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Comparison of Short-term Clinical Outcomes between Complete Laparoscopic and Laparoscopic-assisted Total Gastrectomy for Gastric Upper Cancer: A Meta-analysis

Haiyuan Zhao and Yisheng Zhang*

Department of General Surgery, The First Affiliated Yijishan Hospital of Wannan Medical College, People's Republic of China

***Corresponding author:** Yisheng Zhang, Chief Physician, Department of General Surgery, The First Affiliated Yijishan Hospital of Wannan Medical College, People's Republic of China, Tel: +8655313855300038; E-mail: dukzhao@163.com

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Abstract

Objective: Laparoscopic-assisted total gastrectomy (LATG) is the most commonly used method for laparoscopic treatment of gastric upper gastric cancer. However, because of the difficulties of total laparoscopic reconstruction, especially *in vivo* esophageal jejunum anastomosis is not easy to complete, resulting in a large number of complete laparoscopic total gastrectomy (TLTG), but it is worth to explore the complete laparoscopy the clinical value of total gastrectomy. This study from the perspective of evidence-based medicine TLTG treatment of gastric cancer in the safety and feasibility of the recent and effective.

Methods: A comparative study of the efficacy of TLTG and LATG in the treatment of upper gastric cancer was published in 2017. Meta-analysis was performed using RenMan 5.3 software.

Results: A total of 912 patients with gastric cancer were enrolled in this study. Among them, 425 LATG patients and 487 TLTG patients were all Asian populations. The results of meta-analysis showed that there was no significant difference in TLTG between operation time, proximal margin, lymph node dissection, postoperative complications and the most important complication of the anastomotic fistula compared with LATG (MD=-65.91, 95% CI: -114.18 ~ -1.7.65, P<0.05), but the length of incision was shorter (P<0.05), but the length of incision was shorter (MD=-4.91, 95 (MD=-1.07, 95% CI: -1.88 ~ -0.26, P<0.05), the time of premature feeding was earlier (MD=-1.07, 95% CI: -1.88 ~ -0.26, P<0.05) (MD=-1.55, 95% CI: -2.70 ~ -0.40, P<0.05). The postoperative hospital stay was shorter (MD=-1.55, 95% CI: -2.70 ~ -0.40, P<0.05).

Conclusion: TLTG is safe and feasible in the treatment of upper gastric cancer in Asian population, and has the advantages of quick recovery after incision.

Keywords: Gastric cancer; Total laparoscopic total gastrectomy; Laparoscopic total gastrectomy; Meta-analysis

Introduction

Gastric cancer is the fourth most common cancer in the world, since 2008 because of cancer causes death in gastric cancer in the second [1]. Surgery is widely used as the most effective treatment for gastric cancer. Since the first report in 1994, the number of patients undergoing laparoscopic gastrectomy (LG) has been increasing rapidly. In the early distal gastric cancer surgery, some randomized controlled trials showed laparoscopic gastrectomy without inferior open gastrectomy, and large retrospective study also received the acceptance and recognition of oncology [2]. In addition, laparoscopic surgery has the potential to restore fast, less complications, reduce bleeding and reduce the possibility of blood transfusion, laparoscopic small incision to reduce pain, reduce the risk of intestinal obstruction and the risk of the wound. Laparoscopic total gastrectomy (LATG) and total laparoscopic gastrectomy (TLTG) are two common methods of LG gastric cancer. Often, LATG's *in vitro* coincidence is performed through a 5-7 cm small incision in the upper abdomen. However, in obese patients with laparoscopic assisted total gastric anastomosis, prolonged incision is a necessary condition for the safety of anastomosis. In addition, in the case of shorter esophageal stumps, and in a limited space to do anastomosis more difficult, TLTG is another way of endoscopic anastomosis, that is, *in vivo* resection and anastomosis. It has advantages over LATG, including smaller wounds, less invasive [3-6]. Although the amount of laparoscopic radical gastrectomy (TLDG) is increasing due to the progress of laparoscopic surgical instruments and the accumulation of surgical experience, the technique of total laparoscopic total gastrectomy (TLTG) is difficult, especially in the esophagus Anastomosis of the jejunum does not allow full opening. This article further demonstrates the feasibility and safety of TLTG through Meta-analysis.

Materials and Methods

LATG was used as the search term in PubMed, Embase, MEDLINE, Cochrane and other databases. The results were as follows: (1) The expression of laparoscopic assisted total gastrectomy (LATG) (CNKI), Chinese Journal of Biomedical Periodicals (CMCC), Chinese Journal of Gastroenterology, Chinese Academy of Sciences, Beijing 100029, China.

