

A Simple Method of Truncal Vagotomy for the Definitive Treatment of Chronic Duodenal Ulcer Perforation

Anuwat Chantip, MD

Department of Surgery, Lampang Regional Hospital

Abstract

Objective: To present a simple method of truncal vagotomy procedure, especially for the posterior vagal trunk, for standard definitive treatment of chronic duodenal ulcer perforation, in operable patients with suspected low compliance to receive a complete course of postoperative *Helicobacter pylori* eradication.

Material and methods: A retrospective review of patients who underwent truncal vagotomy and pyroloplasty versus simple closure of perforation site for chronic duodenal ulcer perforation between September 2012 and June 2017. Clinical characteristics and surgical outcomes of patients, and details of surgical techniques for easy posterior truncal vagotomy were described.

Result: There were 28 chronic duodenal ulcer perforation patients in this study. Sixteen patients underwent simple closure perforation site with non-absorbable suture. Twelve patients underwent truncal vagotomy and modified Heineke-Mikulicz pyloroplasty. The ASA functional classification, co-morbid diseases and baseline characteristic of patients between both groups were similar. The operative time was also not significantly different between operations. There was no morbidity and mortality at the 30 days of follow up.

Conclusion: Simple posterior truncal vagotomy can be done safely with similar operative time as for simple closure in patients with perforated chronic duodenal ulcer.

Keywords: Truncal vagotomy, chronic duodenal ulcer perforation, recurrent duodenal ulcer perforation

INTRODUCTION

The excellent acid secretion control with proton pump inhibitor and H₂ receptor antagonists along with the discovery of *Helicobacter pylori* as playing an important role in peptic ulcer disease¹, have made vagotomy a rare procedure. When required, truncal vagotomy is generally performed in conjunction with either pyloroplasty or antrectomy².

The vagus nerve play role in regulating gastric acid production and parasympathetic esophageal

plexus of the vagus nerve give branch of anterior and posterior vagal trunk through the esophageal hiatus at the diaphragm. The anterior (left) vagal trunk is seen on anterior surface of distal esophagus, the posterior (right) vagal trunk usually closer to the right margin of esophagus and lies away from esophageal wall in loose areolar tissue on right crus of the diaphragm. After passing through esophageal hiatus, anterior vagal trunk was divided to a Hepatic division, run into the porta hepatis in lesser omentum, and principle anterior

nerve of Latarjet. Similarly the posterior vagal trunk divided into a large caliber division and principle posterior nerve of Latarjet. The variation involving the posterior vagal trunk was less common than those of anterior vagal trunk, but more difficult to visualize the posterior vagal element, criminal nerve of Grassi, and likely to be missed.

Perforation is often the first clinical presentation of peptic ulcer disease³. The perforation site usually located at the anterior wall of duodenum (60%) and lesser curvature gastric ulcers⁴. The peak incidence of age is 12-60 years and the current management for perforated peptic ulcer can be done with conservative management (Taylor method) based on the theory that effective gastric decompression and continuous drainage will enhance self healing^{5,6}. However, in patients more than 70 year of age or shock at admission were associated with a high mortality rate (64%) by conservative treatment.

After discovery of the role of *H. pylori* in peptic ulcers diseases by Barry J. Marshall and Robin Warren in 1982. More than 90% of duodenal ulcer and 80% of gastric ulcer were cause by this organism. The management of peptic ulcer disease was recommended that ulcer patients positive for *H. pylori* should be treated with antimicrobial agents⁷, according to the Maastricht 3 consensus report, with triple drug regimen plus proton pump inhibitor. However, with the acid secretion control with proton pump inhibitor and *H. pylori* eradication^{8,9}, the need for surgery for perforated peptic ulcer has remained stable.

Vagotomy procedure, gradually decline, is one of the additive definite procedure for chronic duodenal ulcer perforation. But, many surgeons have limited experience nowadays. It should be considered for patients who are found to be *H. pylori* negative, recurrent ulcers¹⁰ despite triple therapy and for low compliance patient to receive complete *H. pylori* eradication after simple closure.

This study was tried to conduct the simple surgical tips to do the vagotomy procedure especially for posterior vagal trunk, more difficult than anterior vagal trunk. This technique can be done in limited time without left lobe liver mobilized, need no encircle EG junction or dissection lesser omentum, as mention by the classical procedure, to avoid injury to nearby organ, adjacent blood vessels or weakened esophageal hiatus and lessen post-vagotomy complication.

