

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-jejunosomy 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).

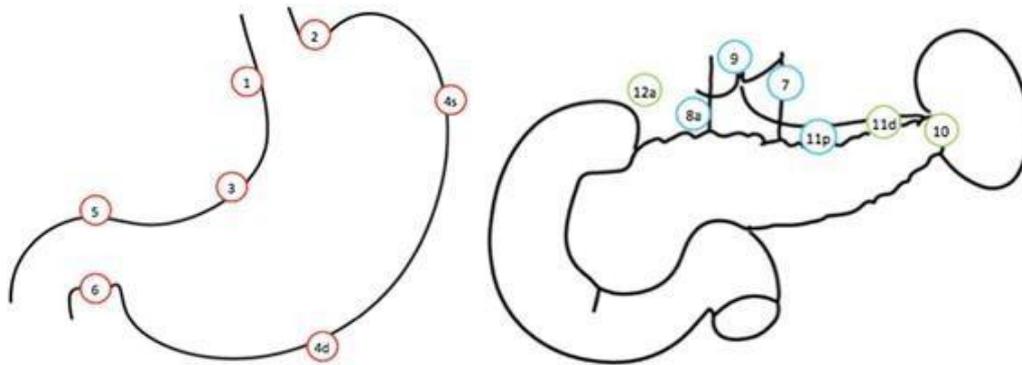


Fig. 1: Gastric lymph nodes.^[23]

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.

REFERENCES

1. Munene G, Francis W, Garland SN, et al. The quality of life trajectory of resected gastric cancer. *J Surg Oncol*, 2012; 105: 337-41.
2. Viudez-Berral A, Miranda-Murua C, Arias-de-la-Vega F, et al. Current management of gastric cancer. *Rev Esp Enferm Dig.*, 2012; 104: 134-41.
3. Ohtani H, Tamamori Y, Noguchi K, et al. Meta-analysis of laparoscopy-assisted and open distal gastrectomy for gastric cancer. *J Surg Res.*, 2011; 171: 479-85.
4. Dudeja V, Habermann EB, Zhong W, et al. Guideline recommended gastric cancer care in the elderly: insights into the applicability of cancer trials to real world. *Ann Surg Oncol*. 2011; 18(1): 26-33.
5. Al-Refaie WB, Hu CY, Pisters PW, Chang GJ. Gastric adenocarcinoma in young patients: a population-based appraisal. *Ann Surg Oncol*. 2011; 18(10): 2800-2807.
6. Lew JI, Posner MC. Surgical Treatment of Localized Gastric Cancer. In: Posner MC, Vokes EE, Weichselbaum RR, editors. *American Cancer Society Atlas of Clinical Oncology, Cancer of the Upper Gastrointestinal Tract*. Hamilton: BC Decker Inc., 2002; 13: 252-77.
7. Association JGC. Japanese gastric cancer treatment guidelines 2010 (ver. 3). *Gastric Cancer*. 2011; 14(2): 113–23.
8. Memon MA, Subramanya MS, Khan S, Hossain MB, Osland E, Memon B. Meta-analysis of D1 versus D2 gastrectomy for gastric adenocarcinoma. *Ann Surg*. 2011; 253(5): 900–11.
9. Haverkamp L, Weijs TJ, van der Sluis PC, van der Tweel I, Ruurda JP, van Hillegersberg R. Laparoscopic total gastrectomy versus open total gastrectomy for cancer: a systematic review and meta-analysis. *Surg Endosc*. 2013; 27(5): 1509–20.
10. Zeng YK, Yang ZL, Peng JS, Lin HS, Cai L. Laparoscopy-assisted versus open distal gastrectomy for early gastric cancer: evidence from randomized and nonrandomized clinical trials. *Ann Surg*. 2012; 256(1): 39–52.
11. Kitano S, Iso Y, Moriyama M, Sugimachi K. Laparoscopy-assisted Billroth I gastrectomy. *Surg Laparosc Endosc*. 1994; 4(2): 146–8.
12. Akoh JA, Macintyre IM. Improving survival in gastric cancer: review of 5-year survival rates in English language publications from 1970. *Br J Surg*, 1992; 79: 293-9.
13. Dassen AE, Dikken JL, van de Velde CJ, et al. Changes in treatment patterns and their influence on long-term survival in patients with stages I-III gastric cancer in The Netherlands. *Int J Cancer*, 2013; 133: 1859-66.

