International Journal of Healthcare Sciences ISSN 2348-5728 (Online)
Vol. 4, Issue 1, pp: (435-440), Month: April 2016 - September 2016, Available at: www.researchpublish.com

Systemic Review of Curative Gastrectomy for Adenocarcinoma of Stomach

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Abstract: **Gastric cancer as known the fourth leading cause of cancer-related mortality worldwide. It is the second most common form of cancer in first world countries. Younger patients are more likely than older adults to present with advanced or metastatic disease at diagnosis. Despite these trends at presentation, younger patients tend to have a more favorable prognosis at each stage compared with their older counterparts**

Objective: the purpose of this study was to identify and synthesize findings from all articles on surgical and long-term outcomes in patients with gastric cancer undergoing curative gastrectomy.

Methodology: systematic review study Search methods for identification of studies. The literature search included the period through July, 2016 of the MEDLINE database. The literature searches were carried out using Medical Subject Heading (MeSH) terms:

"Curative gastrectomy" "total gastrectomy" "partial gastrectomy" "stomach neoplasms" and "gastric cancer". Two different reviewers carried out the search and evaluated studies independently.

Conclusion: Gastric cancer is one of the most common causes of cancer-related death worldwide. Surgical resection with lymph node dissection is the only potentially curative therapy for gastric cancer. However, the appropriate extent of lymph node dissection accompanied by gastrectomy for cancer remains controversial.

Keywords: **Gastric cancer, Curative gastrectomy, total gastrectomy, partial gastrectomy, Adenocarcinoma, gastric cancer. stomach neoplasms.**

1. INTRODUCTION

Gastric cancer as known the fourth leading cause of cancer-related mortality worldwide [(1)] It is the second most common form of cancer in first world countries [(2)], with 930,000 new cases and 700,000 deaths reported yearly [(3)]. The median age of patients at the diagnosis of gastric cancer is 69 years. Like persons with other solid organ cancers, most of those affected are older adults (>65 years of age) [(4)]. Recently, the incidence of early gastric cancer has begun to rise in younger adults (<50 years of age). Younger patients are more likely than older adults to present with advanced or metastatic disease at diagnosis. Despite these trends at presentation, younger patients tend to have a more favorable prognosis at each stage compared with their older counterparts [(5)]. Since the first successful operation in 1881 [(6)], partial or total gastrectomy remains the only curative intervention for localised gastric cancer [(3,6)].

Open gastrectomy is the preferred surgical approach worldwide [(7)]. However, this procedure is associated with considerable morbidity [(8,9,10)]. Minimally invasive gastrectomy was introduced in 1993 and aimed at reducing surgical trauma and as a consequence lowering morbidity and mortality [(11)]. Post-operative survival has improved dramatically. The 5-year survival rate of all resections rose from 20.7% before 1970 to 28.4% by 1990, while 5-year survival rates of curative resections increased from 37.6% to 55.4% during the same period [(12)]. Contemporary studies quote 5-year survival rates of 33-50% [(13)].

A systematic review of the literature was undertaken with the aim of assessing evidence regarding the outcomes of gastrectomy as a primary treatment for patients with gastric adenocarcinoma.

2. OBJECTIVES

A surgical intervention strategy for the treatment of patients with newly diagnosed gastric adenocarcinoma seem to be the only curative procedure and very beneficial comparing to other treatment strategies, therefore the purpose of this study was to identify and synthesize findings from all articles on surgical and long-term outcomes in patients with gastric cancer undergoing curative gastrectomy.

3. METHODOLOGY

We conducted a systematic review study Search methods for identification of studies. The literature search included the period through July, 2016 of the MEDLINE database. The literature searches were carried out using Medical Subject Heading (MeSH) terms:

"Curative gastrectomy" "total gastrectomy" "partial gastrectomy" "stomach neoplasms" and "gastric cancer". Two different reviewers carried out the search and evaluated studies independently.

Data collection: The abstracts of the citations extracted from this initial search were subsequently screened for potential eligibility. The full text of potentially eligible papers was reviewed, studies to be included were identified and their reference lists were screened for additional eligible articles, data relevant to the aims of the study were extracted.

4. RESULTS

Several systematic reviews and meta-analyses have shown an advantage in short-term outcomes of curative laparoscopic partial and total gastrectomy compared to open procedures. Oncologic outcomes are similar on the short term [9, 10, 14, 15,16]. However, these studies are mainly performed in the Asian population in which early gastric cancer is detected at a higher rate due to a screening program. This is in contrast to the Western population in which gastric carcinoma is usually diagnosed at an advanced stage [17].

Curative total gastrectomy for gastric adenocarcinoma:

The patient is positioned in supine position under general anesthesia. The conventional open total gastrectomy is performed by means of an upper midline laparotomy. In case of the laparoscopic procedure, the number and placement of the camera, working and assistance ports will be performed according to the surgeons' preference. After establishment of pneumoperitoneum and introduction of the camera port, the working ports and assistance ports are introduced under direct vision[18,19].

In both procedures, first the lesser omentum is divided. Next, the lesser and greater curvatures of the stomach are dissected together with the locoregional lymph nodes. The left gastric artery and vein are transected at their origin. Next, the right gastroepiploic artery and the right gastric artery are transected at their origin. The duodenum is divided at least 1 cm distal to the pyloric sphincter by means of an endostapler. Subsequently, the distal esophagus is dissected from the left and right crus and mobilized, after which the distal esophagus is transected with an endostapler. Frozen section histology is performed to assess the extent of tumor invasion at the resection planes when indicated. The greater omentum is resected separately or en-bloc and marked uniformly. In the laparoscopic procedure the removal of the resected specimen with en-bloc lymphadenectomy and the greater omentum occurs via a mini-laparotomy (max. 5–6 cm), which must be muscle sparing. Next, an esophago-jejunostomy is performed by means of a Roux-en-Y reconstruction. The formation of a jejunal pouch and a feeding jejunostomy is optional [18,19].