MATERIAL AND METHODS

A single institution retrospective review during the period between September 2012 - June 2017. Ninety one perforated peptic ulcer patients were identified and collected, approval by Lampang Regional Hospital research ethics committee. All of the patients were categorized as acute duodenal ulcer perforation, chronic duodenal ulcer perforation and gastric ulcer perforation. There are only 12 cases from 28 cases of chronic duodenal ulcer perforation, which had definite surgical treatment by truncal vagotomy and pyroloplasty, single surgeon performed. Post operative outcomes were reviewed from medical chart and records reports as operative times, duration of hospital stay and complication after discharge follow up.

The demographic data of these groups were expressed as number, mean and standard deviation (SD) and compared the data of patients in simple closure method and patients who underwent truncal vagotomy and pyloroplasty group. The different between two groups were evaluated using chi-square test, *t*-test. The *p*-value of less than 0.05 is considered statistical significant.

The classical open truncal vagotomy procedure can be done with mobilization of left lobe of liver with left triangular ligament dissection and left lobe liver medial retraction to exposed and incised pars flaccida, then bluntly encircle esophagogastric junction with penrose drain. After esophagogastric junction is being retracted laterally, the right vagal trunk is identified. For the left vagal trunk, usually easier identified within the musculature part of distal esophagus

To performed open posterior truncal vagotomy in this study, my technique, just only place abdominal swab packing between posterior-lateral aspect of spleen and inferior surface of left hemidiaphragm to avoid short gastric vessel stretching and further inadvertent injury during EG junction dissection. Next step is to use index finger of surgeon's right hand for blunt dissection (Figure 1) at the left lateral aspect of EG junction adjacent to left crus of diaphragm anterior to abdominal aorta. We can use the 3rd finger of surgeon's right hand for downward and medially traction of the angle of His with the 4th, 5th finger place over fundus of stomach. We can feel a taut bowstring by the index finger, usually single, posterior vagal trunk nearby

right crus of the diaphragm and then used right angle clamp with surgeon's left hand to hold this nerve (Figure 2), 1-2 cm. of this trunk is excised between ligatures or clips. This approach can identify the posterior gastric branch, criminal nerve of Grassi, short gastric vessels and spleen obviously.

This technique can be done within minutes, without dissection left triangular ligament, left lobe liver mobilization, encircle or even sling the esophagus.



Figure 1 Blunt finger dissection, left side esophagogastric (EG) junction approach

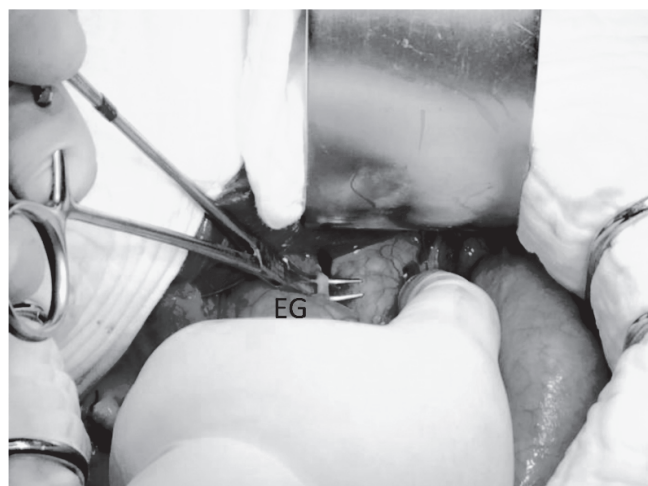


Figure 2 Right posterior vagal trunk was sling with right angle clamp of surgeon's left hand

These were tried to shorten operative time and get easier access to do the posterior truncal vagotomy procedure.

For the anterior truncal vagotomy, left vagal trunk, can be seen in the anterior surface of intra-abdominal esophagus and made more prominent by downward traction of stomach to render the esophagus then mobilized the vagus with right angle clamp, segment of vagus nerve is excised between ligature or clip.

Vagotomy is generally performed in conjunction with drainage, resection or diversion procedure. The definite procedure for chronic duodenal perforation in this study were truncal vagotomy and modified Heineke Mikulicz pyroloplasty procedure.