Objective

To investigate the effect of total laparoscopic total gastrectomy on laparoscopic total gastrectomy, and the Vibro database in the laparoscopic and total laparoscopic radical gastrectomy clinical efficacy of the literature; seized years from the reservoir to June 2017, the language is limited to Chinese and English, while the selected study of the reference literature to expand the search.

Inclusion and exclusion criteria

Included in the standard:

Type of study: included in the comparison of laparoscopic assisted and laparoscopic radical gastrectomy clinical study of the efficacy of the study.

Subjects: radical gastrectomy radical resection of gastric cancer patients.

Intervention: laparoscopic assisted laparoscopic assisted radical resection of gastric cancer, total laparoscopic group of patients underwent radical gastrectomy.

Outcome index: the literature at least one of the following indicators: Operation time, proximal margin, intraoperative blood loss, intraoperative lymph node dissection, incision length, postoperative first exhaust time, eating time, postoperative hospital stay and postoperative complications, postoperative anastomotic fistula.

Exclusion criteria

The study of benign stomach disease, recurrent gastric cancer.

For the radical laparoscopic radical gastrectomy.

Did not report the clinical efficacy of two surgical methods; Published or lack of original data.

Data extraction and document quality assessment

Document data was independently extracted by two researchers, and it was difficult to determine whether or not to incorporate the study into the study, either by discussion or by the third researcher. The extraction data mainly include: literature nomination, author, publication time, research methods, sample size, case characteristics, surgical related indicators and postoperative recovery. The quality of the literature was evaluated by the Newcastle-Ottawa Scale (NOS) scale. The quality score was higher than 6 points, which indicated that the quality of the literature was high and included in the meta-analysis.

Statistical analysis

Meta-analysis was performed using RevMan 5.2 statistical software to calculate the odds ratio (odds ratio, OR), 95% confidence interval (95% confidence interval, 95% CI), mean difference (MD) I2 Analysis of heterogeneity, I2<50% that homogeneity is good, using a fixed effect model for analysis; I2 ≥ 50% that is included in the study between the statistical homogeneity, the use of random effects model analysis. Draw a funnel chart to analyze publication bias. Selected literature was arranged according to the published year. P<0.05 for the difference was statistically significant.

Result

Into the literature

A total of seven articles in line with the standard into the study, the literature search process shown in Figure 1, in which the English literature 4, 3 articles, the cumulative sample size of 912 cases, including total laparoscopic resection of 487 cases, laparoscopic total gastrectomy group 425 cases. The basic data and quality score of the literature are shown in Table 1.

