

# Heller's Cardiomyotomy with Augmented Toupet's Fundoplication Immediate and Long Term Outcome

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**Background:** Achalasia patients who underwent Heller cardiomyotomy with Toupet's fundoplication have excellent results in a previous report data. However, the result with open technique has not been reported in Thai.

**Objective:** To study the immediate and long-term outcome of open transabdominal Heller cardiomyotomy with Toupet's fundoplication in Achalasia patients.

**Material and Method:** Retrospective review of all achalasia patients who underwent open Heller cardiomyotomy with Toupet's fundoplication in Maharaj Nakorn Chiang Mai Hospital, Thailand during the past ten years (1997-2007). The data was analysis with descriptive statistics.

**Results:** Twenty-two cases (11 male) were included in this study. Mean age was 40 years. The mean duration of symptoms before surgery was 62.5 months. Ninety-one percent of patients were free from dysphagia immediately after operation. There was no early postoperative complication. Three patients had relapse symptom (14%). Mean follow-up time in the present study was 30 months.

**Conclusion:** Open transabdominal Heller's cardiomyotomy with augmented Toupet's fundoplication done by experienced surgeons is an effective technique to treat achalasia patients in our center.

**Keywords:** Achalasia, Heller cardiomyotomy, Toupet fundoplication

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Achalasia is a degenerative change of Auerbach plexus of the esophagus from unknown etiology<sup>(1,2)</sup>, results in aperistalsis of the esophageal body and abnormal relaxation of the lower esophageal sphincter<sup>(3,4)</sup>, obstructed passage of food through cardia, which result in dysphagia. Usually, medical treatment fails to control symptoms of dysphagia in the long term<sup>(4)</sup>. In contrast to mechanical therapeutic option (Pneumatic dilatation), Heller's myotomy is an effective technique to improve dysphagia that results from abnormal relaxation of the lower esophageal sphincter<sup>(5-10)</sup>. Unfavorable results of the endoscopic treatment are the need to do re-intervention to achieve the therapeutic goal, and the possibility of recurrence. Contrastingly, Heller's cardiomyotomy can improve dysphagia immediately postoperation and the recurrent rate is low. Therefore, Heller's cardiomyotomy

is the most effective treatment for dysphagia in achalasia<sup>(8-10)</sup>. Most common performed operation for achalasia is Heller's cardiomyotomy. The muscular layer of esophagus is divided from the distal part of the esophagus to the proximal part of the stomach<sup>(11)</sup>. The authors conducted a retrospective study to analyze the outcome of surgical treatment and complication in Thai achalasia patients who underwent transabdominal Heller's cardiomyotomy with augmented Toupet's fundoplication in Maharaj Nakorn Chiang Mai hospital.

## Material and Method

The authors analyzed clinical data on 22 patients who had open transabdominal Heller's cardiomyotomy between January 1997 and December 2007. Achalasia was diagnosed by history taking and physical examination, Esophagogram and Endoscopic examination. Patient data included demographic data, time before surgery, weight loss, level of dysphagia, retention symptom and preoperative medication. Grading of achalasia was interpreted by measurement of maximal dilatation of AP view Esophagogram (Table 1). Operative data included operative time,

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**Table 1.** Grading of achalasia by esophagogram

| Dysphagia grade | Definition                                 |
|-----------------|--------------------------------------------|
| Grade 1         | size $\leq$ 3 cm                           |
| Grade 2         | size $>$ 3 cm but not more than 6 cm       |
| Grade 3         | size $>$ 6 cm                              |
| Grade 4         | size $>$ 6 cm with sigmoid like dilatation |

amount of blood loss, operative detail, postoperative complication, and recovery time. Postoperative follow-up data included improvement of dysphagia, weight gain, post operative GERD, postoperative GI contrast study and postoperative medication. Relapse of achalasia was defined as increased degree of dysphagia or retention symptom. The time after operation and relapse was collected. Overall improvement of disease was categorized as good, fair and poor. This retrospective study was approved by Maharaj Nakorn Chiang Mai ethic committee.

