



# Differences Regarding the Laparoscopic and Laparotomic D2 Lymphadenectomy for the Surgical Treatment of Gastric Adenocarcinoma A Literature Review



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**Submission:** December 14, 2016; **Published:** January 20, 2017

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## Abstract

**Introduction:** The gastric adenocarcinoma is currently the most common histological type of gastric cancer, being diagnosed in 95% of the cases of gastric tumors. Lymphomas, sarcomas and gastrointestinal stromal tumors comprise the remaining 5%. Objective: This study aims to analyze, evaluate and compare the existing evidences regarding D2 lymphadenectomy performed laparoscopically or conventionally (laparotomically) during the treatment of gastric adenocarcinoma. Methodology: The current study is based on literary review of publications from the databases SciELO, LILACS and PubMed. The research was made using “gastric cancer”, “Laparoscopic gastrectomy” and “open gastrectomy” as keywords. Discussion: The surgical approach is the standard treatment, and its execution relies on the patient’s performance status. For the gastric adenocarcinoma, the surgical treatment of choice, and usually the most suitable, is the radical resection, respecting the safety margins for complete resection, as well as excision of epiploon and regional lymph nodes. Currently, the D2 lymphadenectomy is considered the standard treatment of gastric adenocarcinoma. Conclusion: It is seen that the resected lymph nodes seen in laparoscopic approaches are in greater number than the ones resected during a lymphadenectomy performed via laparotomy, the D2 lymphadenectomy performed via laparoscopy was as efficient as the one performed conventionally. Despite controversies in the past regarding the comparison between the laparoscopic procedure and open surgery, recent studies have shown good efficacy of the procedure and demonstrate reduction of complications and survival rates maintained or improved.

## Introduction

The gastric adenocarcinoma is currently the most common histological type of gastric cancer, being diagnosed in 95% of the cases of gastric tumors. Lymphomas, sarcomas and gastrointestinal stromal tumors comprise the remaining 5%. Its incidence is higher amongst men, with an average age of 70 years old, with the confirmatory diagnostic occurring, usually, above the age of 50 years old [1,2]. Currently, in Brazil, the adenocarcinoma is the third most incident tumor in men and the

fifth among women. The current oncologic estimative expects 20,520 new cases in 2016, being 12,920 in men and 7,600 in women [3].

The etiological triggering of gastric cancer is multifactorial. Within the multiple factors considered are: genetic alterations, gastric histological changes after benign or malignant diseases previously dissected, pernicious anemia, long exposure to radiation and family history of gastric adenocarcinoma [4].

The diagnosis is made by endoscopic screening with the performance of multiple biopsies not only aiming at the center of the suspected lesion, but also around all its edges in order to increase the diagnostic accuracy. The preoperative staging is made through imaging methods, being the abdominal and thoracic tomography the method of choice because of its high sensitivity in the evaluation of peritoneal and liver metastases [2].

### Objective

This study aims to analyze, evaluate and compare the existing evidences regarding D2 lymphadenectomy performed laparoscopically or conventionally (laparotomically) during the treatment of gastric adenocarcinoma.

### Methodology

The current study is based on literary review of publications from the databases SciELO, LILACS and PubMed. The research was made using "gastric cancer", "Laparoscopic gastrectomy" and "open gastrectomy" as keywords.

### Discussion

#### Surgical treatment

The surgical approach is the standard treatment, and its execution relies on the physical condition of the patient. For the gastric adenocarcinoma, the surgical treatment of choice, and usually the most suitable, is the radical resection, respecting the safety margins for complete resection, as well as excision of the greater and regional lymph nodes [5,6].

In rare cases of tumors confined to the mucosa (early staged tumors), an endoscopic resection is possible, and can be considered curative if it fulfills the following criteria: en bloc resection, lesion smaller than 2cm, histologically well differentiated tumor, invasion restricted to mucous tissue, free margins horizontally and vertically and lymphovascular tract without signs of invasion [4].

The location of the primary tumor defines the extension of the surgical resection, as well as longitudinal and circumferential margins, which need to be free of disease, only those standards being respected it is possible to discuss possibility of curative procedure [5].

