophageal sphincter did not relax to respond to swallowing and coined the term Achalasia [1].

Patients with achalasia usually do not suffer from severe clinical syptoms, they are in silent progress in 5-6 years before having definitive diagnosis. Almost patients have wrong diagnoses in the early stage of this disease. In the study of Bonavina [5], about 40% achalasia patients had late diagnosis because of the similar symptoms as gastroesophageal relux disease (GERD).

The diagnosis depends on clinical symptoms including dysphagia, heartburn, chest pain, hiccough, vomiting, weight loss, aspiration pneumonia and laboratory tests: chest X-rays, esophagram, upper endoscopy, esophageal pressure topography, endoscopic ultrasound, esophagus CT scan. The treatments include pharmacologic therapy to reducing the tone of lower esophageal sphincter, endoscopic botulinum toxin therapy (Botox), graded pneumatic dilation (PD), peroral endoscopic myotomy (POEM) which has been introduced recently as a new assessment of achalasia, Heller myotomy (Heller surgery) can perform by chest open, abdominal open, thoracoscopic surgery, abdominal laparoscopy and robot-assisted surgery. Antireflux procedures include Dor, Toupet or Nissen-Rossetti. Nowadays, usual antireflux procedures are Dor or Toupet depending on surgeons offer. The advantages of Toupet is to prevent the adhesion of the muscle, to create a better antireflux valve, however, there are some comments that Toupet procedure moving completely the esophagus posterior wall can increase the antireflux. Conversely, the major advantage of Dor is easy to perform, making no moving of the esophagus posterior wall which helps to prevent the antireflux and to protect the mucous membrane [5], [14], [17].

Materials and method

Objectives:

That included 23 patients with achalasia laparoscopic Heller myotomy and Dor fundoplication and be followed postoperative condition in the period from January 2011 to May 2017 in Cho Ray Hospital. All patients had definitive diagnosis as achalasia depending on clinical symptoms, esophagram and upper endoscopy and were admitted to hospital for laparoscopic Heller myotomy and Dor fundoplication with complete medical records.

Method:

We collected all the data of patients being operated at the Digestive Surgery Department of Cho Ray hospital following the medical record form and focusing on: age, gender, disease duration; clinical features including weight loss, dysphagia, vomiting, heartburn, chest pain; laboratory features including upper endoscopy, esophagram image, the largest esophageal diameter on esophagram; the surgery including surgery duration, the length of the lower esophageal sphincters myotomy cut line, accidents during the surgery, complications, the time of removing nasogastric tube sonde after the surgery and the hospitalization stay.

Surgical technique:

Patients were admitted general anesthesia with nasogastric sonde before the surgery.

Patient position: Spread legs with the head lifted about 30 degree

Place 5 trocar follow protocol, if liver retractor in epigastric is used, we only need 4

Approach to esophageal hiatus: Open the upper part of the lesser omentum, dissect the phrenoesophagealligament, dissect gastroplenic ligament in the back, expose the esophagus, expose the two crus and approach to the retoperitoneal space from the right side to expose the esophagus entirely. Slip a penrose drain or an expanded gauze swab to retract the esophagus down and perform myotomy of esophagus cardiac sphincter: open from 6cm above the thickened point of sphincter and extending to about 2cm below the point in the

gastric, pump the air through Levin tube to recheck whether any perforated in esophagus mucosa layer complication happened.

Perform Dor fundoplication: Suture a part of pylorus antrum to the esophagus cover about 1800 in the front side of the esophagus.

Results

During 6 years, we performed laparoscopic Heller myotomy and Dor fundoplication for 23 patients with achalasia and followed postoperative condition with the results were:

The mean age was 48.3±14,8 years (from 22 to 71 years old).

Gender: female : male = 1.9:1 (15 women and 8 men)

The median disease duration from onset was 36 months, the quartile was 7-120 months.

The pre-operative severity: following the largest diameter. We had 3 patients (13,04%) in I stage (the diameter <4cm), 12 patients (52,18%) in II stage (the diameter 4-6cm), 3 patients (13,04%) in III stage (the diameter >6cm), 5 patients (21,74%) in IV stage (esophagus with sigma form).

