Proximal gastrectomy versus total gastrectomy for proximal gastric carcinoma

A meta-analysis on postoperative complications, 5-year survival, and recurrence rate

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ABSTRACT

الأهداف: مقارنة استئصال المعدة الداني والكلي لسرطان المعدة الداني من خلال معدل البقاء لخمس سنوات، وفترة الانتكاسة، ومضاعفات بعد الجراحة، وجودة الحياة.

الطريقة: أجريت دراسة تحليلية في قسم الجراحة العامة التابع لمستشفى جامعة سوتشو، سوزوهو، الصين. قمنا بمراجعة قواعد المعلومات ومكتبة كوكرين خلال الفترة من يونيو 2012م حتى نوفمبر 2012م. أجري البحث باستخدام المصطلحات التالية: استئصال المعدة الداني، استئصال المعدة الكلي، استئصال المعدة الجزئي، الأورام المعدية، سرطان المعدة. وأجرى مراجعين البحث وقاموا بتقييم الدراسات.

النتائج: اشتملت الدراسة على 2 تجارب مخبرية عشوائية و9 دراسات استعادية. اشتملت دراستنا على 1364 مريض. أظهرت نتائج الدراسة أنه لا يوجد اختلاف مهم إحصائي في معدل الحياة بين استئصال المعدة الكلي، واستئصال المعدة الجزئي 60.9% ضد 64.4%. وكانت الرجعة أعلى لدى مجموعة استئصال المعدة الجزئي من استئصال المعدة الكلي 38.7% ضد 24.4%. كما كان معدل التضيق التفاغري مرتفع لدى استئصال المعدة الجزئي من استئصال المعدة الكلي 27.4% ضد 7.4%.

خاتمة: أن استئصال المعدة الداني وسيلة آمنة لسرطان المعدة العلوي. وملازم مع ارتفاع اعراض الارتجاع والتضيق التفاغري. ولهذا السبب المذكور استئصال المعدة الكلي يعد الخيار الأول لسرطان المعدة الداني ولمنع أعراض الارتجاع.

Objectives: To compare proximal gastrectomy (PG) with total gastrectomy (TG) for proximal gastric carcinoma, through the 5-year survival rate, recurrence rate, postoperative complications, and long-term life quality.

Methods: The meta-analysis was carried out in the General Surgery Department of the Second Affiliated Hospital of Soochow University, Suzhou, Jiangsu Province, China. We searched Medline, EMBASE, and the Cochrane Library from June to November 2012. The literature searches were carried out using medical subject headings and free-text word: "proximal gastrectomy" "total gastrectomy" "partial gastrectomy" "stomach neoplasms" and "gastric cancer". Two different reviewers carried out the search and evaluated studies independently.

Results: Two randomized controlled trials and 9 retrospective studies were included. A total of 1364 patients were included in our study. Our analysis showed that there is no statistically significant difference in 5-year survival rate between PG and TG (60.9% versus 64.4%). But, the recurrence is higher in the PG group than the TG (38.7% versus 24.4%). The anastomotic stenosis rate is also higher in the PG than the TG (27.4% versus 7.4%).

Conclusion: Proximal gastrectomy is an option for upper third gastric cancer in terms of safety. However, it is associated with high risk of reflux symptoms and anastomotic stenosis. Therefore, TG should be the first choice for proximal gastric cancer to prevent reflux symptoms.

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Over the past 20 years, while the incidence of distal gastric cancer has decreased, the incidence of adenocarcinoma of proximal gastric cancer is increasing more rapidly than that of any other type of carcinoma in Western countries, with the same trends reported in China.[1,2] There are 2 options for the surgery treatment of proximal gastric cancer: proximal gastrectomy (PG) and total gastrectomy (TG). The traditional TG for proximal gastric cancer can be with extended lymph node dissection, while the PG is function-preserving and limited surgery, but after PG, 16.2-29.2% of patients suffer reflux symptoms.[3,4] So whether PG or TG is the better choice for proximal gastric cancer is still controversial. The extent of surgical resection for proximal gastric cancer has been debated for many years. The aim of our study is to evaluate value of PG versus TG through the 5-year survial rate, recurrence rate and surgical complications for upper third gastric cancer.

