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Laparoscopic subtotal/total gastrectomy (LS/TG) versus open subtotal/total gastrectomy (OS/TG) for gastric cancer: literature review to activate the laparoscopic procedure gastric cancer resection in secondary care hospital

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Introduction

The aim of this review is to compare various number of manuscripts to underline the advantages and disadvantages of laparoscopic subtotal or total gastrectomy (LS/TG) versus open subtotal or total gastrectomy (OS/TG) to treat malignant tumors (MT) of the stomach. Gastric adenocarcinoma is the fifth cause of death in the world. Guidelines for Gastric Cancer treatment recommend performing D2 lymph nodes dissection with radical tumor resection to achieve R0 disease and to obtain a significant improved long-term survival (LTS) and overall survival (OS).[1] In the past subtotal or total gastrectomy was always performed with open technique. In 1991 The Japanese school of gastric resection led by Professor Kitano performed the first Laparoscopic Subtotal Gastrectomy (LSG) for Early Gastric Cancer (EGC).[2–8] Since this first reported surgery, Laparoscopic Gastrectomy (LG) has gained popularity in the last 20 years. Many studies demonstrated benefits of LG or LSG compared to Open Gastrectomy (OG) such as a decrease in blood loss (LBL), shorter Hospital Stay (SHS), accelerated recovery (AR), easier lymph nodes dissection (LND) and fewer postoperative complications (POC). Although these results are related to subtotal gastrectomy in EGC, the feasibility and safety of LSG or LTG for proximal or middle-third or advanced cancer are still in need of further validation.[2] As reported in literature; LG for proximal cancer remains limited, due to technical difficulties in performing esophagojejunostomy or Lymph Nodes Dissection (LND) while LG for Advanced Gastric Cancer (AGC) remains controversial.[3–8] We analyze retrospective-prospective-meta-analysis manuscripts to stress the importance of LG vs OG.

Methods

The objective of this review is to compare blood loss (BL), hospital recovery (HR), lymph nodes dissection (LND), type of techniques (TT), morbidity/mortality (MM), time of operation (TO), long term survival (LTS) and overall survival (OS) in Laparoscopic Gastrectomy (LG) to Open Gastrectomy (OG) for gastric cancer.

Study design

This is a review based on articles published between 1990 and 2015 in the following Database: PUBMED META-ANALYSIS, EMBASE, CoCHRANE. The review has been carried out by researching the following keywords: "laparoscopic gastrectomy", "open gastrectomy", "gastric cancer", " randomized controlled trial ", "prospective study", " comparative study". All titles, abstracts or related quotations have been reviewed.

Goals: comparing the literature results in order to perform laparoscopic gastrectomy plus D2 lymph nodes dissections in a primary hospital.

Techniques

Laparoscopic procedure for total gastrectomy with D2 lymphadenectomy

The patient is placed in the 'split leg position' and reverse Trendelenburg position. The main surgeon stands between the legs of the patient, Four 10mm trocars are placed in the upper part of the abdomen: two in the xypho-umbilical line and two in the mid-clavicular right and left lines. Two 5mm trocars are placed, one each in the right and left hypochondrium. The telescope is placed in the supra-umbilical trocar for the submesocolic surgery and then in the subxyphoidal trocar during the supramesocolic surgery. The exploration of the peritoneal and hepatic areas is then carried out. The great omentum is sectioned 2cm below the gastro-epiploic vessels at the level of the antrum to access to the omental cavity .The gastro-splenic vessels are sectioned to the left gastro-phrenic ligament (group 4). The right gastro-epiploic vessels are exposed and ligated from their origin on the gastro-duodenal artery and the gastro-colic vein. The artery is dissected forward to the duodenum to the point where it arises from the hepatic artery (group 6). The hepato-duodenal ligament is cut above the duodenum and the retro-duodenal dissection is joined. The right gastric artery is ligated at its origin on the hepatic artery (group 5). The first part of the duodenum is sectioned 2cm below the pylorus, using a blue stapler. The lesser omentum is cut starting from the lower side of the liver up to the right side of the oesophagus (group 3). Attention must be paid to a possible left hepatic artery arising from the left gastric artery which, if large, must be left free and preserved. The gastric specimen, separated from the omental specimen, is placed in the left hypochondrium. The left gastric vein is ligated at the top of the pancreas. The left gastric artery is ligated at its origin on the celiac