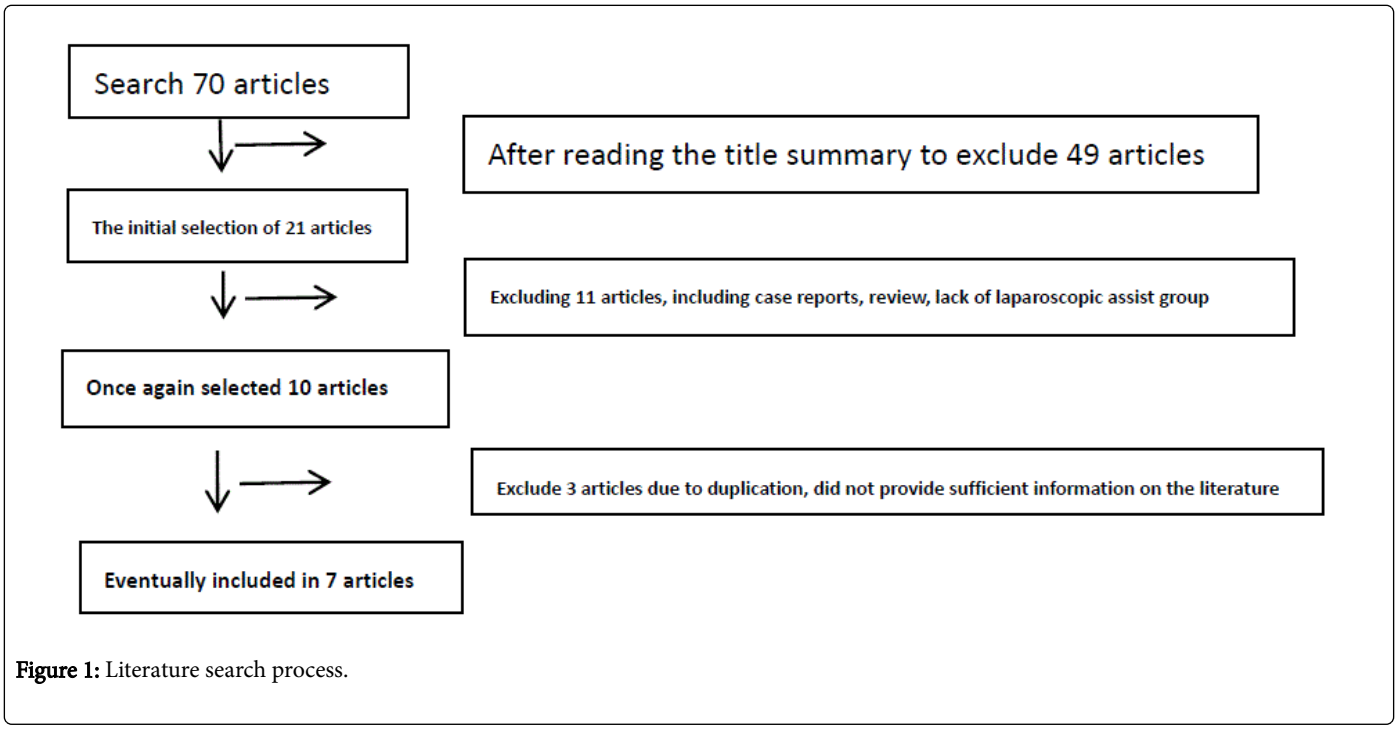

Figure 1: Literature search process.

Author	Country/Year	Sample Size (n)		Quality Score
		TLTG	LATG	
Jung et al. [7]	Korea/2013	40	47	8
Kim et al. [8]	Korea/2013	90	23	9
Xu and Chuanqing [9]	China/2013	69	70	8
Ito et al. [10]	Japan/2014	117	46	6
Cui et al. [11]	China/2015	16	47	7
Chen et al. [12]	China/2016	108	145	9
Hua and Wang [13]	China/2017	47	47	8

Table 1: Basic information and quality score of the literature.

Operation and postoperative situation

Operation time: 7 articles were compared with the operation time. There was heterogeneity among the study groups (P=0.00, I2=91%), using random effects model analysis. Meta-analysis showed no statistically significant difference between the two groups (MD=11.06, 95% CI: -9.59 ~ 31.70, P=0.29) as shown in Figure 2.

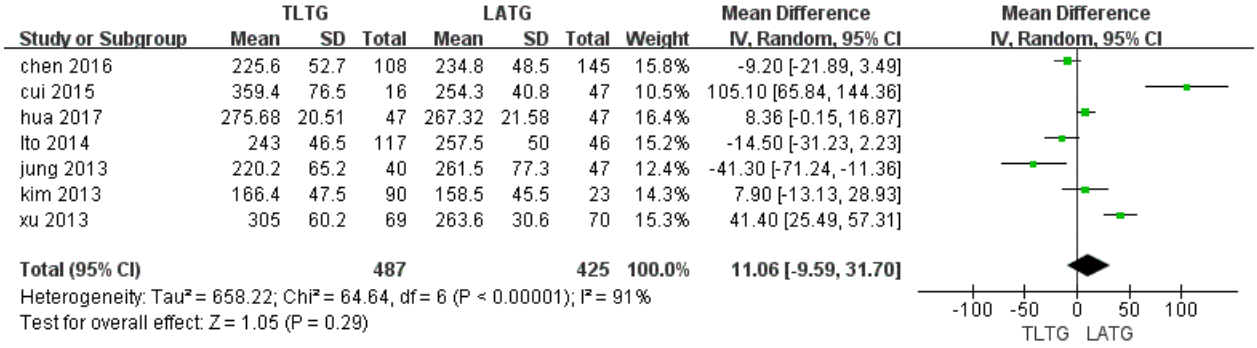

Figure 2: The results of Meta-analysis of the operation time of laparoscopy and laparoscopic assisted group.

Intraoperative blood loss: 5 articles were compared with the operation time. There was heterogeneity among the study groups (P=0.00, I2=96%), using a random effects model analysis. Meta-analysis showed statistically significant difference between the two groups (MD=-65.91, 95% CI: -114.18 ~ -1.7.65, P=0.007) as shown in Figure 3.