Pre-operative clinical symptoms:

Table 1: Pre-operative clinical symptoms

Symptoms	N	%
Dysphagia	22	95,7
Vomiting	9	39,1
Weight loss	6/13	46

Workup:

Table 2: The pre-operative esophageal shape on the esophagram

Shape	N	%
Bird's beak	16	69,6
Sigma form	5	21,7
Normal or slightly dilation	2	8,7
Total	23	100

Table 3: The features of the upper endoscopy

Features	N	%
Slight resistance at the gastroesophageal junction but still easy to pass with the endoscope	1	4,3
Stagnant food and fluid	21	91,3
Esophageal dilation	16	69,6
Severe resistance at the gastroesophageal junction, difficult to pass with the endoscope	9	39,1

Pre-operative treatment: In our research, there was 1 patient admitted 2 times of graded pneumatic dilation (PD), 1 patient admitted 1 time of PD and 2 patients refusing to PD as well as demanding the surgery. There was 1 patient admitted laparoscopic Heller myotomy in Cho Ray Hospital 8 years ago and having dysphagia symptom after 1 year postoperation.

Surgery characteristics:

The mean surgery duration: 150,22 ± 35,63 minutes (from 80 to 240 minutes)

The length of the lower esophageal sphincters myotomy cut line: the longest: 12 cm, the shortest: 5,5 cm, the average: 7,48 ± 1,62 cm

Intraoperative complication: In 23 patients, we reported 4 patients suffering complications: 1 patient having bleeding esophageal varices because of cirrhosis and hepatitis B in his past medical history causing the dilation of esophageal vein, so in the surgery the vein was damaged with 600 ml blood loss and was handled by clips and sutures. There were 3 patients (13,0 %) suffering esophageal perforation being checked by pump the air through nasogastric tube and solved by laparoscopic surgery.

Postoperative treatment:

Postoperative treatment duration: the longest: 8 days, the shortest: 2 days, the average: 4,83 ± 1,78 days

Time to remove the nasogastric tube: the longest: 5 days, the shortest: 1 day, the average: 2,52 ± 1,31 day

Time to begin postoperative feeding: the longest: 6 days, the fastest: 1 days, the average: 2,96 ± 1,52 days.

Treatment results:

Table 4: Postoperative clinical symptom improvement

Symptoms (n=23)	Preoperation	Postoperation	P
Dysphagia	22 (95,7%)	5 (21,7%)	P<0,001
Vomiting	9 (39,1%)	1 (4,3%)	P=0,021

As McNemartest, there was statistical significance in postoperative clinical symptom improvement.

Eckardt score in these patients:

Table 5: Comparison of the mean Eckardt score in pre and postoperation

N=23	Preoperation	Postoperation	p
The mean Eckardt score	3,96 ± 1,58	1,26 ± 0,92	P=0,03

As T-test: p = 0,03, so there was statistical significance in this change.

The pleasure of patients:

We evaluated the pleasure of patients following their subjective assessment and Likert score with 5 levels: very good, good, average, acceptable and unacceptable. The percentages were respectively 4 cases (17,4%), 17 cases (73,9%) and 2 cases (8,7%) for very good, good and average effect.

Discussions

In medical literature, achalasia occurred in every age, usually in 20 – 40 years old, that was similar to home researches of Lê Châu Hoàng Quốc Chương [1], Đặng Thanh Phú[3] as well as foreign researches of Palanivelu[14]. Howere, in my research, the mean age was 48.3 years old (from 41 to 60 years old), that was similar to the results of Rawlings [16], Sawas[18], Tebaibia [20]. The was the research showed that the average age is >60: Duffield [8] published the higher mean age of more than 60 years old than the others. We believed that the difference of the mean age depended on the population and the location of their researches.

Table 6: The comparison of the mean age

Author	Population	Year	N	Mean age
Lê Châu Hoàng/ Quốc Chương [1]	Vietnam	2005	35	36,9
Palanivelu[14]	India	2007	226	36,4
Rawlings[16]	America	2011	85	48,8
Đặng Thanh Phú[3]	Vietnam	2011	89	36,98
Tebaibia[20]	Algeria	2014	1256	43,3
Duffield [8]	Australia	2017	350	62,1
Sawas[18]	America	2017	150	43
Our research	Vietnam	2017	23	48.3

Some researches reported that the incidence of achalasia was the same between male and female like Torquati [21] and his partners (200 patients with 107 men and 93 women), Tebaibia [20] and his partners (1256 patients in 25 years with 603 men and 653 women), Sawas[18] and his partners (150 patients with 73 men and 77 women), Bowman [6] and his partners (634 patients with 52% of male and 48% of female), Duffield [8] and his partners reported no difference in male and female. However, there were other research showing that the rate of male was higher than this of female like Rawlings [16] and his partners (85 patients with 45 men and 26 women), Palanivelu[14] and his partners (226 patients with 146 men and 80 women). Also there were other researches reporting that the rate of female was higher than this of male like Romero-Hernandez [17] and his partners (114 patients with 73 women and 41 men), Niebisch [12] and his partners (527 patients with 54% of female and 46% of male). In Vietnam, Văn Tần claimed that the incidence of achalasia in female was higher than that in male, Lê Châu Hoàng Quốc Chương[1] claimed that the ratio

of female and male was 2:1(35 patients with 23 women and 12 men), Đặng Thanh Phú [3] proclaim the research of 89 patients with 56 women and 33 men. We achieved the same result with the ratio of female and male was 1,9 :1.