trunk (group 7). The lymphadenectomy is continued along the hepatic artery to the base of the celiac trunk (group 8), along the splenic artery (group 9) and the aorta to the left and right diaphragm (groups 1 and 2). The esophagus, widely freed from the lower mediastinum (including section of both vagus nerves) is sectioned transversely 2cm above the cardia with a flexible automatic stapler. The left side of the hepatic pedicle is dissected together with the contact of the hepatic artery and portal vein (group 12a). The omentectomy is performed, The mesentery and first vascular arcade of jejunal loopare sectioned at 20-40cm from the ligament of Treitz using a linear stapler. The alimentary limb is measured at 60cm and a 6cm mechanical side-to-side jejunojejuno anastomosis is performed using the linear stapler. The inlet is closed by a suture of a 3/0V-loc (Covidien, United Kingdom). Transmesocolic passage of the alimentary loop is perfomed by opening the transverse mesocolon 1cm above the ligament of Treitz (in its thinnest part). The alimentary loop is gradually lifted to the esophagus and the esophago-jejunal anastomosis is performed. The mesocolic defect is then closed. A retro-anastomotic Penrose drain covers the anastomosis and eventually a second one can be used for the duodenal stump. The operation ends with the removal of the specimen by a suprapubic incision[9] (Figure 1).

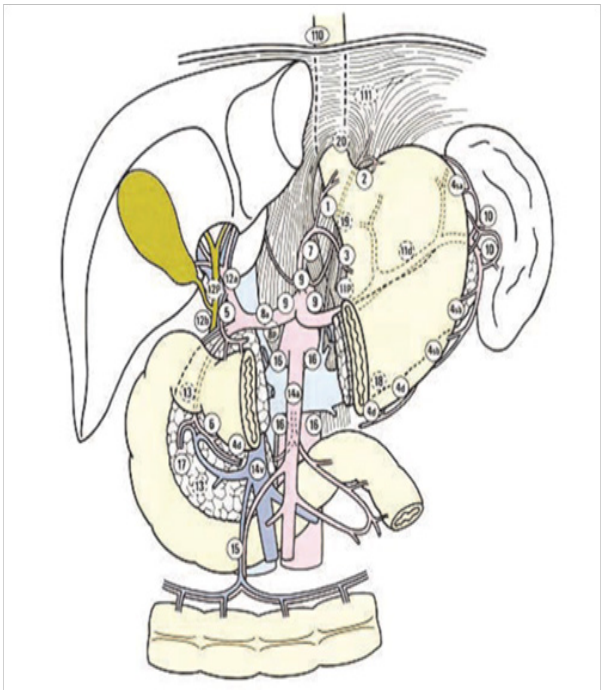

Figure 1 Gastric anatomy.

Results

Huscher et al.,[11] performed a five-year randomized prospective trial between 1992 and 1996 on 70 patients with LSG vs OG. Their comparative results showed that there were no statistical differences between the two groups in terms of pTMN stage, duration of surgery, type of gastrointestinal reconstruction, number of lymph nodes retrieved and intraoperative blood loss. (morbidity/mortality) M/M too were similar. With similar survival rates and disease free survival. OG blood loss was estimated higher compared to LG.[10]

Wang et al. performed an updated meta-analysis laparoscopic vs. open total gastrectomy for gastric cancer after researching manuscripts from 1990 to 2013. They selected 17 studies with 2.313 patients (955 LG vs 1358 OG), where LTG showed longer operative time but less blood loss, fewer analgesic medications, quicker oral intake, fewer hospital stay, reduced complications and the same number of LND, DFS and OS.[2]

Chen et al. made a systematic–meta-analysis reviewing LG vs. OG for AGC. They analyzed 15 trials where they demonstrated longer operative time compared to LG groups but, on the other hand, they reported earlier time to flatus, shorter Hospital Stay and fewer disease complications in favor of LG group with no difference regarding surgical margin, LTS (Long Term Survival) and OS (Overall Survival).[3]

Haverkamp et al. (2014) analyzed a multicentre-prospective-randomized-controlled trial (LOGICA TRIAL) on 210 patients where LG vs. OG were compared. They demonstrated the same points as the other above mentioned studies with the same oncologic outcomes as LG compared to OG.[11]

Ramagem et al. made a retrospective analysis and compared data between patients submitted to total gastrectomy with D2 limphadenectomy at a sole institution. The data of 111 patients showed that 64 (57,7%) had been submitted to laparotomic gastrectomy while 47(42,3%) to gastrectomy entirely performed through videolaparoscopy. All variables related to the surgery, post-operative follow-up and anatomopathologic findings had been evaluated. Among the studied variables, videolaparoscopy has shown shorter surgical time and a more premature period for the introduction of oral and enteral nourishment compared to the open surgery. As far as the amount of dissected lymph nodes is concerned, there has been a significant difference towards laparotomy with p=0,014, but the average dissected lymph nodes in both groups has exceeded 25 nodes as recommended by the JAGC. A significant difference between the studied groups regarding age, ASA, type of surgery, need for blood transfusion, stage of the disease, Bormann classification, degree of differentiation, damage of the margins, further complications and death was not found. The total gastrectomy with D2 lymphadenectomy performed by laparoscopy presented the same known benefits as laparotomy and with the already established advantages of minimally invasive surgery. It was performed with less surgical time, less time for re-introduction of the oral and enteral diets and less hospitalization time compared to laparotomy, without increasing postoperative complications.[12]