Methods. *Search strategy.* The meta-analysis was carried out in the General Surgery Department of the Second Affiliated Hospital of Soochow University, Suzhou, Jiangsu Province, China. We searched the Medline, EMBASE and Cochrane Library from June 2012 to November 2012. The literature searches were carried out using medical subject headings and free-text word: "proximal gastrectomy" " total gastrectomy" "partial gastrectomy" "stomach neoplasms" "gastric cancer".

Inclusion criteria. All randomized, non-randomized controlled clinical trials, which compared PG with TG treatment methods for proximal gastric cancer, and which reported 5-year survival rate and recurrence rate as the outcome, were included. Studies on patients must be with upper third gastric cancer.

Exclusion criteria. Abstracts, letters, case reports, comments, and conference proceedings were not included in the review. We exclude studies with small-sized group (<10 patients) or with no long time follow-up.

Data collection. Two reviewers independently extracted the following from each study: first author, publication data, study design, inclusion criteria, and exclusion criteria.

Statistical analysis. We used Review Manager 5.0 to conduct the review. The Mantel-Haenszel method was used for the statistical analysis of the 5-year survival, recurrence, and complications. Dichotomous data were analyzed for odds ratio (OR) and 95% effectiveness confidence interval. The results were displayed by forest plot graph.

Effects on quantitative measures were analyzed by the weighted mean difference (WMD) approach for estimated blood loss, operation time, the lymph nodes retrieved and the serum hemoglobin levels. Inverse Variance (IV) test was used for WMD estimate. A p-value <0.05 was considered as statistical significance.

Results. Two randomized controlled trials and 9 retrospective studies were included[5-15] (**Table 1**). A total of 1364 patients were included in our study. Our data analysis showed that there is no statistically significant difference of 5-year survival rate between PG and TG (total 1245 patients: 60.9% versus 64.4%; heterogeneity: Chi^2 = 13.24, p=0.07) (**Figure 1**). But, the recurrence is higher in the PG group than TG (total 590 patients: 38.67% versus 24.38%; heterogeneity: Chi^2 = 16.08, p=0.001) (**Figure 2**).

The reflux symptoms are more common in the PG than TG (total 917 patients: 19.55% versus 2.15%; heterogeneity: Chi^2=15.41, p=0.004) (**Figure 3**). The anastomotic stenosis rate is also higher in the PG than TG (total 1011 patients: 27.40% versus 7.40%; heterogeneity: Chi^2=13.36, p=0.010) (**Figure 3**). The anastomotic leakage rates of 2 group are no different (total 1084 patients: 2.19% versus 2.61%; heterogeneity: Chi^2=2.78, p=0.73) (**Figure 3**). Also, there is no difference of obstruction rate between 2 groups (total 917 patients: 1.50% versus 2.92%; Heterogeneity: Chi^2=2.36, p=0.67) (**Figure 3**).

For the surgical outcome, our study found that the estimated blood loss is obviously lower in the PG than TG (total 289 patients; Heterogeneity: Chi^2=32.81, p<0.00001) (**Figure 4**). And the mean operative time of PG is also obvious less than PG (total 289 patients; Heterogeneity: Chi^2=56.99, p<0.00001) (**Figure 4**). But, the lymph nodes retrieved were obvious less in the PG group than TG (total 733 patients; Heterogeneity: Chi^2 = 33.47, p<0.00001) (**Figure 4**). The postoperative-hospital-stay of patients with PG obvious less than TG (total 216 patients; heterogeneity: Chi^2=13.22, p=0.001) (**Figure 4**).

For the long-term life quality, the serum hemoglobin levels has no significantly different in the 2 groups at 24 months postoperatively (total 476 patients; heterogeneity: Chi^2=4.86, p=0.16; I^2=79%) (**Figure 5**).

Disclosure. Authors have no conflict of interests, and the work was not supported or funded by any drug company.

Table 1 - Summary of published information from retrospective controlled studies.

