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GASTRECTOMY WITH OMENTUM PRESERVATION VS GASTRECTOMY WITH OMENTECTOMY FOR LOCALLY ADVANCED GASTRIC CANCER : A SYSTEMATIC REVIEW

[*1]Risko Sandy, [2]Yasmine Ayu Dwinastiti, [3]I Nyoman Sudarsa
[*1]*Premagana General Hospital, Bali, Indonesia*
[2]*Faculty of Medicine, University of Indonesia, Depok, Indonesia*
[3]*Faculty of Medicine, Udayana University, Bali, Indonesia*

Corresponding Author:
riskosandy151297@gmail.com

ABSTRACT

Background: *Gastric cancers can be divided into the intestinal type and diffuse type. The most common underlying etiology of intestinal-type carcinoma is Helicobacter pylori infection, which can develop into atrophic gastritis with intestinal metaplasia. Complete omentectomy is considered to be essential in the radical gastrectomy for gastric cancer (GC), but its clinical benefit remains unclear.*

The aim: *This study aims to show about gastrectomy with omentum preservation vs gastrectomy with omentectomy for locally advanced gastric cancer.*

Methods: *By comparing itself to the standards set by the Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) 2020, this study was able to show that it met all of the requirements. So, the experts were able to make sure that the study was as up-to-date as it was possible to be. For this search approach, publications that came out between 2013 and 2023 were taken into account. Several different online reference sources, like Pubmed and SagePub, were used to do this. It was decided not to take into account review pieces, works that had already been published, or works that were only half done.*

Result: *In the PubMed database, the results of our search brought up 104 articles, whereas the results of our search on SagePub brought up 77 articles. The results of the search conducted for the last year of 2013 yielded a total 88 articles for PubMed and 48 articles for SagePub. The result from title screening, a total 7 articles for PubMed and 28 articles for SagePub. In the end, we compiled a total of 10 papers. We included five research that met the criteria.*

Conclusion: *Laparoscopic treatment of gastric cancer with D2 lymphadenectomy and omentum preservation is safe and feasible, both for EGC and for AGC. Total omentectomy may be avoided in tumors smaller than 5.25 cm and T1/T2 tumors. However, lymph node metastasis in the greater omentum is associated with recurrence in the peritoneum, liver, ovary and death.*

Keyword: *gastrectomy, omentum preservation, omentectomy, gastric cancer.*

INTRODUCTION

Gastric cancer (GC) poses a major threat to global health. It is estimated to be the fifth most commonly diagnosed cancer and the fourth leading cause of cancer-related mortality worldwide. Although many treatment modalities, such as systemic chemotherapy, radiotherapy, immunotherapy, and targeted therapy have validated efficacy in GC, radical gastrectomy remains the mainstay of curative treatment for GC. Radical gastrectomy should be performed whenever possible However, the extent of radical gastrectomy for gastric cancer has not reached a consensus. For example, although commonly performed, the efficiency of complete omentectomy (CO) during radical gastrectomy has not yet been universally acknowledged. The greater omentum is an apron-like fatty adipose tissue that extends from the stomach. It functions as a protective cushion and is responsible for peritoneal defenses.[1]

Gastric cancer (GC) is the fourth most common cancer worldwide. In 2020, a total of 1,089,103 (5.6% of all cancer) new gastric cancer cases, causing 768,793 deaths (7.7% of all cancer), were estimated. Although its global incidence has been declining, GC is still one of the leading causes of cancer-related mortality, especially in Asia. Surgical treatment is the key to cure localized GC. In various international guidelines, D2 lymph node dissection is generally recommended during gastrectomy. Theoretically, both omentum and bursa omentalis should be resected to prevent peritoneal metastasis. However, a recent meta-analysis has shown that gastrectomy with bursectomy is not superior in terms of survival to gastrectomy without bursectomy and is thus bursectomy not recommend as a standard treatment modality for cT3 and cT4 GC. Likewise, although the omental lymph system was suggested as a bridge for metastasis to the peritoneal cavity in animal models, and omental lavage occasionally detect omental micrometastasis in patients with GC, there is still no evidence showing a definitive improvement of survival after gastrectomy with total omentectomy.[2,3]

