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ADVANCES IN THE SURGICAL APPROACH OF GASTRIC CANCER: IMPACTS ON CLINICAL OUTCOMES AND FUTURE PERSPECTIVES

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Abstract: Goal: This study aims to analyze recent advances in the surgical approach to gastric cancer, evaluating their impact on clinical results. Methods: Structured bibliographic review following the PVO strategy, with search in the PubMed database. After rigorously applying these criteria, we selected a total of 15 relevant articles. **Results:** Several surgical techniques were examined, highlighting laparoscopic gastrectomy as a less invasive option compared to open gastrectomy, which is considered more invasive. In terms of prognosis, the laparoscopic technique has significant advantages, including shorter hospital stay, reduction in complications, especially respiratory and abdominal complications, lower incidence of abdominal wall wounds, decreased need for endoscopic dilation, significant reduction in blood loss during surgery. and less spread of cancer cells in the peritoneal cavity compared to the open technique. **Final considerations:** Although the laparoscopic technique is associated with higher costs and depends on robotic devices, factors linked to the country's economic situation and individual circumstances, its accessibility is still not universal.
Keywords: Gastric Cancer, Laparoscopic Gastrectomy, Open Gastrectomy, Clinical Results.

INTRODUCTION

Gastric cancer represents a significant threat to global health, being classified as the third most frequent cause of cancer-related death and the fifth most diagnosed cancer worldwide (MA et al., 2020). In 2018, it was estimated that more than 1 million new cases of gastric cancer occurred worldwide (RAMOS et al., 2022). Although the five-year survival rate reaches more than 90% in early stages, the lack of effective screening methods and late diagnosis result in the majority of patients presenting with advanced-stage

disease at the time of treatment (TAN, 2019).

Gastric cancer ranks as the fourth most common cancer and the second most common cause of cancer-related deaths, emerging as a significant challenge in prevention due to the lack of effective screening methods and late diagnosis (TAN, 2019).

The absence of effective screening methods, together with the poor understanding of the etiology and pathogenesis of gastric cancer, as well as its asymptomatic nature in the early stages, results in a late diagnosis in more than 70% of cases, leading to a high mortality rate. (RAMOS et al., 2022).

The choice of surgical approach and treatment for gastric cancer varies based on the stage of the disease. In Western countries, the recommended approach for patients with locally advanced disease is perioperative chemotherapy combined with radical surgery (MACHADO et al., 2022). However, a proportion of patients are diagnosed with locally inoperable tumors or systemic disease from the outset. For these cases, in clinical stage IV, palliative chemotherapy is the main treatment modality (RAMOS et al., 2022).

Regarding surgical approaches, laparoscopic surgery is an alternative to open techniques. Studies demonstrate that laparoscopy offers advantages in terms of length of stay and reduction of postoperative complications (MA et al., 2020). However, the results indicate that laparoscopic radical gastrectomy is comparable to open in terms of long-term results.

Grosek et al., (2021) highlight that distal gastrectomy stands out in relation to total gastrectomy, as it is associated with shorter operative time and more efficient recovery. Choosing between gastrointestinal tract reconstruction techniques, such as Roux-en-Y reconstruction versus Billroth II reconstruction, plays an important role in reducing postoperative complications, pain, and reflux.

Wang et al., (2021) highlight the importance of integrating individual genomic information, clinical, imaging and pathological data for the accurate selection of gastric cancer treatment. This personalized approach allows for a more appropriate choice of minimally invasive surgical approaches, with a positive impact on patients' quality of life.

This review article aims to discuss the most recent advances in the surgical approach to gastric cancer, evaluate how these surgical strategies impact patients' clinical outcomes, and explore future perspectives for treating the disease. Furthermore, it seeks to provide up-to-date information to guide healthcare professionals in optimizing gastric cancer treatment, considering the most recent developments in oncological surgery.