Author and date	Type of study	Patients	Reconstructions
Tsujitani et al[5] 1992	Retrospective controlled study	53 patients with early cancer of the proximal gastric	PG: end-to-side esophagojejunostomy with jejuna transaction; TG: RYR
Zhou et al[6] 2007	Retrospective controlled study	45 patients with cancer of the cardia and esophagogastric junction	Not mentioned
Wang et al[7] 2004	Randomized controlled study	86 patients with proximal gastric cancer	PG: E-G stomy TG: FJI
Chang et al[8] 2005	Randomized controlled study	51 patients with upper third gastric cancer	PG: PGJP TG: TGRY
Chang et al[9] 2004	Retrospective controlled study	259 patients with upper third gastric cancer	PG: esophagogastric anastomosis TG: RYR
Yeong et al[10] 2008	Retrospective controlled study	423 patients with upper-third early gastric cancer at histological stage I or II (T1N0M0, T1N1-2M0)	PG: esophagogastric anastomosis TG: RYR
Kim et al[11] 2006	Retrospective controlled study	147 upper one-third of gastric cancer	PG: esophagogastric anastomosis TG: end to side esophagojejunostomy and RYR
Kondoh et al[12] 2007	Retrospective controlled study	20 patients with stage 1a gastric cancer	PG: esophagogastric anastomosis TG: RYR
Lawrence et al[13] 1998	Retrospective controlled study	98 patients with adenocarcinoma of the proximal one third of the stomach or gastroesophageal junction	Not mentioned
Shiraishi et al[14] 2002	Retrospective controlled study	51 patients with proximal gastric carcinoma histologically in stage I or II	PG: 14 gastric tube reconstruction 17 jejunal interposition TG: RYR
Sang et al[15] 2012	Retrospective controlled study	131 upper-third gastric adenocarcinoma of clinical stage I (T1N0M0 or T2 N0M0)	PG: E-G stomy; TG: E-j stomy RYR

PG - proximal gastrectomy, TG - total gastrectomy, RYR - Roux-en-Y reconstruction, E-G stomy - esophagogastrostomy, FJI - total gastrectomy jejunal interposition instead, PGJP - proximal gastrectomy with jejunal pouch interposition, TGRY - total gastrectomy with Roux-en-Y esophagojejunostomy, E-Jstomy - esophagojejunostomy, T - tumor, N - note, M - metastasis

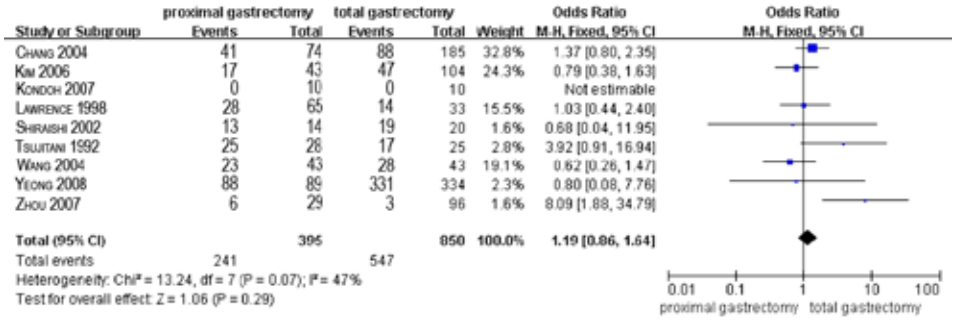

Figure 1 - Analysis of controlled studies of proximal gastrectomy (PG) versus total gastrectomy (TG) in patients with proximal gastric carcinoma. Outcome: 5-year survival rate. 95% CI - 95% confidence interval, M-H - Mantel-Haenszel, df - degrees of freedom, OR - odds ratio

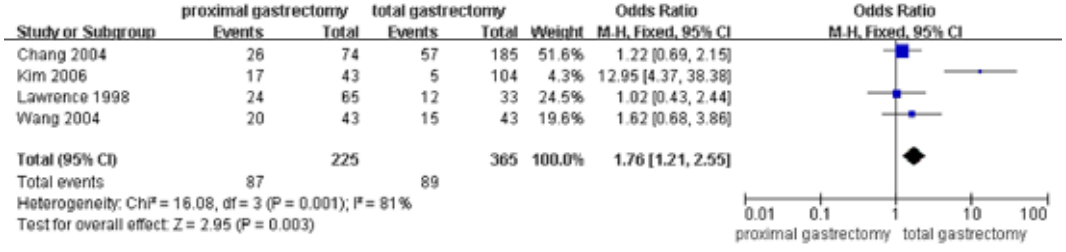

Figure 2 - Analysis of controlled studies of proximal gastrectomy (PG) versus total gastrectomy (TG) in patients with proximal gastric carcinoma. Outcome: recurrence rate. 95% CI - 95% confidence interval, M-H - Mantel-Haenszel, df - degrees of freedom, OR - odds ratio

