

Laparoscopic Heller Myotomy for Achalasia Cardia—Initial Experience in a Teaching Institute

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Abstract Laparoscopic Heller cardiomyotomy and Dor fundoplication is the surgical procedure of choice for esophageal achalasia. The aim of our study was to investigate the clinical outcome and safety of laparoscopic Heller–Dor procedure performed by using Hook electrocautery and as a teaching module for advanced laparoscopic surgery. Between January 2005 and December 2010, 25 consecutive patients with achalasia underwent laparoscopic Heller–Dor operation by a single surgeon. All the patients received upper gastrointestinal series (barium swallow), esophago-gastroscopy, and esophageal manometry to exclude esophageal carcinoma and to confirm the diagnosis. All the patients were operated by laparoscopic modified Heller myotomy with Dor fundoplication by using hook electrocautery. Among 25 operated patients, 14 were male and 11 were female with a median age of 43 years (range 18–72 years). The mean operative time was 93.3 min (range 50–150 min), the mean operative blood loss was 90 ml (range 40–200 ml), the median time to oral feeding was 2 days (2–4 days), and the median hospital stay was 4 days (4–7 days). There was no conversion to open surgery. Intraoperative mucosal perforation was encountered in three patients and was repaired in all of them by laparoscopic suture. All the patients had an uneventful recovery without postoperative complication and had excellent clinical response (96 %)

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during follow-up. Laparoscopic Heller–Dor operation using hook electrocautery is safe, inexpensive, and effective treatment for achalasia which is useful for teaching and training surgical residents in advanced laparoscopic surgery.

Keywords Achalasia cardia · Laparoscopy Hellers myotomy · Dor funduplications

Introduction

Achalasia is a primary motor disorder characterized by aperistalsis of the esophageal body and the absence of relaxation of the lower esophageal sphincter, which often has a high resting pressure [1]. The incidence of achalasia is about 0.3–11/10⁶ per year and the etiology is still not completely understood [2]. The basic principle of treatment consists of disruption of the unrelaxing lower esophageal sphincter either by myotomy or by forceful dilation, with success rates ranging from 70 to 95 % [3]. With the advent and subsequent refinement of minimally invasive surgery, laparoscopic esophageal cardiomyotomy rapidly replaced the open techniques (thoracotomy or laparotomy). Laparoscopic Heller–Dor procedure is now the treatment of choice for this disease with good results in over 90 % patients [4]. Another important aspect of laparoscopic Heller–Dor procedure is its potential as a teaching and training module for advanced laparoscopic surgery. The aim of this study was to analyze the clinical outcome of our initial experience in 25 patients along with assessment of this procedure as a teaching module.

Materials and Methods

Between January 2005 and December 2010, 25 consecutive patients with achalasia cardia underwent laparoscopic Heller cardiomyotomy and Dor fundoplication operation in our

department. Among them, 14 were male and 11 were female with a median age of 43 years (range 18–72 years) (Table 1). The symptom duration ranged from 1 to 30 years. All the patients experienced dysphagia before operation, and many of them also complained of regurgitation (14/25), heartburn (9/25), and chest pain (4/25). More than half of the patients (20/25) had undergone previous endoscopic treatment either by pneumatic dilatation and/or by botulinum toxin. Seventeen patients underwent pneumatic dilatation and 3 patients had botulinum toxin injection. With increasing experience, we observed a significant increase in the number of patients referred for treatment by laparoscopic Heller–Dor operation from our gastroenterologist colleagues. Preoperative evaluation included barium esophagogram, upper GI endoscopy, and manometry in all the patients to establish the diagnosis of achalasia and to rule out esophageal malignancy. All the relevant hematological and biochemical investigations were also performed. Preoperative chest physiotherapy and pulmonary medicine evaluation is an integral part for the preparation of the patient for surgery. All the patients underwent laparoscopic modified Heller myotomy with Dor fundoplication, and all the procedures were completed laparoscopically. Under general anesthesia, the patients were placed in the French position, with the operator standing between the legs. A pneumoperitoneum with a constant 12 mmHg intra-abdominal pressure was created through a 10 mm supra-umbilical incision using a Veress needle. Four or five trocars were inserted in the upper abdomen. The left hepatic lobe was lifted up by a fan retractor inserted through the right upper quadrant port to expose the esophageal hiatus. After the gastroesophageal junction was identified, a longitudinal dissection was performed with the Kellies forceps and electrocautery hook. The myotomy was started in the middle third of the exposed esophagus, lateral to the anterior vagus nerve. First, the longitudinal muscle layer was separated by two forceps and the circular muscular layer was separated by the stretching and tearing method very gently. Once the submucosal plane was identified in one place, the circular muscular layer was