RESULT

There were 91 perforated peptic ulcer patients who underwent emergency operation from September 2012 to June 2017. Sixty three patients, who presented with acute duodenal ulcer perforation and gastric ulcer perforation, were excluded. Twenty eight patients, chronic duodenal ulcer perforation, were included in this study. The baseline characteristics between two groups were summarized in Table 1. The average age in the simple closure group was slightly higher but was not statistically significant. In case of simple closure group, four patients developed symptom more than 48 hours prior to admission. The average time of symptoms prior to admission was significantly higher in the simple closure group. The ASA class, ulcer size, degree of contamination, operative time and length of stayed were similar in both groups. The clinical characteristics and outcome were shown in Table 2. The only significant parameter is totally accumulation of peri-operative complication (p -value=0.036), such as the preoperative shock, respiratory failure and reoperation were occurred only in simple closure group (Table 3). After discharge, the patients have an appointment at 1 month for evaluation of the delayed complication. They were found to have no complications following the procedure (post vagotomy diarrhea, wound infection).

DISCUSSION

Prompt diagnosis and treatment of chronic duodenal ulcer perforation with operative intervention

Table 1 Demographic data of chronic duodenal ulcer perforation patients

	Simple closure(16)	TVP(12)	p-value
Age (year), (Mean±SD)	68.75±12.89	61±18	0.195
Sex male	12	8	0.561
Female	4	4	
Weight (kg), (mean ±SD)	48.62±10.44	50.41±8.60	0.633
Symptom PTA (hour), (mean±SD)	34.5±45.57	7.2±6.73	0.025
ASA class (median)	2.62(2)	2.33(2)	0.345
Co-morbidity conditions			
Diabetes	0	2	0.094
Hypertension	2	3	0.467
Coronary heart disease	2	0	0.356
NSAID used	1	2	0.431
Alcoholic	4	4	0.750
Smoking	2	4	0.239
Anemia	0	1	0.107
Previous DUP operation	1	1	0.887

PTA: prior to admission; DUP: duodenal ulcer perforation

Table 2 Comparison of clinical characteristics and outcome between 2 groups

	Simple closure(16)	TV (12)	p-value
White blood count, mm ³ (mean±SD)	8,621.87±5,383.89	12,559±6696.01	0.243
Ulcer size (cm)	0.64±0.32	0.56±0.33	0.561
Degree of contamination	Moderate	Moderate	
Operative time (min)	32.81±13.28	40.33±20.98	0.256
Length of stay (d)	8.18±6.16	5.41±0.79	0.135
Peri-operative complication	10	3	0.036

is almost always indicated. Unfortunately, risk of mortality range from 6% to 14%¹¹⁻¹³ in recent studies, several variables have been independently associated with an increase risk of mortality including age, American society of Anesthesiologist (ASA class), hypoalbuminemia, shock on admission¹⁴, Creatinine level¹⁵ and delayed in diagnosis and management (more than 24 hours)¹⁶, advance age (> 70 year) is associated with higher mortality, rate of approximately 41%^{17,18}. Many scoring system including the Boey scoring system, Mannheim peritonitis index¹⁹ and PULP score have been used to stratified the risk of the patients and predict the outcomes of patients with perforated peptic ulcer, but the strongest simple mortality predictor is hypoalbuminemia.

Surgery is the mainstay of treatment for perforated peptic ulcer. Disease is mainly occurred at the duodenal bulb, followed by the pyloric region and the gastric

Table 3 Perioperative complication

	Simple closure ¹⁰	TV (3)	p-value
Pre-operative shock	3	2	0.385
Post-operative shock	0	1	0.263
Pneumonia	2	0	0.185
Respiratory failure	4	0	0.052
Re-operation	1	0	0.256

body²⁰. The patients should be evaluated for *Helicobacter pylori*, present in 70-90% of duodenal ulcer and antibiotic therapy is the effective treatment. Nowadays, the most common method for the management is patch repaired with an omental pedicle, Graham patch, simple closure or omentopexy²¹, followed by *H. pylori* eradicated medication. The definitive repair, accompanied by ulcer operation either

a vagotomy or pyloroplasty, was declined then many surgeons practicing today have limited experience with these definitive ulcer operation.

For the patients, whom the definite ulcer surgery should be considered are those with duodenal ulcer perforation and chronic recurrent ulcer despite triple therapy. In this setting, truncal vagotomy and pyloroplasty, simple closure and parietal cell vagotomy or antrectomy with truncal vagotomy have all been advocated as suitable repair but the choice of definite operation should depend on experience of surgeon. This study was tried to performed easier definitive procedure, especially the truncal vagotomy method, with the similar total operative time as simple closure or patch technique. All case of definite procedure were underwent truncal vagotomy and modified Heineke-Mikulicz pyloroplasty, surgeon preference. After operation, with a short follow up, they all had no detectable dumping or post vagotomy diarrhea. Postoperative complication rates were significantly different between 2 groups, with more complications in the simple closure group possibly due to longer duration of symptoms prior to admission.