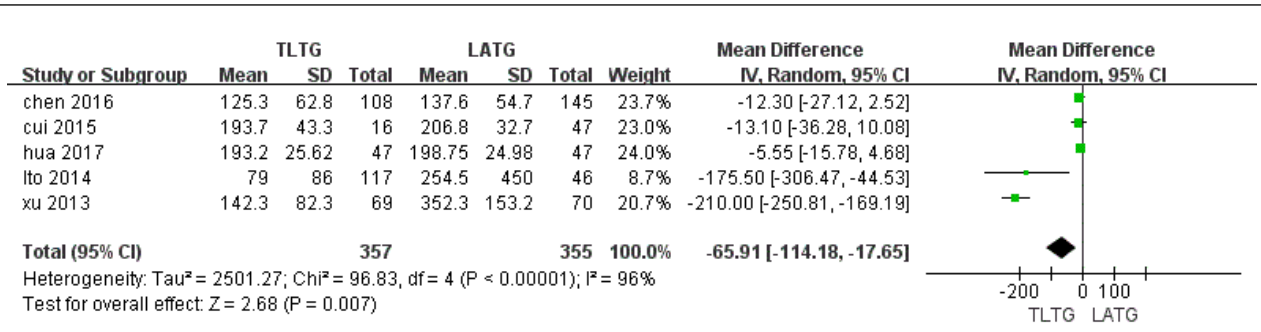

Figure 3: The results of meta-analysis of intraoperative blood loss in laparoscopic group and laparoscopic assistant group.

Approximate edge distance: 2 articles were compared with the operation time. There was heterogeneity among the study groups (P=0.36, I2=0%), using the fixed effect model analysis. Meta-analysis showed no statistically significant difference between the two groups (MD=0.18, 95% CI: -0.14 ~ 0.49, P=0.27) as shown in Figure 4.

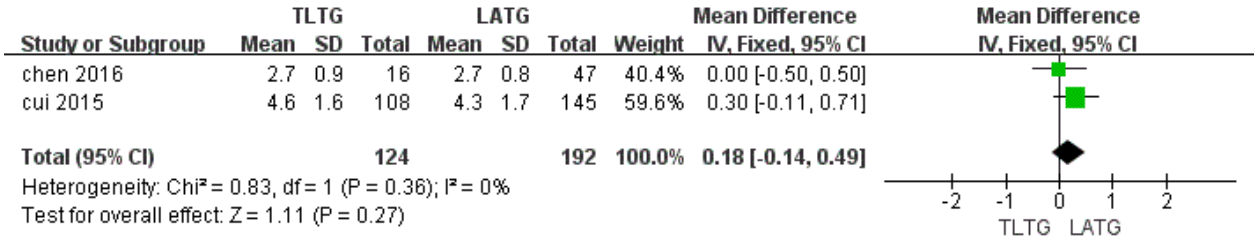

Figure 4: The results of meta-analysis of the distance between the laparoscopic group and the laparoscopic-assisted group.

Number of lymph node dissection: 6 articles were compared with the operation time. There was heterogeneity among the study groups (P=0.45, I2=0%), using the fixed effect model analysis. Meta-analysis showed no statistically significant difference between the two groups (MD=0.56, 95% CI: -0.78 ~ 1.90, P=0.41) as shown in Figure 5.

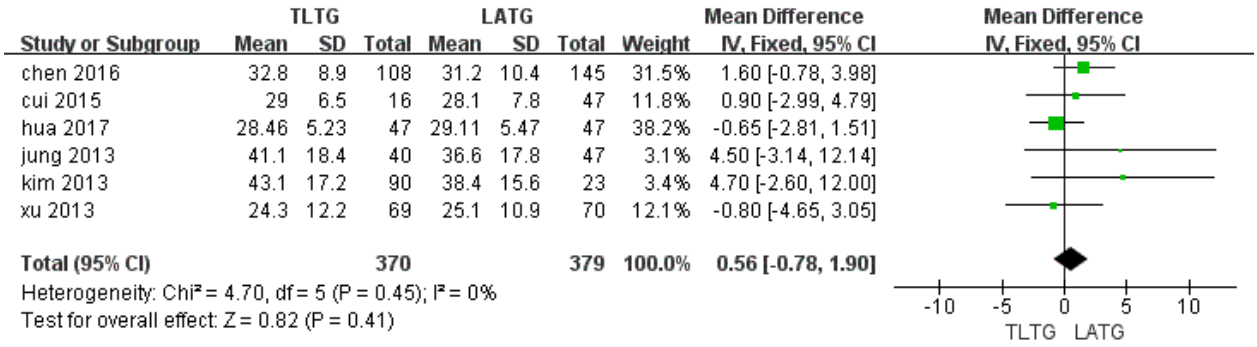

Figure 5: Total laparoscopic group and laparoscopic assisted lymph node dissection of meta-analysis results.