METHODOLOGY

This study constitutes a bibliographical review structured in accordance with the PVO strategy, whose acronym stands for Population or Research Problem, Variables and Outcome. This methodology was adopted to answer the following central question: "What are the most recent innovations in the surgical approach to gastric cancer, how do these strategies impact clinical outcomes and what are the future perspectives for the treatment of this disease?" Within the scope of this research, the population or problem investigated focuses on patients diagnosed with gastric cancer who have undergone different types of surgical intervention in the treatment of the disease. The objective is to evaluate the most effective surgical approaches in terms of improving clinical prognosis. The search for literature was conducted in relevant databases, with emphasis on PubMed Central (PMC). We use search terms combined with Boolean operators "AND", "OR" and "NOT". This initial search strategy resulted in a total

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of 2,462 articles, which were subsequently subjected to selection criteria. The inclusion criteria that guided the selection of articles included: publication in English between 2018 and 2023; approach to relevant themes for this research; inclusion of studies such as systematic reviews, meta-analyses, cohorts and complete clinical trials.

The exclusion criteria include articles that did not directly address the central research question and that did not meet the other inclusion criteria. After rigorous application of these criteria, a total of 15 articles were selected from the PubMed database to compose the study, contributing substantially to the analysis of the most recent innovations in surgical approaches to gastric cancer and their impact on clinical results, in addition to promote discussions about future perspectives in the treatment of this disease.

DISCUSSION

SURGICAL ACCESS OPTIONS FOR GASTRIC CANCER

The surgical approach to gastric cancer is crucial in defining the patient's prognosis. This topic will discuss the available surgical options, specifically laparoscopic gastrectomy (GL) and open gastrectomy (GA), evaluating their clinical implications. A comparative study between laparoscopic gastrectomy (GL) and open gastrectomy (GA) revealed significant differences in terms of clinical outcomes. GA demonstrated inferior prospects, associated with prolonged periods of hospitalization and a higher incidence of complications, including respiratory complications, abdominal complications, abdominal wall wounds and the need for endoscopic dilation.

With regard to abdominal wall wound complications, it was observed that the totally laparoscopic approach showed a reduction in these complications, particularly in patients with an average BMI of 25 and high comorbidity. Furthermore, the lower incidence of respiratory complications in the group undergoing laparoscopic gastrectomy can be attributed to the reduction in postoperative pain and the encouragement of early ambulation (MONERO et al., 2018).

However, Davey et al. (2023) reported that GL had a slightly higher recurrence rate (9.1%) compared to open surgery (8.7%). Analysis of overall survival revealed similar results, with a survival rate of 87% in both surgical techniques, aligning with findings from previous literature (LI et al., 2019).

Regarding blood loss during the surgical procedure, laparoscopic gastrectomy demonstrated less blood loss compared to the open approach, corroborating previous studies (LI et al., 2019). However, regarding the duration of surgery, there are disagreements, with LI et al. (2019) stating that there is no significant difference in surgical time, while Davey et al. (2023) report a significantly longer duration in GL. Regarding lymph node count, both techniques showed similar results, emphasizing the effectiveness of lymphadenectomy during laparoscopic gastrectomy.

The endoscopic technique plays a fundamental role in both the diagnosis and treatment of gastric cancer. Its use has enabled the early detection of gastric lesions and their characteristics, making endoscopic resection (ER) of precancerous gastric lesions and early gastric cancers (EGCs) more efficient and less morbid. Early detection of precancerous lesions and EGCs, amenable to endoscopic resection, has proven crucial in patient follow-up. ER is recommended for all discrete gastric lesions with histological evidence of dysplasia, due to the risk of concomitant or subsequent EGC. Furthermore, the data support the use of RE for lesions with indefinite histology for dysplasia. There are several endoscopic

light techniques, each with its advantages. From white light endoscopy, which is the conventional technique, to confocal laser endomicroscopy, which allows for high-resolution histological evaluation. More advanced techniques have demonstrated higher identification rates and more detailed characterization of mucosal lesions. Endoscopic dissection has been shown to be effective in the resection of intramucosal differentiated gastric carcinomas, especially those less than 2 cm in diameter and without an ulcer or scar. The continuous evolution of these techniques has contributed to reducing the rates of advanced neoplasms, reducing the need for high-risk surgeries with complications (YOUNG et al., 2021).