#### Lymphadenectomy

The lymphatic dissemination of the gastric adenocarcinoma is more significant when compared to the hematogenous spreading. Therefore, lymph node metastasis are common and appear in early stages of the disease. The definition of the extension of the lymphadenectomy has brought forth many controversies regarding the surgical approach of the gastric cancer [7,8].

The lymphadenectomy should be planned before and during the surgical approach and must take into consideration tumor location, staging and the possibility of fully curative procedure.

The broadening of the extension allows the disease to remain local, preventing systemic neoplastic lymph node spread [9].

According to the Japanese Gastric Cancer Association, the lymphadenectomy performed is associated with the type of gastrectomy performed, and no longer performed according to the location of tumor. Currently, the D2 lymphadenectomy is considered the standard treatment of gastric adenocarcinoma [4].

The overall prognosis is related to the histological characteristics of the tumor, aggressiveness, location, manner of dissemination, stage, age of the patient and associated comorbidities. In early staged cancers, surgical treatment is intended as curative and in advanced cancers surgery is seen as the only curative option [9]. Thus, the aim of this review is to address what are the prospects for the surgical approach of gastric adenocarcinoma, comparing laparotomy and laparoscopy in the performance of D2 lymphadenectomy.

#### Laparotomy versus Laparoscopy

Laparoscopy was first introduced in the surgical treatment of colorectal cancers in the mid-90s, the results were as efficient as the laparotomy. For the surgical treatment of gastric cancer there was still some resistance among surgeons from around the world until the last decade, because of the difficulties regarding the surgical technique, advanced technological equipment and long-term learning curve [10].

Martinez-Ramos [11] showed in his meta-analysis a longer surgical time in the laparoscopic approach, but with less blood loss and fewer lymph nodes resected compared to open surgery. An important advantage of the laparoscopic method is the reduction of mortality and better 5-year survival rates. Regardless of the fewer resected lymph nodes, the study showed that the D2 lymphadenectomy performed via laparoscopy was as efficient as the one performed conventionally [11].

As for the surgical procedure length, the same author, relates it to be directly dependent on the surgeon's practice, and considers a good learning curve to hold at least 60 to 90 cases. The justification of the time difference mentioned above, an average of 40 minutes according to the author can be attributed to the experience of the surgeon and other unknown factors, not being related to the differences between the two surgical approaches [11].

Another study analyzed, written by Hong-Bo Wei et al. [12] and published in 2011 talks about the acceptance of laparoscopy in surgical treatment of gastric cancer, highlighting the importance of proper technique for the D2 lymphadenectomy. The number of lymph nodes resected proved to be sufficient in correlation to the overall pattern, and survival rates showed better results when compared with open surgery. An important difference found in this study was the significantly lower need for analgesics in patients undergoing laparoscopy, indicating

less postoperative pain, and consequently a shorter hospital stay. The analysis of postsurgical complications showed that patients that underwent laparoscopy had a lower incidence of wound infection and ileum, but showed no statistical difference regarding the presence of duodenal fistula, suggesting a good safety feasibility of the method [12]. The same study also highlights greater surgical time when comparing laparoscopy with conventional means. The concluded reasons for that fact are the learning curve when considering the complexity of the procedure, the lack of practice, the time for reconstruction of the gastrointestinal tract and the extension of lymphadenectomy performed. For the author, the longer surgical time can increase morbidity and mortality, especially in the elderly due to prolonged exposure to pneumoperitoneum. However, there is less blood loss during the procedure, reducing the need for perioperative blood transfusion.

The comparison of laparoscopic surgery and open surgery was also made by Shondara [13], and the study demonstrated equivalent mortality rates in both groups. However, the rate of surgical related complications was lower in patients undergoing laparoscopy. Less operative time, reduced hospital stay and less blood loss during the procedure were also seen.

### Conclusion

The evolution of surgical procedures for the treatment of gastric cancer and the discussion about the best treatment demonstrate a significant advance in the approach and the prognosis of this disease. The D2 lymphadenectomy is already well established, and is currently the gold standard approach for resection and lymph node staging, permitting greater chance of cure. The extent of tumor resection will be dependent on the location and staging, but the complete cure is associated with an effective lymphadenectomy. Studies show that the resected lymph nodes seen in laparoscopic approaches are in greater number than the ones resected during the lymphadenectomy performed via laparotomy, the D2 lymphadenectomy performed via laparoscopy was as efficient as the one performed

conventionally. Despite controversies in the past regarding the comparison between the laparoscopic procedure and open surgery, recent studies have shown good efficacy of the procedure and demonstrate reduction of complications and survival rates maintained or improved [10-15].