The advantage of complete omentectomy is in accordance with the current understanding of the lymphatic drainage of the omentum by means of milky spots, which are located throughout the entire greater omentum and act as a gate through the abdominal cavity into the subperitoneum, which contributes to the peritoneal seeding of cancer cells. Thus complete resection of the greater omentum has been believed to be essential to eliminate tumor cells during surgery for gastric cancer. However, the disadvantage of this procedure is also considerable. Complete omentectomy increases the operating time (especially for laparoscopic procedures) and is associated with greater blood loss and a higher risk of complications such as abdominal abscesses, ascites, anastomotic leakage, ileus, wound infections and colonic and mesocolonic injuries.[4]

METHODS

Protocol

By following the rules provided by Preferred Reporting Items for Systematic Review and Meta-Analysis (PRISMA) 2020, the author of this study made certain that it was up to par with the requirements. This is done to ensure that the conclusions drawn from the inquiry are accurate.

Criteria for Eligibility

For the purpose of this literature review, we compare and contrast of gastrectomy with omentum preservation vs gastrectomy with omentectomy for locally advanced gastric cancer. It is possible to accomplish this by researching or investigating the risk factor for physical disability in patients with leprosy. As the primary purpose of this piece of writing, demonstrating the relevance of the difficulties that have been identified will take place throughout its entirety.

In order for researchers to take part in the study, it was necessary for them to fulfil the following requirements: 1) The paper needs to be written in English, and it needs to determine the best time to perform emergency surgery for congenital diaphragmatic hernia. In order for the manuscript to be considered for publication, it needs to meet both of these requirements. 2) The studied papers include several that were published after 2013, but before the time period that this systematic review deems to be relevant. Examples of studies that are not permitted include editorials, submissions that do not have a DOI, review articles that have already been published, and entries that are essentially identical to journal papers that have already been published.

Search Strategy

We used "Gastrectomy with omentum preservation"; "Gastrectomy with omentectomy for locally advanced gastric cancer" as keywords.The search for studies to be included in the systematic review was carried out using the PubMed and SagePub databases by inputting the words: *(("gastrectomy"[MeSH Subheading] OR "omentum preservation"[All Fields] OR "gastrectomy procedure"[All Fields]) AND ("gastrectomy with omentectomy"[All Fields] OR "omentectomy"[All Fields]) AND ("gastrectomy in gastric cancer"[MeSH Terms] OR ("omentectomy in gastrectomy"[All Fields]) OR ("omentectomy procedure"[All Fields]) AND "procedure for gastric cancer"[All Fields]))* used in searching the literature.

Data retrieval

After reading the abstract and the title of each study, the writers performed an examination to determine whether or not the study satisfied the inclusion criteria. The writers then decided which previous research they wanted to utilise as sources for their article and selected those studies. After looking at a number of different research, which all seemed to point to the same trend, this conclusion was drawn. All submissions need to be written in English and can't have been seen anywhere else.