The most challenging clinical scenario for truncal vagotomy and pyloroplasty is the large, chronic and fix perforated kissing duodenal ulcer. The risk of repaired failure was high, from leakage pyloroplasty even in case of simple suture or omental patch repair, up to 12%²². In that case, the recommendation composed of tube duodenostomy, jejunal pedicle graft, jejunal serosal patch, partial gastrectomy or disconnection^{23,24}. Finally, the choice of repair should be depended on patient's clinical status, degree of contamination, ulcer size, location of perforation and surgeon experience.

CONCLUSION

Due to the widespread use of PPI in the last twenty years, the anti-ulcer operation were significantly decreased, especially an open procedure. In my opinion, this open procedure for group of patients with low compliance and alcoholics, they will not follow recommendation for post-operative antiulcer treatment, especially the recurrence chronic duodenal ulcer perforation patients. This simple open approach for truncal vagotomy and drainage procedure can be safely performed, not inferiorly than the classical methods.

REFERENCES

1. Marshall BJ, Warren JR. Unidentified curved bacilli in the stomach of patients with gastritis and peptic ulceration. *Lancet* 1984;1:1311.
2. Lagoo J, Pappas TN, Perez A. A relic or still relevant: the narrowing role for vagotomy in the treatment of peptic ulcer disease. *Am J Surg* 2014;207:120.
3. Druart ML, Van Hee R, Etienne J, et al. Laparoscopic repair of perforated duodenal ulcer: a prospective multicenter clinical trial. *Surg Endosc* 1997;11:1017-20.
4. Zittel TT, Jehle EC, Becker HD. Surgical management of peptic ulcer disease today: indication, technique and outcome. *Langen-becks Arch Surg* 2000;385:84-96.
5. Bucher P, Oulhaci W, Morel P, et al. Results of conservative treatment for perforated gastroduodenal ulcers in patients not eligible for surgical repair. *Swiss Med Wkly* 2007;137:337-40.
6. Donovan AJ, Berne TV, Donovan JA. perforated duodenal ulcer: an alternative therapeutic plan. *Arch Surg* 1998; 133:1166-71.
7. Fischbach LA, Goodman KJ, Feldman M, Aragaki C. Sources of variation of *Helicobacter pylori* treatment success in adults worldwide: a meta-analysis. *Int J Epidemiol* 2002; 31:128-39.
8. Sivri B. Trends in peptic ulcer pharmacotherapy. *Fundam Clin Pharmacol* 2004;18:23-31.
9. Malfertheiner P, Megraud F, O'Morain C, et al. Current concepts in the management of *helicobacter pylori* infection: the Maastricht III Consensus Report. *Gut* 2007; 56:772-81.
10. Schwesinger WH, Page CP, Sirinek KR, et al. Operation for peptic ulcer disease: paradigm lost. *J Gastrointest Surg* 2001;5:438-443.
11. FY L e, Leung KL, Lai BS, et al. Predicting mortality and morbidity of patients operated on for perforated peptic ulcer. *Arch Surg* 2001;136:90-4.
12. Arici C, Mesci A, Dincer D, et al. Analysis of risk factors predicting (affecting) mortality and morbidity of peptic ulcer perforation. *Int Surg* 2001;92:147-54.
13. Kocer B, Surmeli S, Solak C, et al. Factors affecting mortality and morbidity in patients with peptic ulcer perforation. *J Gastroenterol Hepatol* 2001;22:565-70.
14. Bucher P, Oulhaci W, Morel P, et al. Results of conservative treatment for perforated gastroduodenal ulcer in patients not eligible for surgical repair. *Swiss Med Wkly* 2007;137:337-40.
15. Moller MH, Shah KJ, et al. Risk factors in patients surgically treated for peptic ulcer perforation. *Scand J Gastroenterol*. 2009;44:145-52. 142. Following 152.
16. Boey J, Choi SK, Poon A, Alagaratham TT. Risk stratification in perforated duodenal ulcers. A prospective validation of predictive factors. *Ann Surg* 2001;205:22-6.
17. Uccheddu A, Floris GM, Altana M, et al. Survey for perforated peptic ulcer in the elderly. Evaluation of the factors influencing prognosis. *Hepatogastroenterology* 2003;