Chen XZ et al. compared the 5-year overall survival (OS) rate, recurrence, and gastric cancer-related deaths in patients treated with LG to patients treated with OG. Twenty-three studies with 7336 patients were included. A meta-analysis, meta-regression, sensitivity analysis, subgroup analysis, and stage-specific analysis were performed to estimate the survival rate between the two groups in order to identify the potential confounders. The score of comparability between the two groups and the extent of lymphadenectomy were two independent confounders. Based on the well-balanced studies, the 5-year OS rates (OR=1.07, 95% CI 0.90-1.28, P=0.45), recurrence rates (OR=0.83, 95% CI 0.68-1.02, P=0.08), and gastric cancer-related death rates (OR=0.86, 95% CI 0.65-1.13, P=0.28) were comparable in LG and OG. Randomized controlled trials comparing LG to OG to assess their long-term survival outcomes remain sparse. Current knowledge indicates that the long-term survival outcome in laparoscopic gastric cancer surgery is comparable to that of open surgery among early or advanced stage gastric cancer patients, and LG is acceptable as regard to oncologic safety.[13]

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Discussion

Gastric cancer remains the fifth cause of related cancer death. The objective of the cure is to obtain Ro resection with negative margins to have the best prognosis. Surgical option remains the only curative choice for this disease. Open Gastrectomy was the only type of technique available until 1991 when Kitano performed the first LG followed by Goh in 1992.[14–15] Since then, the laparoscopic technique has gained large consensus and several authors have reported successful results regarding laparoscopic subtotal or total gastrectomy for cancer. They demonstrated that LSG/LTG are feasible and safe techniques with important peri-operative advantages such as fewer use of analgesics; less blood loss, due to major field amplification; less acute lung injury (ALI) volume overload and less hypothermia. In addition to this, they also showed better LND, faster oral intake, reduced pain, earlier hospital discharge, the same M/M and similar anastomotic leakage or stenosis, and similar LTS-DFS-OS compared to OG. As far as port site some Author has reported negative results[10–14] while other authors have noticed that the time is shorter and closer to open technique when a dedicated laparoscopic team perform at least 50 LG.[4,5] Recently, Haverkamp et al. meta-analysis have showed the superiority of LG vs OG but oncological outcomes are still being debated.[2,11] According to Japanese Guidelines, distal or total gastrectomy with D2 dissection improve survival. The review reported that LSG or LTG plus D2 LND is feasible and safe in the hands of experienced surgeons. With the development of the laparoscopic technique, the number of LTG use is increasing, and seven additional articles comparing the LTG to OTG have been published. There was a longer duration of operative time in the LTG group than that in the OTG group (WMD, 47.00; 95% CI, 31.67, 62.33; P, 0.001). Blood loss during the operation was decreased under the laparoscopic procedure (WMD, 2179.60; 95% CI, 2251.80, 2107.89; P, 0.001). No statistical difference was found between the two groups in the number of harvested lymph nodes (WMD, 2.33; 95% CI, 20.04, 4.71; P=0.054). The length of the proximal resection margin was similar for either groups (WMD, 0.06; 95% CI, 20.26, 0.39; P=0.706). In the subcategory analysis of postoperative complications, patients in the LTG group have showed less wound infection (RR, 0.35; 95% CI, 0.20, 0.61; P, 0.001). No statistical differences were found in anastomotic leakage, anastomotic stenosis, postoperative ileus, pneumonia, pancreatitis, intra-abdominal abscess. There were no significant differences in hospital mortality. DFS in LTG was similar to that in OTG (HR, 0.62; 95% CI, 0.30, 1.27; P=0.191) (Figure 2-3).[1–3,12–20]

Finally, we believe that these results can be obtained with a learning curve associated to groups of experienced laparoscopic surgeons.