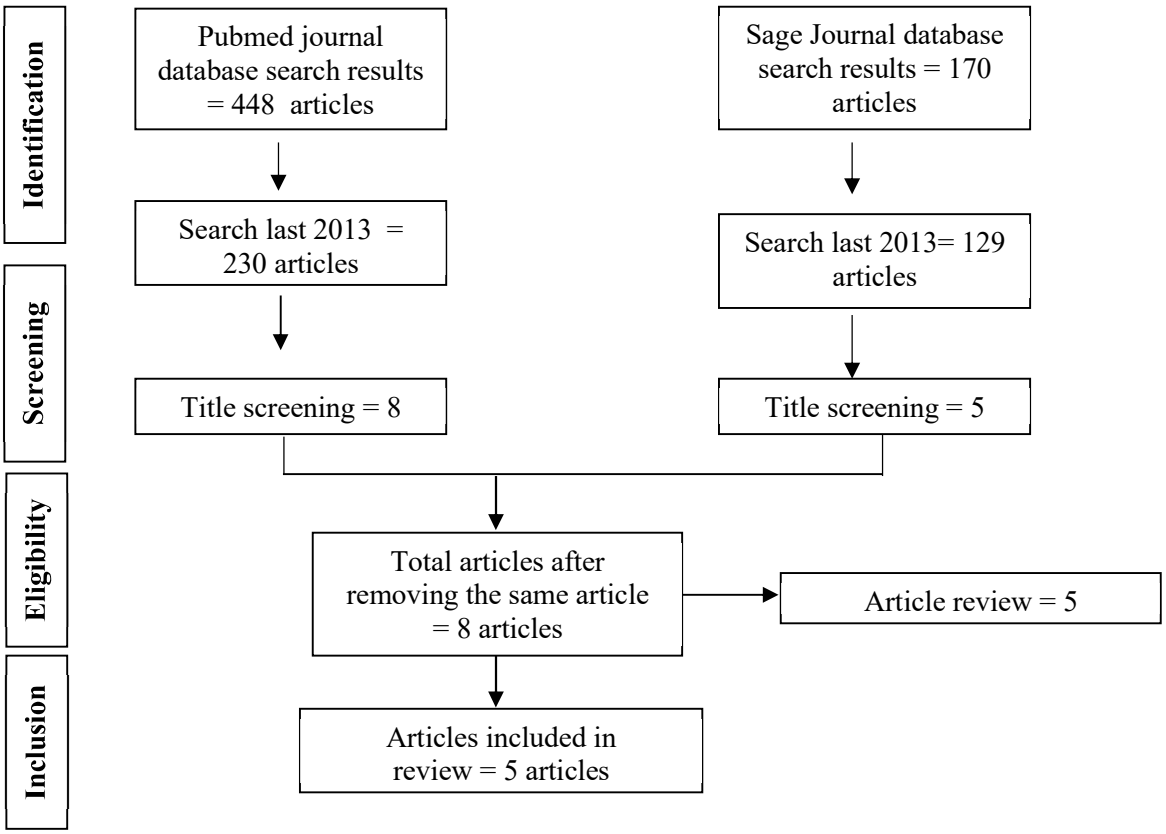

Figure 1. Article search flowchart

Only those papers that were able to satisfy all of the inclusion criteria were taken into consideration for the systematic review. This reduces the number of results to only those that are pertinent to the search. We do not take into consideration the conclusions of any study that does not satisfy our requirements. After this, the findings of the research will be analyzed in great detail. The following pieces of information were uncovered as a result of the inquiry that was carried out for the purpose of this study: names, authors, publication dates, location, study activities, and parameters.

Quality Assessment and Data Synthesis

Each author did their own study on the research that was included in the publication's title and abstract before making a decision about which publications to explore further. The next step will be to evaluate all of the articles that are suitable for inclusion in the review because they match the criteria set forth for that purpose in the review. After that, we'll determine which articles to include in the review depending on the findings that we've uncovered. This criteria is utilized in the process of selecting papers for further assessment. in order to simplify the process as much as feasible when selecting papers to evaluate. Which earlier investigations were carried out, and what elements of those studies made it appropriate to include them in the review, are being discussed here.

RESULT

In the PubMed database, the results of our search brought up 448 articles, whereas the results of our search on SagePub brought up 170 articles. The results of the search conducted for the last year of 2013 yielded a total 230 articles for PubMed and 129 articles for SagePub. The result from title screening, a total 8 articles for PubMed and 5 articles for SagePub. In the end, we compiled a total of 8 papers. We included five research that met the criteria.

Barchi, LC *et al* (2019)[5] showed subtotal gastrectomy was performed in 182 (64.1%). The tumor was located at the antrum in 185 (65.2%). Forty (14.1%) patients received neoadjuvant chemotherapy. Open surgery was performed in 253 (89.1%). Thirty-day mortality was 3.1% (nine patients). The median follow-up period for all patients was 27.6 months (1-89.5). The median follow-up time of the disease-free patients was 34.3 months (1-89.5). The pathological analysis is summarized in Table 3. Peritoneal washing was negative in all patients. The average number of LN resected was 41.2 (±17; 15-114).