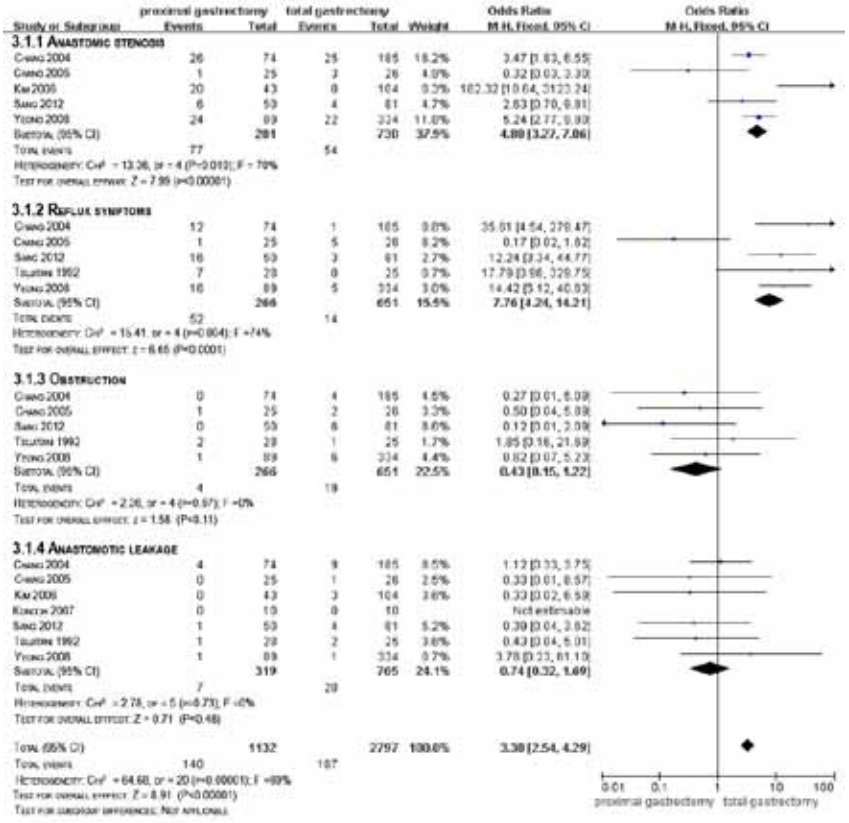

Figure 3 - Analysis of controlled studies of proximal gastrectomy (PG) versus total gastrectomy (TG) in patients with proximal gastric carcinoma. Outcome: complications after gastric surgery. 95% CI - 95% confidence interval, M-H - Mantel-Haenszel, df - degrees of freedom, OR - odds ratio