The disease duration in our research was 36 months being similar to other authors [1], [6], [20], [17], [20]. The long duration could occur in patients with severe symptoms when being admitted to the hospital, patients being diagnosed incorrectly to other internal medical diseases in the previous medical centers.

Dysphagia: In our series, the rate of dysphagia was in 95,7%, that was similar to other authors in Table 7. It could be demonstrated that dysphagia was the most common symptoms of achalasia and the major cause of admission of the patients to examine.

Table 7: Comparison of the dysphagia incidence

Authors	Year	Dysphagia
Lê Châu Hoàng Quốc Chương[1]	2005	35/35 (100%)
Tebaibia [20]	2016	1243/1256 (99%)
Palanivelu [14]	2007	226/226 (100%)
Niebisch [12]	2017	457/527(87%)
Sawas[18]	2017	147/150 (98%)
Series	2017	22/23(95,7%)

Table 8: Comparison of the vomiting incidence

Authors	Year	Vomiting
Lê Châu Hoàng Quốc Chương[1]	2005	31/35 (88,6%)
Tebaibia [20]	2016	1042/1256 (83%)
Palanivelu [14]	2007	184/226 (81,4%)
Niebisch [12]	2017	437/527(83%)
Sawas[18]	2017	125/150 (83%)
Series	2017	9/23(39,1%)

Following Table 8, the percentage of patients with vomiting was 81,4%-88,6%, that was much higher than our result. We could explain that the vomiting was not concerned as much as the dysphagia. Vomiting also occurred in other diseases and was not as specific as dysphagia in the achalasia diagnosis, whereas achalasia was supposed to be relatively rare in Vietnam and only be diagnosed by clinical doctors.

Weight loss

Due to retrospective study so the database collected depending on medical records, only 13 in 23 records referred to the symptom "weight loss", in which 46% patients (6/13) had this symptom. This rate was less than other results, probably because our sample size was small, the rate of medical records which referred to this symptom was low and the symptom "weight loss" was not noticed by Vietnamese patients.

Diagnostic imaging

The specific imaging of esophagus achalasia is that large esophageal dilation, no peristalsis and the ending segment narrows in the sharp of "bird beak". Our study, most cases had"bird beak sign" in 16 patients (69,6%), "sigma form" was seen in 5 patients (21.7%), "normal or slight esophageal dilation" was seen in 2 patients (8.7%). The X-ray imaging of esophagus demonstrates that patients with achalasia comes late occasionally with the sign of "bird beak" or "sigma form" and seldom with normal imaging. This is suitable with the other home researches such as Le Chau Hoang Quoc Chuong [1], Do Ming Hung [2], which supposed that the normal esophageal imaging account for 0-14.3%. International literature also recorded the "bird beak sign" accounting majorly in achalasia patients and this imaging was specific in diagnosis of achalasia [4]

Endoscopy procedure aimed to investigate the stagnant state of food in esophageal lumen, access spasm of the lower esophageal sphincter and bring out differential diagnosis of malignant diseases [16]. All of the achalasia patients have to be investigated by esophageal endoscopy procedure, this which is in guideline for diagnosis and treatment achalasia

of American College of Gastroenterology (ACG). The result of our study in esophageal endoscopy procedure was presented in Table 3.6. The imaging of stagnant fluid and food was seen most in 21/23 patients (91.3%), the slightly spasm of esophageal sphincter was seldom with only one patient (4.3%). Our results was similar to the other authors in our country and foreign [1],[2],[3].

Esophagus cardiac sphincter myotomy incision line: In the middle or deviated to the right side because this is easier to handle. Castrinin et al. (1985) claim that the obstruction cause by the lower sphincter do not go along with the swallowing motion could be solve by insect the disfuction lower esophageal sphincter and extents 1-2 cm to the gastric. Oelshlager [13] et al. (2003) established a concept for standard myotomy incision line is the 6-8cm incision and extents toward the gastric 1,5-2cm. In 2016, El Kafsi [9] et. al recommended in the guideline for achalasia surgery treatment: we should insect esophagus muscle 5-7cm and extent toward the gastric 2-3cm. In our study, esophagus cardiac sphincter myotomy length is 7,48 ± 1,62 cm (shortest 5,5cm, longest 12cm) and this result is equivalent to other authors.