Postoperative first exhaust time: 6 articles were compared with the operation time. There was heterogeneity among the study groups (P=0.00, I2=97%), using a random effects model analysis. Meta-analysis showed statistically significant difference between the two groups (MD=-1.07, 95% CI: -1.88-0.26, P=0.009) as shown in Figure 6.

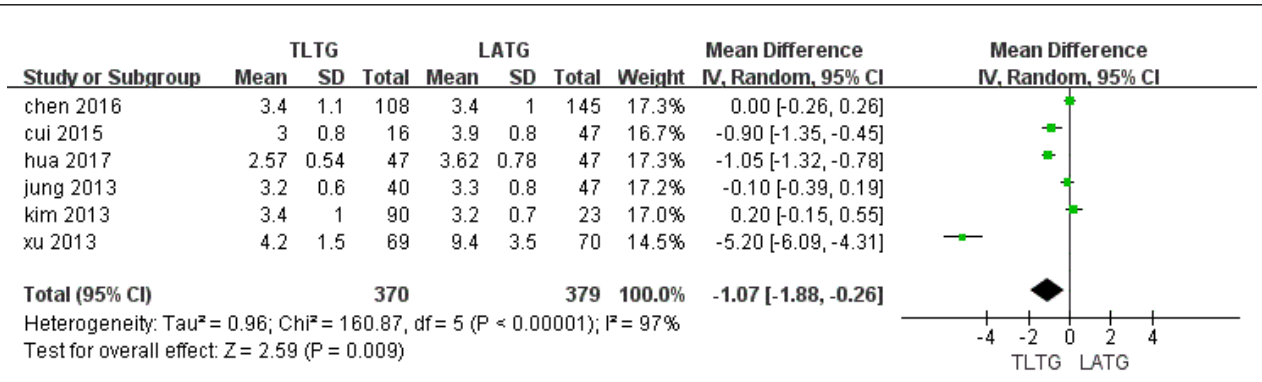

Figure 6: The results of meta-analysis of the first exhaust time in the laparoscopic group and the laparoscopic group.

Time for the first time after eating: 5 articles were compared with the operation time. There was heterogeneity among the study groups (P=0.00, I2=85%), using a random effects model analysis. Meta-analysis showed statistically significant difference between the two groups (MD=-0.76, 95%CI: -1.35-0.18, P=0.01) as shown in Figure 7.

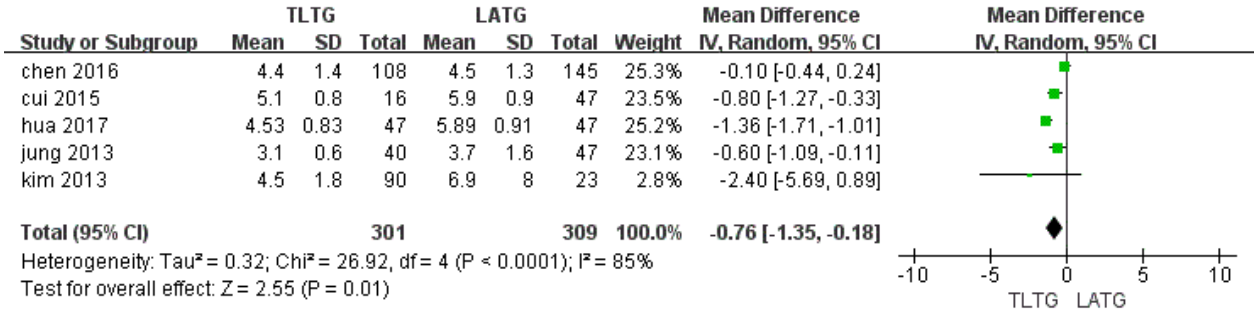

Figure 7: The results of meta-analysis of the first feeding time in the laparoscopic group and the laparoscopic group.

Postoperative hospital stay: 6 articles were compared with the operation time. There was heterogeneity among the study groups (P=0.00, I2=88%), using a random effects model analysis. Meta-analysis showed statistically significant difference between the two groups (MD=-1.55, 95%CI: -2.70-0.40, P=0.008) as shown in Figure 8.