The average number of positive LN was 4.69 (±8.12; 0-53). The Lymph Node Ratio (LNR) was 0.113 (±0.447; 0-0.96). The intestinal histological type of Lauren occurred in 146 (51.4%) patients. Poorly differentiated tumors were also 146 (51.4%). Sixty-six (23.2%) had at least one LN in the greater omentum. Metastatic LN were found in five (1.8%) patients (one: pT3N3bM0; two: pT4aN3bM0; one: pT4aN2M0 and one pT4bN3bM0). The mean size of tumors of patients without metastatic omental LN was 4.8 cm (±2.96; 0.5-14.5), while the mean size of tumors of patients with metastatic LN was 8.06 cm (±2.75; 2.75-9, p=0.018). The cut-off point was 5.25 cm (area under the curve: 0.8072; IC95%: 0.6645-0.9498). Metastatic LN in the greater omentum was significantly correlated with N stage (p<0.001), clinical stage (p=0.022) and venous invasion growth (p=0.003). During the follow-up period 163 (57.4%) were free of the disease. The cancer relapse was found in 65 (22.8%) patients and the most frequent site was in the peritoneum (46.2%). Four patients with metastatic omental LN died and the other one was under palliative chemotherapy due to the relapse on the liver and pleura. We found association between metastatic LN in the omentum with recurrence (p=0.006), site of recurrence (peritoneum: p=0.008; liver: p=0.023; ovary: p=0.035) and death (p=0.008).

Olmi, S *et al* (2020)[6] showed a total of 138 patients (Table 1) with endoscopic diagnosis of advanced gastric cancer (AGC) or early gastric cancer (EGC) were subjected to laparoscopic total or subtotal gastrectomy with D2 lymphadenectomy and attempted omentum preservation at the San Marco Hospital—GSD (Bergamo, Italy). Median age was 72 (IQR, 63.5–79) years; 57.2% of patients were male. Thirty-eight (27.5%) patients underwent a total gastrectomy and 100 (72.5%) a subtotal gastrectomy. The median surgery duration was 2.3 (IQR, 1.8–2.8) hours, and median length of hospital stay was 10 days (IQR, 9–12). Table 2 summarizes the main results related to surgery. Thirty-four (25%) patients had a complication after surgery, 19 (14%) had a medical complication, and 17 (12%) had a surgical complication. Additional information regarding complications is summarized in Table 3. The most common complication was anastomosis fistula (7/138; 5.1%). The most concerning complication was fistula at the level of the duodenal transection. The overall incidence of duodenal fistula across the study population was 3.6% (5/138). The rate of reoperation was 7.2% (10/138).

Table 1. The literature included in this study

Author	Origin	Method	Sample Size	Result
Barchi, LC *et al.*, 2019[5]	Brazil	Retrospective study	284 patients	Of 284 patients included, five (1.8%) patients had metastatic omental LN (one: pT3N3bM0; two: pT4aN3bM0; one: pT4aN2M0 and one pT4bN3bM0). Four of them deceased and one was under palliative chemotherapy due relapse. LN metastases in the greater omentum significantly correlated with tumor's size (p=0.018), N stage (p<0.001), clinical stage (p=0.022), venous invasion growth (p=0.003), recurrence (p=0.006), site of recurrence (peritoneum: p=0.008; liver: p=0.023; ovary: p=0.035) and death (p=0.008).
Olmi, S *et al.*, 2020[6]	Italy	Retrospective study	138 patients	Mean operative time: 2.4 – 0.7 hours (range 1.2–4.7 hours). Rate of conversions: 14.5% (20/138); Intraoperative complications: 1.4% (2/138) and positive resection margins: 6.5% (9/138). Overall incidence of duodenal fistula: 3.6% (5/138). Rate of reoperation was 7.3% (10/138). Postoperative complications according to Clavien–Dindo classification: I 3.6% (5/138); II 13.0% (18/138); III 5.8% (8/138); III B 0.7% (1/138); V 1.4% (2/138). Overall survival with 60 months follow-up was 58%.