Intraoperative complications

The most serious intraoperative complication of achalasia is the perforation of esophageal epithelium, especially with endoscopy surgery, which manipulation factors is more difficult than open surgery. We recorded perforation complication in 3/23 cases (13.04%), which were detected by gastric pumping gas through nasogastric tube, then sewing perforated esophageal epithelium and performing the other line opening the esophagogastric muscle which was in right edge of esophageal. The results of esophageal muscuso perforation was similar to the other authors in Vietnam and foreign coutries. In comparison with the result of Sharp [19] when performing 50 first endoscopy surgeries, there were 6 case with perforation (12%), in 45 next case only 2 of which had that complication (4,4%). Sharp mentioned the difficulties of performing the skill of opening the longitudinal muscle following the length of esophagus and identifying exactly the point connecting between esophagus and gastric, the author recommended for the value of "training curve" In our study, besides the perforation complication, we recorded a bleeding case (4.4%), in this case, the patient had cirrhosis with enlarged esophageal varices, then a branch of esophageal vein was perforated with the loss of 600ml blood during the surgery and forced to clamp clip to stop bleeding. Tsuboi [21] also had a case (1%) bleeding from short gastric arteries with the loss of 1300ml blood that leaded to unstoppable bleeding which forced to perform open surgery and need blood transfusion. Le Chau Hong Quoc Chuong [1], besides the perforation complication of esophageal epithelium, also recorded one case with bleeding from the left gastric artery (2,9%) and one case with gastric perforation (2,9%). Debb [77] also recorded two cases with pneumothorax (1%), one case with bleeding due to tear of splenic capsule (0.5%), one case with bleeding from short gastric artery (0.5%) and 5 cases which demanded to convert open surgery.

The life quality after surgery

In our study, there were 2 cases having dysphagia frequently after the surgery at least once a day. One dysphagia case occurred due to eating too fast and worrying a lot which sometimes prevented from working, 2 case complaining about dysphagia about once a week. 4 remained cases recovered completely without recurrent dysphagia after the surgery, and the last cases sometimes has trivial dysphagia symptom.

Table 9: The effects of laparoscopic Heller myotomy and Dor fundoplication

Author	Year	Sample size	Dysphagia following operation (%)
Yamamura [24]	2000	24	11
Patti [15]	2001	102	11
Oelschlager [13]	2003	52	17
Wright [17]	2007	52	17
Our study	2017	23	21,7

In Table 9, our result of dysphagia following the operation was slightly higher than the others, probably due to our sample size, majority of patients with achalasia for many years, the enlarged esophagus leading to effecting the results of treatment following operation. However because our sample size was small, and in our country there was not any study accessing the result of laparoscopic Heller myotomy and Dor fundoplication to compare, it is necessary to conduct study with larger sample size to have results for comparing and accessing more exactly in the future.

The result of accessing patients pleasure depended on the personal access of patients based on the Likert score with 5 degrees which brought out: good and very good was 91.3%. In 2004, Abir [4] and his partners reviewed 12 studies accessing the effect of laparoscopic Heller myotomy and Dor fundoplication which reported good and very good results of 88% -100%.

With these results, we found that laparoscopic Heller myotomy and Dor fundoplication was a safe and effective method treatment for achalasia patients.

Conclusion

Achalasia is a disease with low incidence, long disease duration, in early stage having to be noticed to prevent mistaking with other internal diseases such as gastroenteritis, gastroesophageal reflux. Laparoscopic Heller myotomy and Dor fundoplication has no mortality, is a safe method with low incidence of esophageal epithelium perforation. Laparoscopic Heller myotomy and Dor fundoplication is effective, most patients are satisfied with the results of the surgery and improved the quality of life. However the number of studies is not large enough so it is necessary to follow up, conduct other studies with a bigger sample size.