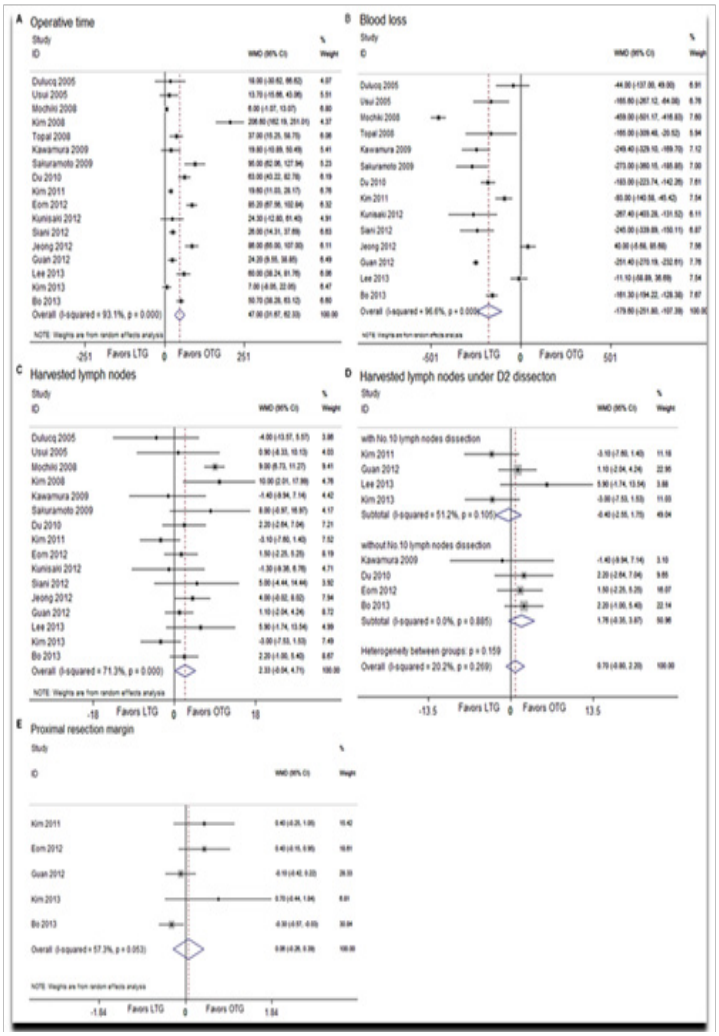

Figure 2 Wang 2014.

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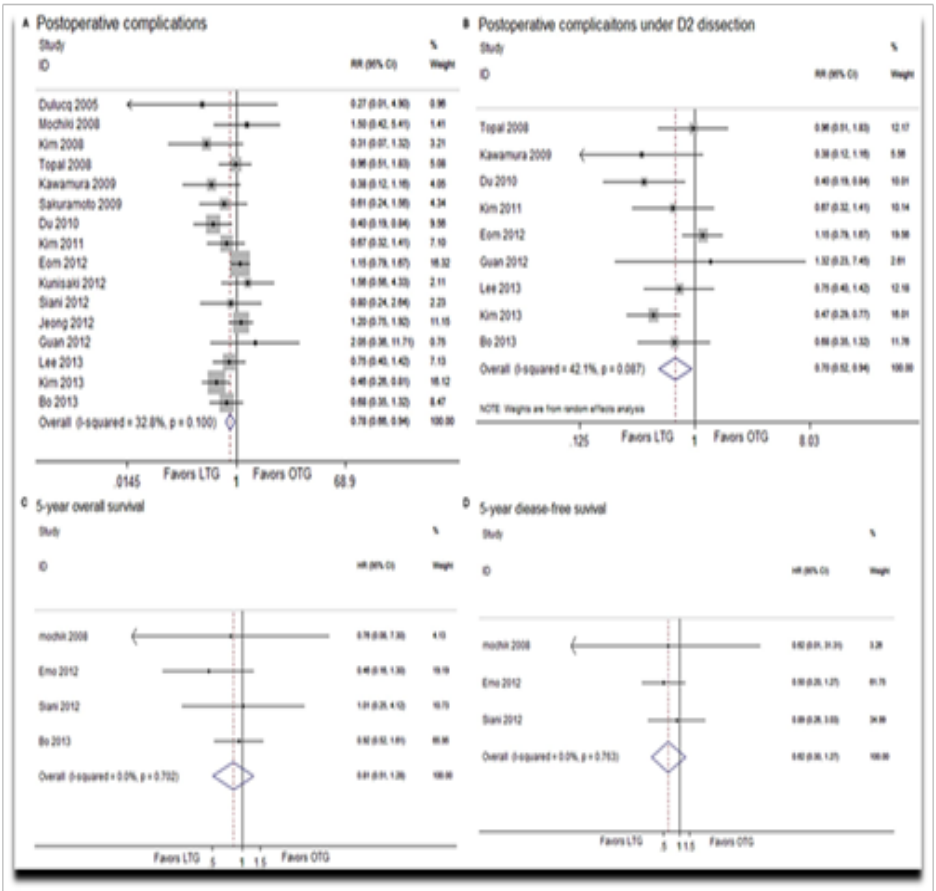

Figure 3 Wang 2014.

Acknowledgements

None.

Conflict of interest

The author declares no conflict of interest.

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