Distal gastrectomy:

The conventional open distal gastrectomy is performed by means of a midline laparotomy. In case of the laparoscopic procedure, the number and placement of the camera, working and assistance ports will be performed according to the surgeons' preference. In both procedures, the lesser omentum is opened. Next, the greater curvature of the stomach is prepared. The left gastric artery and vein are transected at their origin. The gastrocolic ligament is divided at 3 cm distal to the gastroepiploic artery, after which the greater curvature is skeletonized up to the gastrosplenic ligament. The right gastroepiploic vein and artery are transected at its origin. Next the right gastric vessels are transected. The duodenum is divided distal to the pyloric sphincter by means of an endostapler. The proximal side of the stomach is divided at least 6 cm cranially from the tumor. Frozen section histology is performed to assess the extent of tumor invasion at the distal resection plane. Resection of the greater omentum is performed separately or en-bloc and marked uniformly. In the

laparoscopic procedure, the removal of the resected specimen with en-bloc lymphadenectomy and omentum occurs via a mini-laparotomy (max. 5–6 cm), which must be muscle sparing. Finally, a gastro-jejunostomy is performed with Roux-en-Y reconstruction [20,21].

Lymphadenectomy following gastrectomy:

Lymph node dissection is performed according to the Dutch oncologic guidelines and Japanese gastric cancer treatment guidelines [7, 22]. For D2 lymphadenectomy no pancreatico-splenectomy is performed since this is associated with high postoperative morbidity and mortality without proven benefit [23]. Furthermore, lymph node station ten is not dissected during total gastrectomy since it has no additive oncological value and is associated with morbidity [23]. Lymph node stations 1–3, 4d, 4sa, 4sb, 5–9, 11p, 11d and 12a are dissected during total gastrectomy. Lymph node stations 1, 3, 4d, 4sb, 5–9, 11p and 12a are dissected during distal gastrectomy (Fig. 1).

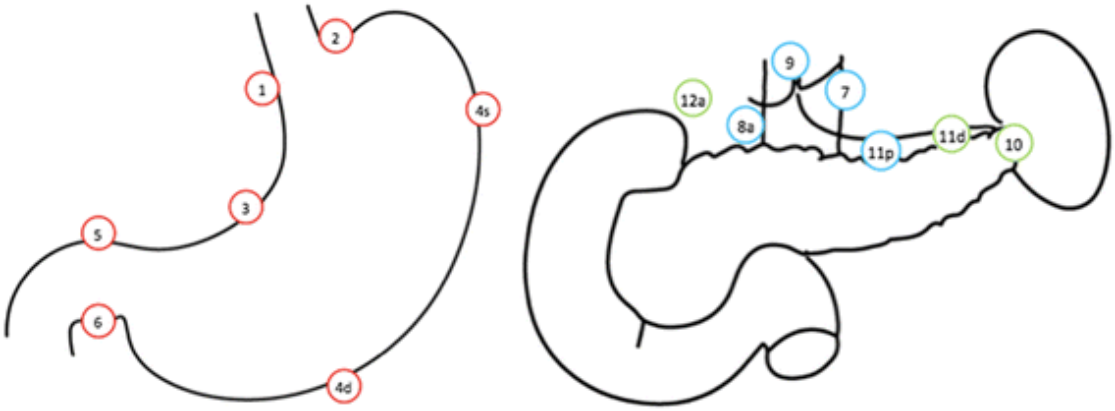

Fig. 1: Gastric lymph nodes [23]

Survival after gastrectomy:

The majority of studies report better physical health in patients undergoing partial gastrectomy compared to total gastrectomy [24,25,26,28]. Two studies indicated total gastrectomy patients achieved better scores [29,30], but this was not statistically significant in one [29]. There was no major difference between laparoscopic and open surgery patients' physical functioning scores [31]. Both groups experienced a decline after surgery which slowly improved with recovery, but remained below baseline levels at 90 days [31].

Eighteen studies (n=2,881) provided overall survival data [32, 33, 34, 35, 36, 37-49]. Meta-analysis of 10 studies including 2,075 and 3,698 patients undergoing gastrectomy or non-resectional operation, respectively, showed that gastric resections were associated with a 5-fold higher overall survival rate compared with non-resectional operations (p<0.0001, test for heterogeneity: p<0.001, I^2=78%, test for publication bias: p=0.173). Meta-analysis of data from two studies including patients undergoing gastrectomy (n=187) or conservative treatment (n=144) showed that gastric resections were associated with a 2.5-fold higher overall survival rate compared with conservative treatment (p<0.0011, test for heterogeneity: p<0.001, I^2=78%, test for publication bias: p=0.739).

5. CONCLUSION

Gastric cancer is one of the most common causes of cancer-related death worldwide. Surgical resection with lymph node dissection is the only potentially curative therapy for gastric cancer. Recurrence is the main cause of treatment failure after curative gastrectomy for patients with gastric cancer. Frequency of recurrence, time to first recurrent event, and survival are strongly dependent on the stage of disease at the time of surgery and extent of surgical resection. However, the appropriate extent of lymph node dissection accompanied by gastrectomy for cancer remains controversial.

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