				Overall 60 months incidence of relapse was 44%. Patients with omentum preservation had a lower incidence of relapse than patients with omentectomy (40% versus 57% P = .002).
Lan, YT *et al.*, 2017[7]	Taiwan	A pilot study	79 patients	There was no significant difference in the operative time, total number of retrieved lymph nodes, operative blood loss, and postoperative hospital stay between the patients who underwent robotic gastrectomy with or without indocyanine green fluorescence. For each lymph node station, there was significantly more number of retrieved lymph nodes in the indocyanine green group than in the no-indocyanine green group at the greater curvature side of the low body (#4d) to the infrapyloric region (#6) of the stomach. Five of the 14 patients who received an indocyanine green injection for lymphatic mapping had lymph node metastasis, and metastatic lymph nodes were located in the lymph node stations as detected by indocyanine green fluorescence during surgery.
Back, J *et al.*, 2022[8]	Finland	Retrospective study	99 patients	In total, 99 elderly patients were included in the study (51 in D1 group, 48 in D2 group). The median follow-up was 32.5 months. Patients in the D1 group were older and had a higher American Society of Anesthesiologist (ASA) score. Both groups had similar burden of postoperative complications (CCI 20.9 versus 22.6, p = 0.26, respectively) and 90-day mortality (2% for both groups). The OS, DSS, and DFS were similar between groups. Multivariable analysis adjusted for potential confounders detected no difference in the survival between the D1 and D2 groups.
Teoule, P *et al.*, 2020[9]	Germany	A Retrospective Cohort Study	126 patients	Enteral nutrition was initiated significantly earlier after CP implementation (5.0 vs. 7.0 days, p < 0.0001). Readmission was more frequent before CP implementation (7.8% vs. 0.0%, p = 0.05). Incentive spirometer usage increased following CP implementation (100% vs. 90.6%, p = 0.11).

				Mortality, morbidity and reoperation rates remained unchanged.

Lan, YT *et al* (2017)[7] showed a total of 79 patients who underwent robotic surgery for gastric cancer were enrolled in this study. Among them, lymphatic mapping with indocyanine green (ICG) injection around the tumor was performed in 14 patients (17.7%). Among the 14 patients, 9 received an intraoperative subserosal injection of ICG, and five received a preoperative submucosal ICG injection by the same gastroenterologist during endoscopy the day before surgery. In total, 7 of the 14 patients had stage IA lesions; two patients had stage IB lesions; one patient had stage IIA lesion; three patients had stage IIIA lesions; and one patient had a stage IIIC lesion. The median age of the patients was 70 years (range, 35–91), and the median body mass index (BMI) of the patients was 23.9 kg/m2 (range, 16.7–31.4).

Back, J *et al* (2022)[8] showed With respect to gastrectomy or operative time, no significant difference between the groups was observed. Laparoscopic approach was more common in the D1 group, with a conversion rate of 33% (p=0.013). Moreover, splenectomy rate (p=0.001) and intra-operative bleeding (p=0.003) were significantly higher in the D2 group. Morbidity and mortality were similar in both groups (Table 3). Rate of severe complications (Clavien-Dindo Grades III, IV, and V) was 17.6% in the D1 and 20.8% in the D2 group. ICU admissions were 19.6% and 6.3%, respectively. The number of ICU days was significantly higher in the D1 group (p=0.04). Re-operation was performed on two patients (3.9%) in the D1 group and on three patients (6.3%) in the D2 group. All re-operations were due to anastomotic leakage. Length of stay and re-admissions did not differ between the groups. One patient (2.0%) died of oesophago-jejunal anastomosis leakage in D1 group within 30 days. In the D2 group, one patient treated for anastomotic leak died for unknown reason within 90 days of discharge.

Teoule, P *et al* (2020)[9] showed the proportion of total gastrectomies was non-significantly higher in the pre-CP group, and correspondingly, there were proportionally more tumors extending to the entire stomach in this group. The type of surgical reconstruction differed significantly between the two groups. While all patients received a Roux-en-Y reconstruction, the proportion of handsewn esophagojejunostomies was higher in the pre-CP group (23.4%) than in the CP group (8.1%; $p = 0.01$). In the CP group, patients received liquid nutritional supplements significantly earlier (median 5.0 vs. 7.0 days in the pre-CP group; $p < 0.0001$). The usage of incentive spirometers increased following CP implementation, although the difference did not reach statistical significance (100% vs. 90.6% in the pre-CP group; $p = 0.11$). Foley and arterial catheters were removed significantly earlier in the pre-CP group (median of 1.0 vs. 4.0 and 2.0 vs. 5.0 days, respectively; $p = 0.01$).