separated from the submucosa, and it was lifted up by the hook diathermy and cut under direct vision all the time. When cutting the circular muscle layer, it was done only after it was lifted off the submucosa and always under vision. In case of mucosal perforation, it was repaired with “000” Vicryl (J&J, India) sutures in interrupted manner. We used diluted methylene blue solution at the end of surgery and checked for any leak. The myotomy was extended upward 7 cm on the esophageal side and downward 1–2 cm on the gastric side across the sling muscles of the gastroesophageal junction. The length of the myotomy was measured by the marks on the irrigation/suction tube. In the event of mucosal perforation, it was sutured with absorbable sutures laparoscopically. Then the anterior partial fundoplication was fashioned using the gastric fundus fixed to the edges of the myotomy with four to five absorbable stitches for each side. All the surgeries were done by a consultant surgeon along with a senior resident and a junior resident as assistants. The junior residents did all the port placements, and the senior residents did all the initial dissections and laparoscopic suturing during the Dor fundoplication. The patients were followed up in the outpatient department. The postoperative evaluation included clinical questionnaire and esophageal barium radiography routinely. The results were stratified as follows: no response (persistent or recurrent dysphagia), minor response (intermittent dysphagia within weeks), good response (mild dysphagia within months), and excellent response (no dysphagia and reflux) to treatment. Another questionnaire was prepared for stratification for the level of training and teaching during surgery for the surgical residents. This consisted of questionnaires for the theoretical part of achalasia management and the laparoscopic surgery for achalasia. The same questionnaires were answered by the residents before and after the surgery. They were also asked to comment on the experience of teaching and training of the surgery as unsatisfactory, satisfactory, or very satisfactory.

Table 1 Patients profile and preoperative data

Total numbers	25
Male	14 (56 %)
Female	11 (44 %)
Age in years (median)	43 (18–72)
Preoperative treatment	20 (80 %)
Endoscopic dilatation	17 (68 %)
Botulinum injections	03 (12 %)
Primary surgery	05 (20 %)
Preoperative symptoms	
Dysphagia	25 (100 %)
Regurgitations	14 (56 %)
Heartburn	09 (36 %)
Chest pain	04 (16 %)

Results

All patients were treated by laparoscopic modified Heller cardiomyotomy with Dor fundoplication without conversion (Table 2). The mean operative time was 93.3 min (range 50–150 min) and decreased with experience. The mean operative

Table 2 Intraoperative and postoperative data

Total numbers of Laparoscopic Heller myotomy	25
Mean operating time (minutes)	93.3 (50–150)
Mean operative blood loss (ml)	90 (40–200)
Mucosal perforation	03 (12 %)
Hospital stay (days)	04 (4–7)
Good response (mild dysphagia after months)	01 (4 %)
Excellent response (no dysphagia)	24 (96 %)

blood loss was 90 ml (range 40–200 ml), the median time to oral feeding was 2 days (range 2–4 days), and the median hospital stay was 4 days (range 4–7 days). Intraoperative mucosal perforation occurred in three patients. Among them two had undergone pneumatic dilatation twice and one had botulinum injection before surgery and was repaired by laparoscopic sutures. All the patients had an uneventful recovery without postoperative complication. They were advised soft semisolid diet for 1 month. They were followed up in the outpatient department every 15 days for 2 months and then every 30 days for 6 months, thereafter as and when basis or after 12 months. Manometric study was done after 3 months. After a median follow-up of 5.5 months (5–63 months), all patients were asymptomatic and 24 patients (96 %) had excellent response. All 25 patients had relief of dysphagia. One patient had developed mild dysphagia after 3 months of surgery. In 24 patients the body weight increased by 5–12 kg 3 months after operation. A total of 8 senior residents and 10 junior residents participated in the study, and 6 senior residents were very satisfied and 2 were satisfied. Out of 10 junior residents, 8 were very satisfied and 2 were satisfied. This result reflects a high level of effectiveness of this procedure as a teaching and training module for laparoscopic surgery.