14. Xiong JJ, Nunes QM, Huang W, Tan CL, Ke NW, Xie SM, et al. Laparoscopic vs open total gastrectomy for gastric cancer: a meta-analysis. *World J Gastroenterol.* 2013; 19(44): 8114–32.
15. Wang W, Zhang X, Shen C, Zhi X, Wang B, Xu Z. Laparoscopic versus open total gastrectomy for gastric cancer: an updated meta-analysis. *PLoS ONE.* 2014; 9(2): e88753.
16. Vinuela EF, Gonen M, Brennan MF, Coit DG, Strong VE. Laparoscopic versus open distal gastrectomy for gastric cancer: a meta-analysis of randomized controlled trials and high-quality nonrandomized studies. *Ann Surg.* 2012; 255(3): 446–56.
17. Dicken BJ, Bigam DL, Cass C, Mackey JR, Joy AA, Hamilton SM. Gastric adenocarcinoma: review and considerations for future directions. *Ann Surg.* 2005; 241(1): 27–39.
18. Mortensen K, Nilsson M, Slim K, Schafer M, Mariette C, Braga M, et al. Consensus guidelines for enhanced recovery after gastrectomy: Enhanced Recovery After Surgery (ERAS(R)) Society recommendations. *Br J Surg.* 2014; 21.
19. Fein M, Fuchs KH, Thalheimer A, Freys SM, Heimbucher J, Thiede A. Long-term benefits of Roux-en-Y pouch reconstruction after total gastrectomy: a randomized trial. *Ann Surg.* 2008; 247(5): 759–65.
20. Zong L, Chen P. Billroth I vs. Billroth II vs. Roux-en-Y following distal gastrectomy: a meta-analysis based on 15 studies. *Hepatogastroenterology.* 2011; 58(109): 1413–24.
21. Shim JH, Oh SI, Yoo HM, Jeon HM, Park CH, Song KY. Roux-en-Y Gastrojejunostomy After Totally Laparoscopic Distal Gastrectomy: Comparison With Billroth II Reconstruction. *Surg Laparosc Endosc Percutan Tech.* 2014; 4.
22. Lee JH, Lee HJ, Kong SH, Park do J, Lee HS, Kim WH, et al. Analysis of the lymphatic stream to predict sentinel nodes in gastric cancer patients. *Ann Surg Oncol.* 2014; 21(4): 1090–8.
23. Hartgrink HH, van de Velde CJ, Putter H, Bonenkamp JJ, Klein Kranenbarg E, Songun I, et al. Extended lymph node dissection for gastric cancer: who may benefit? Final results of the randomized Dutch gastric cancer group trial. *J Clin Oncol.* 2004; 22(11): 2069–77.
24. Shiraishi N, Adachi Y, Kitano S, et al. Clinical outcome of proximal versus total gastrectomy for proximal gastric cancer. *World J Surg.* 2002; 26: 1150–4.
25. Hjerstad MJ, Hollender A, Warloe T, et al. Quality of life after total or partial gastrectomy for primary gastric lymphoma. *Acta Oncol.* 2006; 45: 202–9.
26. Huang CC, Lien HH, Wang PC, et al. Quality of life in disease-free gastric adenocarcinoma survivors: impacts of clinical stages and reconstructive surgical