DISCUSSION

Gastric cancer is the fifth most common cancer worldwide, with an estimated 952,000 new cases (7% of total cancer incidence) and 723,000 deaths (9% of total cancer mortality) in 2012. Surgical resection of the primary tumor can lead to radical treatment; however, discussions about less invasive procedures and functional preservation for AGC surgery have arisen recently. Gastrectomy is widely performed and is the most effective treatment for gastric cancer. Recent improvements in early-stage diagnosis and treatment have improved the detection, treatment, and subsequent curing of the disease.[10] Omentectomy for gastric cancer was first reported by Groves as removal of the lymphatic tissue comprising cancer cells, including bursectomy. Microscopic studies indicate the importance of milky spots of the greater omentum for cancer cell proliferation leading to peritoneal dissemination and have concluded that the greater omentum should be removed. Haverkamp et al. insisted that omentectomy has prognostic and oncologic value in the curative treatment of patients with gastric cancer. In a clinical practice, Japanese gastric cancer treatment guidelines indicate that removal of the greater omentum is usually recommended in standard gastrectomy for T3 or deeper tumours. National Comprehensive Cancer Network Guidelines Version 1 mentions that D1 dissection entails resection of both the greater and lesser omenta.[11]

In 2018, a large-scale randomized controlled trial (JCOG1001) reported that omentobursectomy does not provide a survival advantage over non-bursectomy (omentectomy) for patients with gastric cancer. Thereafter, bursectomy is not recommended for GC surgery in the guidelines of the Japanese Gastric Cancer Association (JGCA). According to the current guidelines of the JGCA (5th edition), gastrectomy with complete omentectomy (GCO) and D2 lymphadenectomy are the mainstream procedures for GC surgery. Nevertheless, the clinical benefit of GCO for GC remains unclear.[12,13]

Removal of the omentum may cause problems. The omentum functions as a protective cushion, reducing intestinal adhesion and also preventing inflammation in adjacent sites. Furthermore, abdominal complications may be caused by omentectomy, such as injury to the spleen, mesocolon or colon, and performing complete resection of the omentum, especially in laparoscopic gastrectomy, is technically difficult and time-consuming. If gastric cancer cells firstly metastasize to the omentum only then spread to the peritoneal cavity, omentectomy has a role to prevent a true peritoneal dissemination. Peritoneal dissemination may increase by omentum preservation. However, several retrospective studies have shown that omentum-preserving gastrectomy for advanced gastric cancer did not increase the rate of peritoneal relapse and did not worsen patient survival compared with omentectomy. To confirm this, well-designed prospective studies are necessary.[14,15]

CONCLUSION

For the curative treatment of patients with GC, omentectomy is highly valuable. According to Japanese guidelines for the treatment of gastric cancer, a standard gastrectomy for patients with T3 or deeper should include the removal of the greater omentum. Compared to non-bursectomy (omentectomy), omentobursectomy does not offer a survival advantage. Therefore, bursectomy is not advised for gastrointestinal surgery. Omentectomy plays a role in preventing a true peritoneal dissemination if gastric cancer cells first metastasize to the omentum and then spread to the peritoneal cavity.

The most common procedures for gastric cancer surgery are gastrectomy with complete omentectomy (GCO) and D2 lymphadenectomy, according to the most recent 5th edition guidelines published by the Japanese Gastric Cancer Association (JGCA). However, it is still unclear whether GCO has any clinical benefits for GC. On the other hand, removing the omentum could cause issues with the protective cushion, intestinal adhesion, and inflammation. In comparison to omentectomy, omentum-preserving gastrectomy for advanced gastric cancer did not worsen patient survival or raise the rate of peritoneal relapse. Well-designed prospective studies are still required to verify this.

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