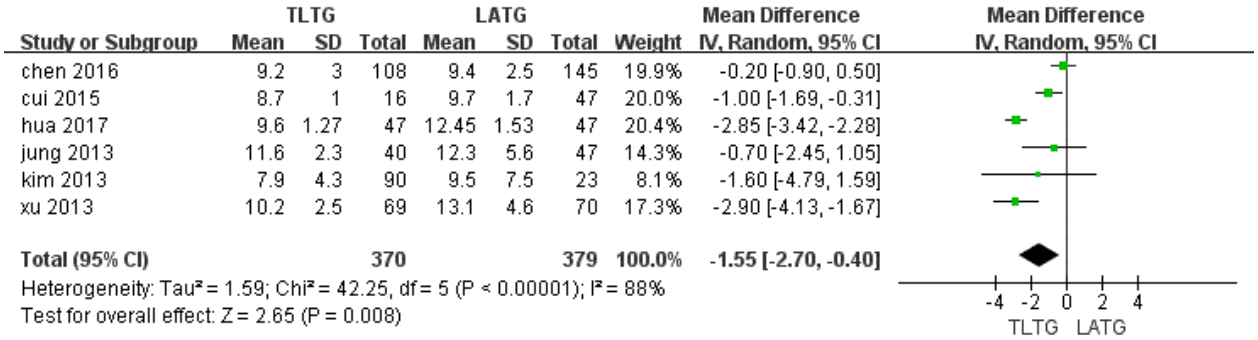

Figure 8: The results of meta-analysis of postoperative hospital stay in laparoscopic and laparoscopic assistive groups.

Cut length: 2 articles were compared with the operation time. There was heterogeneity among the study groups (P=0.97, I2=0%), using the fixed effect model analysis. Meta-analysis showed statistically significant difference between the two groups (MD=-4.91, 95%CI: -5.40 ~ -4.42, P=0.00001) as shown in Figure 9.

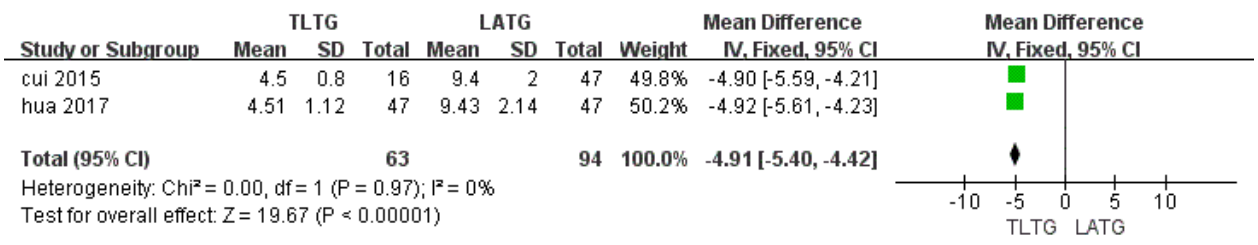

Figure 9: The results of meta-analysis of total laparoscopic and laparoscopic-assisted incision length.

Postoperative complications compared

Postoperative overall complications: 7 articles were compared with the operation time. There was heterogeneity among the study groups (P=0.91, I2=0%), using the fixed effect model analysis. Meta-analysis showed no statistically significant difference between the two groups (MD=0.65, 95%CI: -5.40 ~ 1.04, P=0.07) as shown in Figure 10.

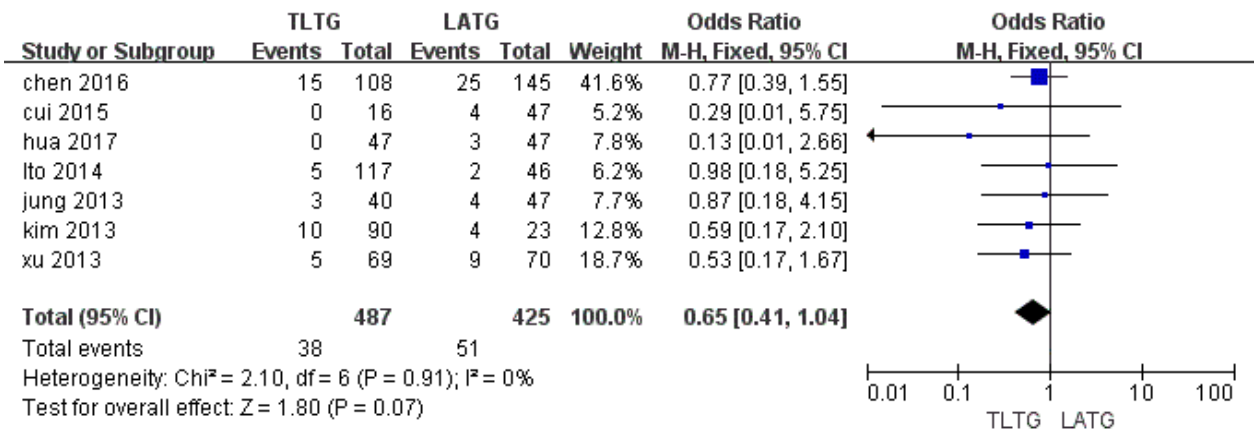

Figure 10: The results of meta-analysis of total postoperative complications in laparoscopic group and laparoscopic group.