### References

1. Santo AS, Burchianti LC, Netto NA, Mazon VAP, et al. (2015) Adenocarcinoma gástrico. *Arq Med Hosp Fac Cienc Med Santa Casa São Paulo* 60: 156-159.
2. Cóvos FHG, Ferreira FMF, Navarro PF, David PM, Freitas Junior WR et al. Câncer gástrico avançado: complicação pós operatória - discussão decaço. *Arq Med Hosp Fac Cienc Med Santa Casa São Paulo* 56(3): 145-149.
3. Instituto Nacional do Câncer–Ministério da Saúde do Brasil (2016) Estimativas da incidência e mortalidade por câncer no Brasil.
4. Zilberstein B, Jacob CE, Yagi OK, Donato Mucerino D, Bresciani C, et al. (2013) Câncer Gástrico - Estado Atuale Perspectivas. *Gastrão*.
5. Toneto MG (2012) Estado atual do tratamento cirúrgico do adenocarcinoma gástrico avançado. *Revista da AMRIGS* 56(1): 81-86.
6. Toneto MG, Hoffmann A, Conte AF, Schambeck JPL, Ernani V, et al. (2011) Linfadenectomia alargada (D2) no tratamento do carcinoma gástrico-análise das complicações pós-operatórias e sobrevida. *Rev Col Bras Cir* 35(4): 229-234.
7. Bravo GPN, Santos EG, Victor FC, Carvalho CES (2011) Lymph node metastasis in early gastric cancer. *Rev Col Bras Cir* 41(1): 11-17.
8. Japanese Gastric Cancer Association (2011) Japanese gastric cancer treatment guidelines 201 (ver3). *Gastric Cancer* 14(2): 113-123.
9. Castro OAP, Malheiros CA, Rodrigues FCM, Ilias Elias Jirjoss, Kassab P (2009) Fatores prognósticos nas gastrectomias com linfadenectomia D2 por adenocarcinoma gástrico. *Arq Bras Cir Dig* 22(3): 158-164.
10. Ramagem CAG, Linhares M, Lacerda CF, Bertulucci PA, et al. (2015) Comparison of laparoscopic total gastrectomy and laparotomic total gastrectomy for gastric cancer. *Arq Bras Cir Dig* 28(1): 65-69.
11. Martinez-Ramos D, Miralles-Tena JM, Cuesta MA, Escrig-Sos J, Van der Peet Det al. (2011) Laparoscopy versus open surgery for advanced and resectable gastric cancer: a meta-analysis. *Rev Esp Enferm Dig* 103(3): 133-141.
12. Wei HB, Wei B, Qi CL, Chen TF, Huang Y, et al. (2011) Laparoscopic versus open gastrectomy with D2 lymph node dissection for gastric cancer: a meta-analysis. *Surg Laparosc Endosc Percutan Tech* 21(6): 383-390.
13. Shinohara T, Satoh S, Kanaya S, Ishida Y, Taniguchi K, et al. (2013) Laparoscopic versus open D2 gastrectomy for advanced gastric cancer: a retrospective cohort study. *Surg Endosc* 27(1): 286-294.
14. Li Q, Wang J, Zhang G, Wang J, Yang B, et al. (2016) Feasibility and safety comparison of laparoscopy assisted versus open gastrectomy for advanced gastric carcinoma with D2 lymphadenectomy. *Jpn J Clin Oncol* 46(4): 323-328.
15. Lin JX, Huang CM, Zheng CH, Li P, Xie JW, et al. (2013) Laparoscopy-assisted gastrectomy with D2 lymph node dissection for advanced gastric cancer without serosa invasion: a matched cohort study from South China. *World J Surg Oncol* 11: 4.



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DOI: [10.19080/ARGH.2017.02.555593](https://doi.org/10.19080/ARGH.2017.02.555593)

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