#### **Method of data analysis**

All continuous data are expressed as a mean and standard deviation. The categorized data are presented as percent. Time of relapse was calculated with Kaplan Mier survival curve to correct the missing cases.

#### **Surgical technique**

The operation was done through an upper midline incision. Mobilization of the left lobe of the liver was done by divided left triangular ligament. The gastric fundus was freed by ligation of short gastric arteries. Meticulous dissection at esophagogastric junction was performed cautiously to preserve the anterior vagus nerve. The myotomy was begun in anterior midline just above the constriction point. The incision was carried through the muscular layer of esophagus down to the submucosa, which remain intact. Once the esophageal submucosa was exposed, further myotomy was carried out by following a cleavage of plane between the overlying muscle layer and the submucosa. The myotomy was continued to 8-10 cm above the esophagogastric junction. The myotomy was extended across the gastroesophageal junction for 1.5-2 cm downward to the fundus (Fig. 1A, B). Posterior 180-degree partial fundoplication (Toupet's fundoplication) was performed (Fig. 2A, B). The crus of diaphragm was reapproximated behind the esophagus. The Jackson's pratt drain was

placed in the left subphrenic space and the wound was closed.

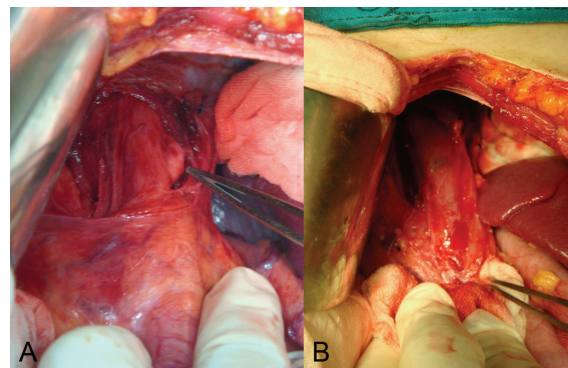
Major groups of patients who underwent Heller's cardiomyotomy with Augmented Toupet's fundoplication are dysphagia grade 2, 3 and 4 as shown in Fig. 3.

The preoperative esophagogram of patients demonstrated grade 2, 3, and 4 dilatation for the size of esophagus (Fig. 4).

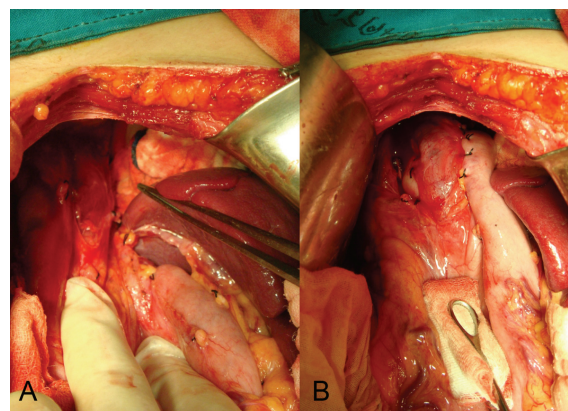
Preoperative esophagogram (upper row) and Postoperative esophagogram 1 month (lower row) show similarity in grade 4 achalasia patient (Fig. 5).

#### **Results**

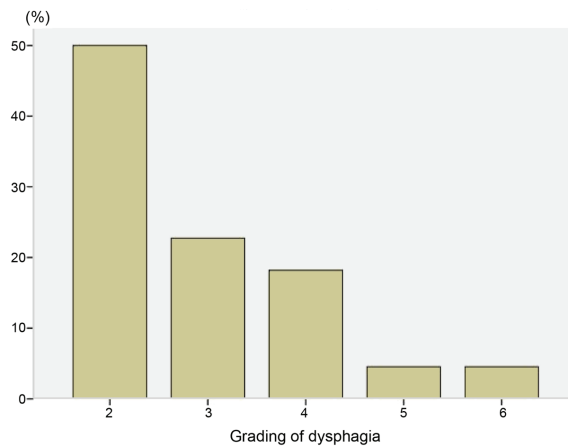
Twenty-two Achalasia patients underwent open transabdominal Heller's cardiomyotomy between