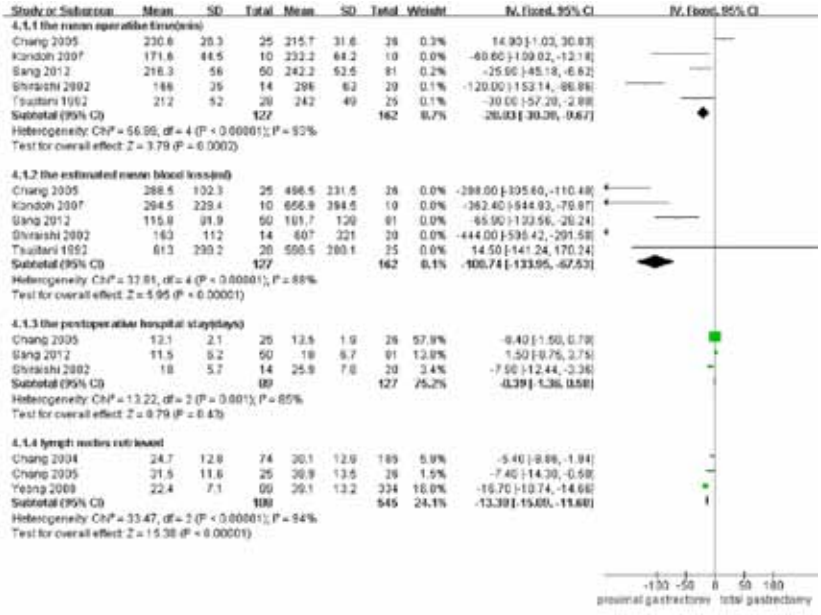

Figure 4 - Analysis of controlled studies of proximal gastrectomy (PG) versus total gastrectomy (TG) in patients with proximal gastric carcinoma. Outcome: meta-analysis for outcome of proximal gastrectomy. 95% CI - 95% confidence interval, M-H - Mantel-Haenszel, df - degrees of freedom, OR - odds ratio

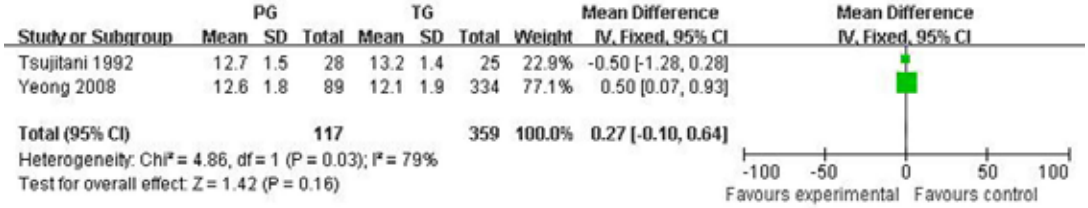

Figure 5 - Analysis of controlled studies of proximal gastrectomy (PG) versus total gastrectomy (TG) in patients with proximal gastric carcinoma. Outcome: serum hemoglobin levels. 95% CI - 95% confidence interval, M-H - Mantel-Haenszel, df - degrees of freedom

Discussion. Also in China, the total gastrectomy is still the first option for upper third gastric cancer. The incidence of gastric cancer did not increase recently, but the incidence of upper third gastric cancer has increased recently[16] and the surgery is still one of the main treatments. But there is no final conclusion of surgical method for proximal gastric cancer because of there is a little number of randomized, controlled studies comparing PG to TG.[3]

Our study showed that the PG is safe and reasonable in terms of mean operative time, estimated blood loss, and there are no differences of 5-year survival rate, early complication rate and the postoperative- hospital- stay between the 2 procedures. But the late complication rate, especially for the reflux symptom, anastomotic stenosis and recurrence, is obviously higher in the PG group than TG group, as with other systematic review.[17] Also the lymph nodes retrieved were obvious less in the PG group than TG. Compared with the total gastrectomy, proximal gastrectomy has the following disadvantages: (1) The lymph nodes retrieval is incomplete of greater gastric curvature (No. 4), the superior pyloric lymph nodes (No. 5), the inferior pyloric lymph nodes (No. 6), splenic lymph nodes (No. 10) and splenic artery lymph nodes (No. 11). On the other hand, total gastrectomy, compared to the proximal gastrectomy has the following advantages: (1) tumor resection range enough, lymph node dissection thoroughly; (2) full stomach anastomosis simple; (3) less postoperative complications. And the results of our study showed that the recurrence rate of TG was obviously lower than PG (**Figure 2**), since that the PG may have more radical resection extent and more lymph nodes retrieved (**Figure 4**). The meta-analysis showed that the 5-year-survival rates were same in the 2 groups. So we would focus on the postoperative complications and quality life of postoperative. Our analysis showed that the estimated blood loss and mean operative time were less in the PG (**Figure 4**), but the postoperative complications of reflux symptom and anastomotic stenosis were more in the PG (**Figure 3**). Various reconstruction methods developed to overcome the reflux symptom, but one study reported that 100% of patients experienced reflux symptoms.[18] Some study showed that the jejuna pouch interposition (PGJP) is safe and offers better nutritional status and a greater reduction in postgastrectomy symptoms than total gastrectomy with Roux-en-Y esophagojejunostomy (TGPY).[19]

Study limitations. The main limitation of our study is the small number of randomized controlled studies, and we included some retrospective studies in the statistical analysis. When we searched the databases, we limited the language, and we could not find studies of another language.

In conclusion, TG should be the criterion standard method in the treatment of proximal gastric cancer, although more high quality randomized controlled clinical trials are expected.

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