- procedures. *Dig Surg*, 2007; 24: 59-65.
27. Kobayashi D, Kodera Y, Fujiwara M, et al. Assessment of quality of life after gastrectomy using EORTC QLQ-C30 and STO22. *World J Surg*, 2011; 35: 357-64.
 28. Namikawa T, Oki T, Kitagawa H, et al. Impact of jejunal pouch interposition reconstruction after proximal gastrectomy for early gastric cancer on quality of life: short- and long-term consequences. *Am J Surg*, 2012; 204: 203- 9.
 29. Spector NM, Hicks FD, Pickleman J. Quality of life and symptoms after surgery for gastroesophageal cancer: a pilot study. *Gastroenterol Nurs*, 2002; 25: 120-5.
 30. Díaz De Liaño A, Oteiza Martínez F, Ciga MA, et al. Impact of surgical procedure for gastric cancer on quality of life. *Br J Surg*, 2003; 90: 91-4.
 31. Kim YW, Baik YH, Yun YH, et al. Improved quality of life outcomes after laparoscopy-assisted distal gastrectomy for early gastric cancer: results of a prospective randomized clinical trial. *Ann Surg*, 2008; 248: 721-7.
 32. Chang YR, Han DS, Kong SH, Lee HJ, Kim SH, Kim WH, Yang HK, et al: The value of palliative gastrectomy in gastric cancer with distant metastasis. *Ann Surg Oncol*, 2012; 19: 1231-1239.
 33. Kulig P, Sierzega M, Kowalczyk T, Kolodziejczyk P, Kulig J: Non-curative gastrectomy for metastatic gastric cancer: rationale and long-term outcome in multicenter settings. *Eur J Surg Oncol*, 2012; 38: 490-496.
 34. Hallissey MT, Allum WH, Roginski C, Fielding JW: Palliative surgery for gastric cancer. *Cancer*, 1988; 62: 440-444.
 35. Tanizawa Y, Bando E, Kawamura T, Tokunaga M, Kondo J, Taki Y, Terashima M: Influence of a positive proximal margin on oral intake in patients with palliative gastrectomy for far advanced gastric cancer. *World J Surg*, 2011; 35: 1030- 1034.
 36. Saidi RF, ReMine SG, Dudrick PS, Hanna NN: Is there a role for palliative gastrectomy in patients with stage IV gastric cancer? *World J Surg*, 2006; 30: 21-27.
 37. Al-Amawi T, Swider-Al-Amawi M, Halczak M, Wojtasik P, Kladny J: Advisability of palliative resections in incurable advanced gastric cancer. *Pol Przegl Chir*, 2011; 83: 449-456.
 38. Turanli S: The value of resection of primary tumor in gastric cancer patients with liver metastasis. *Indian J Surg*, 2010; 72: 200-205.
 39. Kokkola A, Louhimo J, Puolakkainen P: Does non-curative gastrectomy improve survival in patients with metastatic gastric cancer? *J Surg Oncol*, 2012; 106: 193-196.
 40. Kunisaki C, Makino H, Takagawa R, Oshima T, Nagano Y, Fujii S, Otsuka Y, Akiyama

- H, Ono HA, Kosaka T, Ichikawa Y, Shimada H: Impact of palliative gastrectomy in patients with incurable advanced gastric cancer. *Anticancer Res.*, 2008; 28: 1309-1315.
41. Wang W, Li YF, Sun XW, Chen YB, Li W, Xu DZ, Guan XX, Huang CY, Zhan YQ, Zhou ZW: Prognosis of 980 patients with gastric cancer after surgical resection. *Chin J Cancer*, 2010; 29: 923-930.
42. Hioki M, Gotohda N, Konishi M, Nakagohri T, Takahashi S, Kinoshita T: Predictive factors improving survival after gastrectomy in gastric cancer patients with peritoneal carcinomatosis. *World J Surg*, 2010; 34: 555-562.
43. Park SH, Kim JH, Park JM, Park SS, Kim SJ, Kim CS, Mok YJ: Value of nonpalliative resection as a therapeutic and pre-emptive operation for metastatic gastric cancer. *World J Surg*, 2009; 33: 303-311.
44. Lim S, Muhs BE, Marcus SG, Newman E, Berman RS, Hiotis SP: Results following resection for stage IV gastric cancer; are better outcomes observed in selected patient subgroups? *J Surg Oncol*, 2007; 95: 118-122.
45. Lin SZ, Tong HF, You T, Yu YJ, Wu WJ, Chen C, Zhang W, Ye B, Li CM, Zhen ZQ, Xu JR, Zhou JL: Palliative gastrectomy and chemotherapy for stage IV gastric cancer. *J Cancer Res Clin Oncol*, 2008; 134: 187-192.
46. Li C, Yan M, Chen J, Xiang M, Zhu ZG, Yin HR, Lin YZ: Survival benefit of non-curative gastrectomy for gastric cancer patients with synchronous distant metastasis. *J Gastrointest Surg*, 2010; 14: 282-288.
47. Yagi Y, Seshimo A, Kameoka S: Prognostic factors in stage IV gastric cancer: univariate and multivariate analyses. *Gastric Cancer*, 2000; 3: 71-80.
48. An JY, Ha TK, Noh JH, Sohn TS, Kim S: Proposal to subclassify stage IV gastric cancer into IVA, IVB and IVM. *Arch Surg*, 2009; 144: 38-45.
49. Kikuchi S, Arai Y, Morise M, Kobayashi N, Tsukamoto H, Shimao H, Sakakibara Y, Hiki Y, Kakita A: Gastric cancer with metastases to the distant peritoneum: A 20-year surgical experience. *Hepatogastroenterology*, 1998; 45: 1183- 1188.