The use of the robotic approach in minimally invasive gastrectomy allowed a comprehensive prognostic analysis, considering several parameters, such as age, American Society of Anesthesiologists status, type of gastrectomy, and pathological status of T and N. Through this analysis, it was observed that the surgery Robotics has optimized outcomes in the treatment of advanced gastric cancer, significantly reducing surgical time compared to laparoscopic and open surgery. Furthermore, it has overcome some limitations of the laparoscopic approach, thanks to advanced technology, precise instruments and the expanded skills of surgeons. The ergonomics offered by robotic surgery also contribute to exceptional therapeutic performance in the treatment of gastric neoplasms. The short and medium-term results of robotic gastric surgery are similar to open and laparoscopic procedures, especially when we take into consideration, the surgeon's experience and the technical implementation of the robotic system (SIBIO et al., 2021).

The advantages of robotic surgery include a significant reduction in intraoperative blood loss, less spread of cancer cells in the peritoneal cavity during surgery, improved prognosis, lower risk of esophageal-jejunal anastomosis dehiscence, lower incidence of internal hernias and reduced length of hospital stay. hospital. The statistical data align with the conclusions of Zizzo et al. (2022), who also observed shorter surgical time and less blood loss in robotic surgical procedures. It is worth mentioning that lymph node retrieval is more effective in robotic surgery compared to laparoscopic surgery. Although open surgery is the most widely adopted and recommended surgical technique to date, laparoscopy has been gaining ground in general surgery and may become more common in the future. It is important to consider that the preference for robotic surgery is limited by the technical knowledge required to operate robotic devices, resulting in a steeper learning curve for specialized surgeons (SIBIO et al., 2021). Furthermore, the higher cost of robotic surgery and the availability of robotic devices are strongly related to country wealth and individual circumstances.

INTRAOPERATIVE CHALLENGES IN GASTRIC CANCER SURGERY

Proximal gastrectomy (PG) has become an increasing preference in the treatment of early gastric cancer in the upper third of the stomach, due to the supposedly superior quality of life (QoL) after PG compared with total gastrectomy. However, currently, several reconstruction methods are being proposed, including open resection, laparoscopic resection and endoscopic resection (YABUSAKI, H. et al., 2020).

Intraoperative structure breakdown, leakage into the abdominal cavity, and implantation of remaining cancer cells are factors that contribute to an increase in cancer-specific mortality. Postoperative complications can lead to different levels of

inflammation, both in terms of distribution and severity. Postoperative complications can also inhibit the immune response to cancer cell progression, resulting in a lower rate of cancer-specific survival (CSS). Weakening of the immune environment may favor cancer recurrence, with inflammatory cytokines such as tumor necrosis factor-alpha and interleukin-6 interfering with the function of antigen-presenting cells, natural killer cells and cytotoxic T cells (NAGATA et al., 2023).

Although conventional open gastrectomy (OG) has been the main approach in the past, endoscopic and laparoscopic procedures have become more common, especially in the treatment of early gastric cancer. This is due to advantages such as less blood loss, fewer postoperative complications, faster recovery of bowel function, shorter hospital stay and equivalent long-term results.

In the case of laparoscopic gastrectomy (LG) for advanced gastric cancer (AGC), although some clinical trials have shown efficacy, the lack of data on long-term oncological outcomes and technical difficulties make the use of LG for AGC controversial. Many previous studies compared immediate and long-term postoperative outcomes, but they often lacked sufficient randomized controlled trials or used low-quality studies.

Furthermore, the adoption of robotic surgery for gastrectomy faces challenges such as the complexity of multilayered anatomy and the need for extensive lymph node dissection, which requires a highly coordinated team and complete exposure of the surgical field. The high cost of the robotic system and its maintenance, along with high treatment expenses, limit the popularity of robotic surgery in the treatment of gastric cancer. Overcoming these challenges is essential to expand the adoption of robotic surgery in this context (YABUSAKI et al., 2020).