Anastomotic fistula: 6 articles were compared with the operation time. There was heterogeneity among the study groups (P=0.80, I2=0%), using the fixed effect model analysis. Meta-analysis showed no statistically significant difference in operation time between the two groups (MD=0.98, 95%CI: 0.33 to 2.91, P=0.97) as shown in Figure 11.

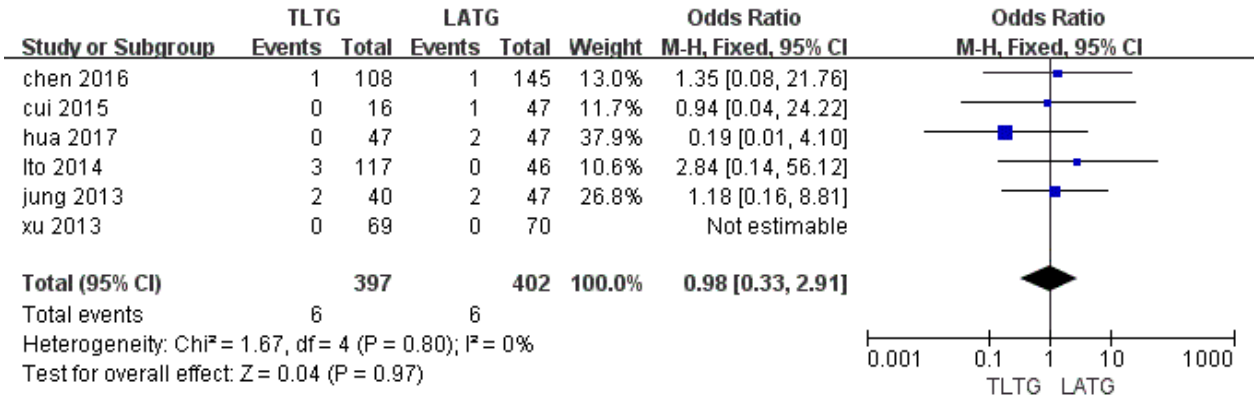

Figure 11: The results of meta-analysis of total laparoscopic and laparoscopic anastomotic fistula.

Release bias analysis: In this study, postoperative overall complications were used as indicators to show bias analysis. It was found that the scatter points were all distributed in the inverted funnel and the symmetry was good, indicating that the publication bias had little effect on the meta-analysis, shown in Figure 12.

Discussion

Although laparoscopic surgery is often used in the treatment of gastric cancer, laparoscopic assisted gastric cancer surgery is the most commonly used method, because the total laparoscopic total gastrectomy (TLTG) of the digestive tract reconstruction methods includes endoscopic anastomosis, abdomen Small incision assisted in two ways [14]. But the two kinds of anastomosis methods are in the whole laparoscopy, the technical difficulty is higher, but with the development of technology, all-round mirror anastomosis was diversified trend, according to the laparoscopic anastomosis equipment used to classify (OrVilTM), anti-puncture, manual handbag sacking, etc. The other is a straight-cut closure method, which mainly includes a straight-cut closure side of the closure device, which is divided into a circular stapler method, Anastomosis, triangular anastomosis, T-anastomosis, etc. [15,16]. But these emerging anastomosis methods have not yet matured, and the safety of surgery is the focus of the surgeon who performs TLTG. So the high risk of complications and the possibility of mortality concern the enthusiasm of the body esophageal jejunum anastomosis. With the progress of laparoscopic surgery and the accumulation of surgical experience, can now be completed under the laparoscopic esophageal jejunum anastomosis. In this study, the advantages and feasibility of total laparoscopic esophageal jejunum anastomosis were mainly studied through large data.