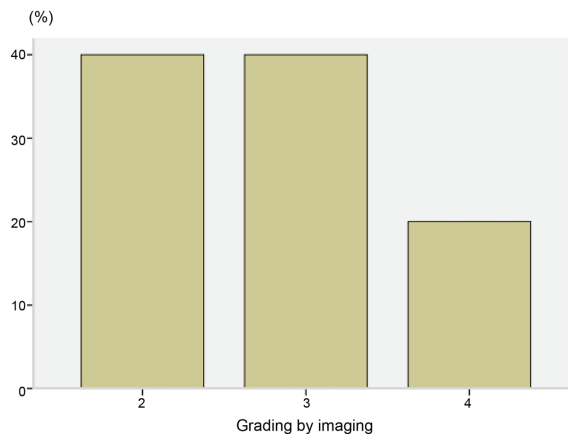
**Fig. 1** A) shows opened phrenoesophageal membrane and retracted vagus n  
B) shows that high pressure zone was incised to submucosal layer anteriorly



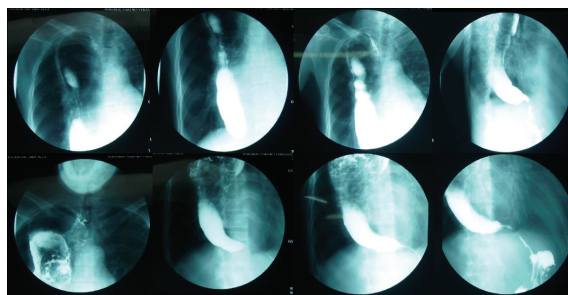
**Fig. 2** A) shows gastric fundus which short gastric artery was ligated  
B) shows posterior half "Toupet's fundoplication"



**Fig. 3** Preoperative grade level of dysphagia



**Fig. 4** Preoperative esophagogram grading



**Fig. 5** Preoperative and postoperative esophagogram

January 1997 and December 2007 (Table 2). The cases were divided equally between male and female. The mean age was 40 years (2-68 years). The mean duration of symptoms before surgery was 62.5 months

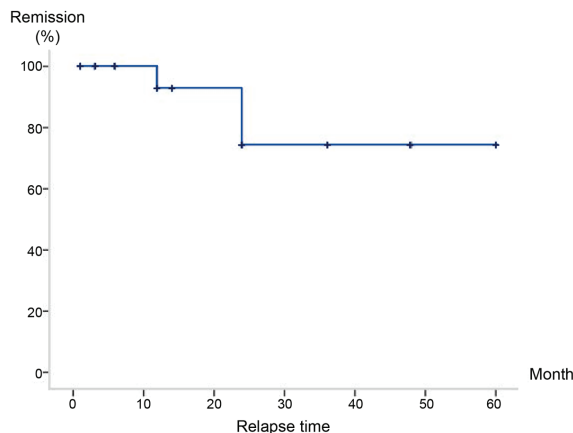
(2-240 months). Most patients (50%) experienced only the mild symptom of dysphagia (grade 2). Retention symptom occurred in 60% of patients (13 in 22). Contrast study resulted in grade 4 sigmoid like dilatation in four patients (18.2%), eight patients in grade 3 (36%), eight patients in grade 2 (36%) and the rest in missed data. The mean operative time was 134 minutes (60-185 minutes). Mean blood loss was 160 ml (0-1,500 ml). Only two patients had blood transfusion. Mean recovery time was 8.85 days (5-18 days) (Table 3). After the operation, 20 patients (91%) recovered from dysphagia. There was no early postoperative complication. Late operative related complication occurred in one patient as small bowel obstruction at two months after operation, but resolved after conservative treatment. Three patients had relapse symptom in the present study (14%), one patient occurred at 12 months and the others at 24 months. All relapsed patients had sigmoid like dilatation of esophagus on esophagogram. In one relapsed patient, aspiration pneumonia occurred due to recurrence of retention symptom. The patient died after intensive medical treatment due to severe sepsis and multi-organ failure. Correlation between esophagogram grading and relapse of symptom was tested with Pearson Chi-square method. The test showed significant