PÓS-OPERATÓRIO CÂNCER GÁSTRICO TARDIO

The studies investigated point to notable progress in surgery for advanced gastric cancer, especially with the introduction of robotic gastrectomy. In the study "Robotic-assisted versus conventional laparoscopic-assisted total gastrectomy with D2 lymphadenectomy for advanced gastric cancer: short-term outcomes at a mono-institution," conducted by Shan-ping Ye et al. (2019), the feasibility and safety of robotic total gastrectomy (RATG) with D2 lymphadenectomy. This approach has demonstrated notable benefits compared to laparoscopic gastrectomy (LATG). RATG not only significantly reduced plasma C-reactive protein (CRP) levels 72 hours after surgery, but was also notable for lower intraoperative blood loss, reduced volume of postoperative abdominal drainage, and a shorter time to removal of the abdominal drainage tube. These results point to a clear improvement in surgical techniques, providing patients with a faster and less complicated postoperative recovery.

Other studies corroborate the advantages of robotic gastrectomy, highlighting a series of benefits, such as less intraoperative blood loss, a greater number of lymph nodes recovered, shorter hospital stays and a smoother learning curve when compared to laparoscopic gastrectomy. These factors not only indicate a faster recovery for patients, but also suggest a potential reduction in postoperative complications, promoting a better quality of life in the immediate postoperative period (ROH et al., 2021)

Despite significant advances in surgery for advanced gastric cancer, especially with the introduction of robotic gastrectomy, it is critical to recognize that analysis of the long-term impact of the '3+2' technique requires further investigation. Conducting high-quality randomized controlled clinical trials

is vital to fully validate the long-term efficacy and safety of this approach. These surveys play a crucial role in ensuring that patients continue to receive the highest quality care throughout their treatment journey (HU et al., 2020)

Robotic surgery, by minimizing blood loss during the procedure, not only enhances patients' recovery expectations but also substantially reduces the likelihood of complications after the operation. This implies a lower incidence of adversities, such as the separation of the connection between the esophagus and the stomach, as well as the formation of internal hernias. This safety profile reinforces the reliability of the robotic approach. The notable decrease in the risk of post-surgical complications plays a crucial role, promoting a smoother recovery and a more positive overall experience for patients (SIBIO et al., 2022).

In the context of the treatment of Siewert II and III adenocarcinoma at the esophagogastric junction, the choice of the method of reconstruction of the digestive tract plays a crucial role. The study entitled "Comparison of three digestive tract reconstruction methods for the treatment of Siewert II and III adenocarcinoma of esophagogastric junction: a prospective, randomized controlled study" carried out by Zhiguo Li, Jianhong Dong, Qingxing Huang, Wanhong Zhang and Kai Tao, highlighted the PJIRSTR procedure as the preferred option. This method not only demonstrated an effective anti-reflux effect, but also significantly improved the nutritional status of patients, contributing to a better long-term quality of life. Furthermore, its operative simplicity represents a significant advantage, indicating that this technique can be more widely implemented in clinical practice.

In summary, all studies provide a comprehensive view of the advantages and challenges associated with robotic gastrectomy in the treatment of advanced gastric cancer. While the immediate benefits are evident, the need for long-term studies is crucial to validate and expand these findings, ensuring that patients continue to receive the most effective and safe treatment available. The field of robotic surgery is constantly evolving, and this research highlights its crucial role in continually improving care for patients with advanced gastric cancer.

FINAL CONSIDERATIONS

The choice of approach and surgical technique in the treatment of gastric cancer varies according to the stage of the disease, with the surgical approach determining the patient's prognosis. Several techniques were accepted, highlighting laparoscopic gastrectomy as a less invasive option, and open gastrectomy, a more invasive alternative. Regarding prognosis, the laparoscopic technique has significant advantages, such as shorter hospitalization period, reduced incidence of complications, especially respiratory and abdominal complications, reduced occurrence of wounds in the abdominal wall, reduced need for endoscopic dilation, significant reduction in intraoperative blood loss. and less dissemination of cancer cells in the peritoneal cavity, when compared to the open gastrectomy technique. In conclusion, the results obtained with laparoscopic gastrectomy demonstrate superiority in relation to open gastrectomy. Despite the higher cost associated with the laparoscopic technique and the dependence on robotic devices, factors that are correlated with the country's economic situation and individual circumstances, its accessibility is currently not universal.

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