- 50:1956-8.
18. Tsugawa K, Koyanaki N, Hashizume M, et al. The therapeutic strategies in performing emergency surgery for gastro-duodenal ulcer perforation in 130 patients over 70 years of age. *Hepatogastroenterology* 2001;48:156-62.
 19. Linder MM, Wacha H, Feldmann U, et al. The Mannheim peritonitis Index. An instrument for the intraoperative prognosis of peritonitis. *Chirurg* 2001;58:84-92.
 20. Bertleff MJ, Lange JF. Laparoscopic correction of perforated peptic ulcer: first choice? A review of literature. *Surg Endosc* 2010;24:1231-9.
 21. Cellan-Jones CJ. A rapid method of treatment in perforated duodenal ulcer. *Br Med J* 1929;1:1076-7.
 22. Jani K, Saxena AK, Vaghasia R. Omental plugging for large-sized duodenal peptic perforations: a prospective randomized study of 100 patients. *South Med J* 2006;99:467-71.
 23. Lal P, Vindal A, Hadke NS. Controlled tube duodenostomy in the management of giant duodenal ulcer perforation: a new technique for surgically challenging condition. *Am J Surg* 2009;198:319-23.
 24. Gupta S, Kaushik R, Sharma R, et al. The management of large perforations of duodenal ulcers. *BMC Surg* 2005;5:15.

บทคัดย่อ การตัดเส้นประสาทเวกัสส่วนโคนอย่างง่ายสำหรับการรักษาแบบแน่นอนในผู้ป่วยแผลเปปติก กดูโอดีนัมเรื้อรังทะลุ

อนุวัติ จันทิพย์

กลุ่มงานศัลยกรรม โรงพยาบาลลำปาง

วัตถุประสงค์: เพื่อจะนำเสนอวิธีการทำ truncal vagotomy procedure อย่างง่าย สามารถทำได้ในระยะเวลาอันรวดเร็ว โดยเฉพาะในส่วนของ posterior vagal trunk ซึ่งการทำหัตถการ truncal vagotomy จะทำในการรักษาแบบจำเพาะสำหรับผู้ป่วยที่เป็นโรค chronic duodenal ulcer perforation ในกรณีที่ผู้ป่วยนั้นมีข้อบ่งชี้และการรักษาโดยการทำ simple closure perforation ร่วมกับการกำจัดเชื้อ *H. pylori* นั้น ไม่สามารถทำได้ เช่นในผู้ป่วยที่มีการเกิด recurrent duodenal ulcer perforation, ผู้ป่วยที่ไม่เข้าใจ และไม่สามารถปฏิบัติตามแผนการรักษาอย่างเคร่งครัด

วัสดุและวิธีการ: เป็นการศึกษาย้อนหลังในผู้ป่วยแผล peptic ชนิด chronic duodenal ulcer perforation โดยเปรียบเทียบวิธีการผ่าตัดแบบ simple closure perforation กับผู้ป่วยที่ได้รับการผ่าตัด truncal vagotomy pyloroplasty ในช่วงระหว่างเดือน กันยายน 2555 ถึงเดือน มิถุนายน 2560 โดยมีการแจกแจงกลุ่มประชากรที่เข้ามาในการศึกษา, ผลการรักษาและได้นำเสนอรายละเอียดวิธีการผ่าตัด posterior truncal vagotomy แบบง่าย

ผลการศึกษา: มีผู้ป่วย chronic duodenal ulcer perforation ที่นำเข้ามาในการศึกษาทั้งหมด 28 ราย, 16 ราย ทำหัตถการ simple closure perforation, 12 รายทำการผ่าตัด truncal vagotomy pyloroplasty ชนิด modified Heineke Mikulicz pyloroplasty มีการแจกแจงปัจจัยพื้นฐานโรคร่วม รวมทั้งความแข็งแรงของผู้ป่วย ทั้งนี้ไม่พบความแตกต่างกันของกลุ่มประชากรที่นำเข้ามาศึกษาทั้ง 2 กลุ่ม โดยเฉพาะระยะเวลาในการทำหัตถการทั้ง 2 แบบไม่ได้แตกต่างกัน และจากการติดตามผู้ป่วยหลังจำหน่ายไปแล้ว 1 เดือน ก็ไม่พบผลแทรกซ้อนและการเสียชีวิต

สรุป: การทำหัตถการ truncal vagotomy สามารถทำได้โดยใช้ระยะเวลาสั้นและมีความปลอดภัย ใกล้เคียงกับ simple closure perforation ในผู้ป่วย perforated chronic duodenal ulcer