**Table 2.** Demographic data

| Characteristic         | Mean $\pm$ SD            |
|------------------------|--------------------------|
| Age                    | 40.41 $\pm$ 15.8 years   |
| Weight loss            | 4.77 $\pm$ 3.33 kg       |
| Time before surgery    | 62.50 $\pm$ 65.50 months |
| Albumin (preoperation) | 3.89 $\pm$ 6.60 g/dl     |
| Sex (male:female)      | 11:11                    |

**Table 3.** Operative data and result

| Characteristic         | Mean $\pm$ SD            |
|------------------------|--------------------------|
| Operative time         | 134.00 $\pm$ 30.00 mins  |
| Blood loss             | 160.00 $\pm$ 321.00 ml   |
| Time to recovery       | 8.86 $\pm$ 3.68 days     |
| Weight gain at 1 month | 2.55 $\pm$ 3.27 kg       |
| Weight gain at 3 month | 4.16 $\pm$ 4.65 kg       |
| Weight gain at 6 month | 4.28 $\pm$ 9.4 kg        |
| Time until improve     | 0.91 $\pm$ 3.98 months   |
| Relapse time           | 20.00 $\pm$ 13.84 months |
| Follow-up time         | 27.27 $\pm$ 50.14 months |



**Fig. 6** Relapse time - symptom curve for analysis of recurrence

correlation ( $p$ -value = 0.001). Mean follow-up time in the present study was 27 months (1-120 months).

The relapse time-symptom curve show 74% cumulative remission at 60 months (Fig. 6).

## Discussion

The present retrospective study demonstrated that open transabdominal Heller's cardiomyotomy with Toupet's fundoplication for achalasia is effective in long-term follow-up. In Ortiz et al series, which was reported in 2009, the technique was transabdominal Heller's cardiomyotomy with Toupet's fundoplication, remission population in 10 years follow-up was 85%<sup>(29)</sup>. The result was comparable to the present series in which dysphagia was relieved successfully approaching 90%. Most recurrence occurred within 2 years, and mainly occurred in high-grade achalasia, which determined by esophagogram. Devaney et al proposed indication for esophagectomy in achalasia patient who had tortuous mega esophagus, failure of multiple prior myotomy and/or dilatation, associated reflux stricture and reported excellence result that remission rate was 95%. However, a mortality rate of 2% was reported<sup>(30)</sup>. In the present series, the patient who died after aspiration pneumonia had been operated for subtotal gastrectomy 12 years ago, so that the operation was more difficult in technique to perform esophagectomy, which is usually indicated in grade 4 (sigmoid like dilatation of esophagus) achalasia patient. However, not all patients in high grade achalasia had an unfavorable result. Patti et al reported excellent results in Heller's cardiomyotomy in patients which had dilated (more than 6 cm) and tortuous esophagus,

remission of symptoms in 90%<sup>(27)</sup>. The present surgical technique focused on length of myotomy on gastric site, the 2 cm length was achieved in most cases and preservation of vagus nerve was strictly followed. AntiReflux procedure was clearly an important part in the operation for Achalasia patients since Richards et al reported the randomized controlled trial study that pathologic reflux and distal esophageal acid exposure was significantly higher in Heller-only group<sup>(31)</sup>. The authors chose Toupet's fundoplication as fundoplication of choice to prevent over plicated the esophagogastric junction. In the present study, no postoperative dysphagia occurred. Postoperative reflux occurred in 20% of patients but most are in mild form that need no medication and all disappeared in six months postoperation. In other series, the postoperative reflux symptom incidence was between 8-31% with various techniques of fundoplication<sup>(28,29,32)</sup>. The presented postoperative reflux incidence was comparable to other series. The weakest point in the present study is the diagnostic manometric study, which is the gold standard of achalasia reference, that is not available in our institute. Solidity of the present result that needed no additional intervention compared to other series which relied on endoscopic balloon dilatation technique and remission rate was lower in the present series (14% vs. 50%)<sup>(33,34)</sup>. Hugo et al reported the result of laparoscopic Heller's cardiomyotomy with Toupet's fundoplication that 16% had persistent swallowing problems, 11% reported frequent reflux, and 25% needed additional therapy<sup>(32)</sup>. Other laparoscopic series reported various results, reflux symptom 8-44% and relapsed dysphagia 10-16%<sup>(25,35,36)</sup>. However, when the authors compared the recovering time, bleeding to other modality (endoscopic dilatation, laparoscopic approach) it took longer hospitalization and time to recover.