Discussions

Achalasia cardia is a rare disease. It is often not diagnosed until several years after the first symptoms are noted. Due to the slow progress of the disease, the symptoms are often confused with gastroesophageal reflux disease or simple dyspepsia and treated accordingly. Arber reported a delay of 4.4 years in his series, attributing it to the rarity of the disease [5]. All treatments for achalasia aim to alleviate symptoms, although no treatment reverses the underlying neuropathological changes or associated impaired lower esophageal sphincter (LES) relaxation and aperistalsis.

Prior to the advent of minimally invasive surgery, most patients with esophageal achalasia opted for less effective medical treatments, such as medication, bougie or balloon dilation, and endoscopic injection of botulinum toxin into the LES. However, the results have been highly disappointing; therefore, these therapeutic modalities have largely been abandoned and are now recommended only for patients who refuse surgery or cannot tolerate an invasive procedure [6]. In 1991, Shimi et al. performed the first laparoscopic myotomy for achalasia; since its introduction, laparoscopic surgical management of esophageal achalasia has achieved rapid and widespread acceptance [7]. At most centers, it is now the treatment of choice for patients with this disease. As was reported before, the most frequent cause of failure or recurrence after this operation is an incomplete myotomy, both on

the mediastinal and gastric sides [8]. The open approach entails a perioperative mortality of 1.2 %, and the laparoscopic approach consistently achieves a zero mortality rate [9]. In our series, all 25 patients had minimal morbidity of surgery and excellent outcome in terms of relief of dysphagia and weight gain. There was no mortality. On the basis of our initial practice on laparoscopic Heller-Dor operation, we strongly agree that the minimally invasive procedures can offer many other advantages over conventional thoracotomy and laparotomy in addition to decreased pain, morbidity, and hospital stay. First, surgeons can operate with greater accuracy in identifying the muscle layers and other important structures (vagus nerve, blood vessels, etc.) due to the magnification of the operative field provided by videoendoscopy. Second, the minimally invasive approach minimizes the operative trauma because of no requirement for detachment of the esophagus from its bed, and furthermore, it decreases postoperative morbidity associated with the open surgical approach. In addition, the laparoscopic approach facilitates the execution and precision of the operation especially when combined with intraoperative endoscopy. Finally, minimally invasive myotomy and fundoplication can restore an optimal quality of life and significantly improve the social function of the patients [10].

Another controversy relates to the type of fundoplication in conjunction with the Heller myotomy. Most surgeons believe that Nissen fundoplication may ultimately lead to dysphagia and recommend partial wraps in association with the myotomy [10]. The Toupet posterior fundoplication has the theoretical advantage of preventing closure of the myotomy by fixing the gastric fundus to both edges of the myotomy, and also provides good protection against postoperative reflux in 93–100 % of patients [11]. Comparatively, the Dor anterior fundoplication may leave the posterior esophageal attachments and the short gastric vessels in place, and it is easier to construct with less operative time. On the basis of selected publications of laparoscopic Heller myotomy for achalasia, the mean operative time for Heller-Dor operation is 30–60 min shorter than that of Heller-Toupet operation [10]. Laparoscopic Heller myotomy has proved to be a safe and effective method, resulting in resolution of symptoms for 85–95 % of patients with little morbidity and almost no mortality [12]. The addition of a Dor fundoplication is quick, simple, and effective in preventing gastroesophageal reflux and is not associated with an increased rate of dysphagia [11, 12].

More and more advanced laparoscopic surgeries should be done in teaching hospitals not only for patient care but also for surgical resident training. Most of the patients in these hospitals come from low socioeconomic background and are working class who need all the above-mentioned advantages of minimally invasive surgery. Regarding resident training, this has become imperative for all surgical residents to have experience in minimally invasive surgery

at all levels. Laparoscopic Heller myotomy is one surgical procedure in which resident surgeons can be trained easily. The surgical steps of laparoscopic Heller–Dor procedures are well defined and straightforward. After laparoscopic cholecystectomy, in our opinion, this is another surgical procedure which can be used for training and teaching surgical residents. In our study more than 80 % residents were very satisfied of their training during the surgical procedure and its outcome. This is another reason for advocating laparoscopic Heller myotomy in teaching hospitals. The main drawback of our study is the nonvalidation of our observation. So we need a more objective and valid instrument to measure its effectiveness and genuineness.

In conclusion, the result of our initial experience in 25 patients shows that laparoscopic Heller–Dor operation for achalasia can be performed by the electrocautery hook. It is safe and has less pain, shorter hospital stay, and excellent outcome. It can be used as a teaching module for surgical resident training and teaching in advanced laparoscopic surgery.

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