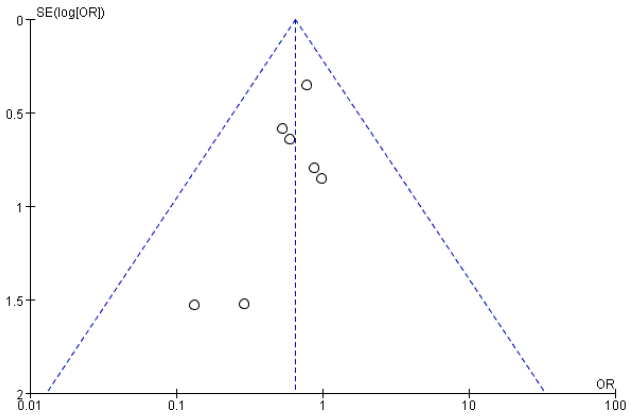

Figure 12: Biopsy of postoperative overall complications.

Because the reconstructed part of the TLTG may be difficult, some researchers believe that longer operative times can adversely affect the outcome of the patient. The results of the meta-analysis showed that there was no statistically significant difference in the operative time between the two groups. According to our TLTG experience, two points were helpful: first, the technique of esophageal jejunal anastomosis was used to simplify the anastomosis. Second, TLTG can eliminate the opening and closing of small open surgery, resulting in shorter operative time. Of course, each doctor learning curve also has an impact on the operating time, so 7 groups of data heterogeneity. TLTG incision is smaller than the upper abdominal incision required by LATG. Therefore, TLTG has a better cosmetic effect. However, it is not entirely clear whether TLTG is really more traumatic and less invasive than LATG. The data showed that TLTG group had less blood loss than LATG group, the difference was statistically significant. This also further demonstrates that TLTG has a more minimally invasive effect and may also result in an increase in blood loss during the skin incision and anastomosis in the LATG group, and that the whole laparoscope has an operative amplification effect that makes the blood vessels more clear and reduces blood vessels And the use of small incision and ultrasound knife can also reduce the amount of bleeding [17,18] In addition, when the LATG, the esophageal stump must be pulled out from the abdominal cavity. Stretching the esophageal stump may cause splenic tear and bleeding. However, this result requires further rigorous explanation, since the amount of blood loss varies widely between studies, and the heterogeneity of the method of estimating the amount of blood loss is different. The results of this study showed that the first time of postoperative anal exhaust time, postoperative oral feeding time and postoperative hospital stay were shorter in LATG group than in LATG group, which indicated that TLTG had small gastrointestinal irritation and gastrointestinal function Quick recovery Kang et al. [19] study that laparoscopic operation more detailed, can reduce surgical trauma, so patients with faster recovery of intestinal function. In addition, Okholm et al. [20] that laparoscopic surgery on patients with immune damage to the body, reducing the inflammatory response, which also helps the recovery of gastrointestinal function.

Postoperative pathological findings are an important reference for determining the success of laparoscopic surgery for malignant tumors. In the case of short follow-up time, the main indicators of the quality of tumor radical resection of the number of lymph nodes and surgical margins. This study shows that no matter whether the use of LATG or TLTG, can be technically similar tumor resection, proximal margin and lymph node dissection of the number of differences was not statistically significant. The heterogeneity of which is largely dependent on the surgeon's technical and pathological analysis variability.

Surgical safety is the focus of the surgeon who performs TLTG. In this study, the overall complication of the two groups was not statistically significant. At the same time anastomotic leakage is the most common complications of digestive tract reconstruction, we also analyzed the anastomotic fistula this important complication, the data show that the two groups of anastomotic fistula also no difference, no statistically significant. Likewise, there is a noticeable heterogeneity in the study because skilled surgeons are safer and faster than unskilled surgeons.

There are several restrictions on our research. First, all the results are from East Asia, with an average BMI below the average Western BMI. However, our results also apply to Western patients because *in vitro* reconstruction is easier than reconstruction of obese patients with lower abdominal incision. Second, there is a difference in the duration of each surgical procedure. LATG has been in operation since March 2006, and TLTG has been in operation since November 2007. Various surgical factors associated with the surgery itself, such as surgical instruments, sutures and drugs, may affect the outcome. In addition, there may be differences in surgical skills and perioperative care between individual surgical groups. Thirdly, most of the studies analyzed focused only on gastrectomy. However, the included studies have gastric proximal gastrectomy because the size of the remaining studies is too small for deterministic conclusions, and the more the number of patients in the meta-analysis, the more likely the test is to be treated. So we did not rule out the study. Although such a low number does not mean significant deviations, but still leads to clinical heterogeneity.

Conclusion

Current studies have shown that TLTG is a viable option for patients with gastric cancer and is comparable to the LATG method. However, more methods are needed for high quality comparative studies to adequately assess the state of TLTG.

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