## Conclusion

In modern endoscopic-preferred ERA, the open transabdominal Heller's cardiomyotomy with Toupet's fundoplication still proved effective to treat achalasia patients with good long-term results, acceptable postoperative recovery period and without early postoperative complications.

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## ผลของการผ่าตัด Heller cardiomyotomy ร่วมกับ Toupet fundoplication จากการศึกษาติดตาม ทั้งในระยะสั้นและระยะยาว

พันธุ์ภัทร จักรพันธุ์, สิริกาญจน์ ยามาตะ, ธีรภัทร จักรพันธุ์

**ภูมิหลัง:** โรค achalasia สามารถรักษาด้วยการผ่าตัด Heller cardiomyotomy with augmented Toupet's fundoplication ได้ผลลัพธ์ดีในรายงานการศึกษาจากต่างประเทศ อย่างไรก็ตามยังไม่มีรายงานถึงผลการรักษาด้วยการผ่าตัดเปิดในประเทศไทย

**วัตถุประสงค์:** เพื่อแสดงผลการรักษาผู้ป่วย achalasia ด้วยการผ่าตัดแบบ Heller cardiomyotomy ร่วมกับ Toupet's fundoplication ในหัวข้อเกี่ยวกับผลการรักษาระยะสั้นและระยะยาวรวมทั้ง ภาวะแทรกซ้อนต่าง ๆ

**วัสดุและวิธีการ:** การศึกษาแบบย้อนหลังโดยรวบรวมข้อมูลผู้ป่วย achalasia 22 รายที่เข้ารับการผ่าตัด Heller cardiomyotomy ร่วมกับ Toupet's fundoplication ด้วยเทคนิคการผ่าตัดแบบเปิด ในโรงพยาบาลมหาวิทยาลัยนครเชียงใหม่ ตั้งแต่เดือนมกราคม พ.ศ. 2541 ถึง เดือนธันวาคม พ.ศ. 2550 ข้อมูลถูกแปลผลด้วยสถิติเชิงพรรณนา

**ผลการศึกษา:** ผู้ป่วยทั้งหมดจำนวน 22 ราย เป็นเพศชาย 11 ราย (50%) เพศหญิง 11 ราย (50%) อายุเฉลี่ย 40 ปี ผู้ป่วยมีระยะเวลาที่มีอาการก่อนการรับการผ่าตัดรักษาเฉลี่ย 62.5 เดือน ผู้ป่วย 91% หายจากอาการกลืนลำบากทันทีหลังการผ่าตัด ไม่มีรายงานถึงภาวะแทรกซ้อนเฉียบพลันหลังการผ่าตัด ผู้ป่วย 3 ราย (14%) มีอาการกลับเป็นซ้ำระยะเวลาเฉลี่ยที่ผู้ป่วยได้รับการตรวจติดตามคือ 30 เดือน

**สรุป:** การผ่าตัด Heller cardiomyotomy ด้วยเทคนิคการผ่าตัดแบบเปิดผ่านช่องท้องร่วมกับ Toupet's fundoplication เป็นวิธีการผ่าตัดที่มีประสิทธิภาพในการรักษาผู้ป่วย achalasia

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