References

1. Lê Châu Hoàng Quốc Chương (2005), "Kết quả phẫu thuật Heller qua nội soi ổ bụng", Đại học Y Dược Tp. Hồ Chí Minh.
2. Đỗ Minh Hùng (2004), "Điều trị co thắt tâm vị bằng phương pháp nong bóng hơi Regiflex", Luận văn Thạc sĩ y học, Đại học Y Dược Tp Hồ Chí Minh.
3. Đặng Thanh Phú (2011), "Đánh giá tai biến và biến chứng sơm của phẫu thuật nội soi điều trị bệnh co thắt tâm vị", Luận án chuyên khoa cấp II, Đại học Y Dược Tp. Hồ Chí Minh.
4. Abir F., Modlin I.M, Kidd M., et al. (2004), "Surgical treatment of achalasia: current status and controversies", Digestive surgery, 21 (3), pp. 165-176.
5. Bonavina L (2006), "Minimally invasive surgery for esophageal achalasia", World Journal of Gastroenterology, 12 (37), pp. 5921-5925.
6. Bowman T. A, Sadowitz B. D, Ross S. B, et al. (2016), "Heller myotomy with esophageal diverticulectomy: an operation in need of improvement", Surgical endoscopy, 30 (8), pp. 3279-3288.
7. Deb S., Deschamps C., Allen M. S., et al. (2005), "Laparoscopic esophageal myotomy for achalasia: factors affecting functional results", Ann Thorac Surg, 80 (4), 1191-4; discussion 1194-1195.
8. Duffield J. A., Hamer P. W., Heddle R., et al. (2017), "Incidence of Achalasia in South Australia Based on Esophageal Manometry Findings", Clin Gastroenterol Hepatol, 15 (3), pp. 360-365.
9. El Kafsi J., Foliaki A, Dehn T CB, et al. (2016), "Management of achalasia in the UK, do we need new guidelines?", Annals of Medicine and Surgery, 12, pp. 32-36.
10. Fisichella P. M., Raz D., Palazzo F., et al. (2008), "Clinical, radiological, and manometric profile in 145 patients with untreated achalasia", World J Surg, 32 (9), pp. 1974-1979.
11. Hunter JG, Trus TL, Branum GD, et al. (1997), "Laparoscopic Heller myotomy and fundoplication for achalasia. Discussion", Annals of surgery, 225 (6), pp. 655-665.
12. Niebisch S., Hadzijusufovic E., Mehdorn M., et al. (2017), "Achalasia-an unnecessary long way to diagnosis", Dis Esophagus, 30 (5), pp. 1-6.
13. Oelschlager BK, Chang L, Pellegrini CA (2003), "Improved outcome after extended gastric myotomy for achalasia", Archives of Surgery, 138 (5), pp. 490-497.
14. Palanivelu C, Maheshkumar GS, Parthasarthi R, et al. (2007), "Minimally Invasive Management of Achalasia Cardia: Results From a Single Center Study", JSLS, 11, pp. 350-357.
15. Patti M. G., Molena D., Fisichella P. M., et al. (2001), "Laparoscopic Heller myotomy and Dor fundoplication

for achalasia: analysis of successes and failures", Arch Surg, 136 (8), pp. 870-877.

16. Rawlings A., Soper N. J, Oelschlager B., et al. (2012), "Laparoscopic Dor versus Toupet fundoplication following Heller myotomy for achalasia: results of a multicenter, prospective, randomized-controlled trial", Surgical endoscopy, 26 (1), pp. 18-26.
17. Romero H. F., Furuzawa C. J., Hernandez M.G., et al. (2017), "Autoimmune comorbidity in achalasia patients", J Gastroenterol Hepatol.
18. Sawas T, Ravi K, Geno DM, et al. (2017), "The course of achalasia one to four decades after initial treatment", Alimentary pharmacology & therapeutics, 45 (4), pp. 553-560.
19. Sharp KW, Khaitan L, Scholz S, et al. (2002), "100 Consecutive Minimally Invasive Heller Myotomies: Lessons Learned", ANNALS OF SURGERY, 235 (5), pp. 631-639.
20. Tebaibia A, Boudjella M.A, Boutarene D, et al. (2016), "Incidence, clinical features and para-clinical findings of achalasia in Algeria: Experience of 25 years", World J Gastroenterol, 22 (38), pp. 8615-8623.
21. Torquati A, Richards WO, Holzman MD, et al. (2006), "Laparoscopic myotomy for achalasia: predictors of successful outcome after 200 cases", Annals of surgery, 243 (5), pp. 587-591; discussion 591-593.
22. Tsuboi K., Omura N., Yano F., et al. (2009), "Results after laparoscopic Heller-Dor operation for esophageal achalasia in 100 consecutive patients", Dis Esophagus, 22 (2), pp. 169-76.
23. Wright A. S., Williams C. W., Pellegrini C. A., et al. (2007), "Long-term outcomes confirm the superior efficacy of extended Heller myotomy with Toupet fundoplication for achalasia", Surg Endosc, 21 (5), pp. 713-718.
24. Yamamura M.S, Gilster J.C, Myers B.S, et al. (2000), "Laparoscopic Heller myotomy and anterior fundoplication for achalasia results in a high degree of patient satisfaction", Archives of Surgery, 135 (8), pp. 902-906.