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Name of Journal: *World Journal of Gastroenterology*

Manuscript NO: 73316

Manuscript Type: LETTER TO THE EDITOR

Benefits of minimally invasive surgery in the treatment of gastric cancer

Sibio S *et al.* Minimally invasive surgery in gastric cancer

Abstract

We read with great interest the study which retrospectively reviewed 814 patients with primary gastric cancer who underwent minimally invasive R0 gastrectomy between 2009 and 2014, dividing patients into two groups based on the approach used: Laparoscopic or robotic. The results of the study showed that age, American Society of Anesthesiologists status, gastrectomy type, and pathological T and N status were prognostic factors of minimally invasive gastrectomy, with the robotic approach possibly improving long-term outcomes of advanced gastric cancer. In accordance with most of the current literature, robotic surgery is associated with a statistically longer operating time than open and laparoscopic surgery, but the adequacy of resection, expressed in terms of negativity of the surgical margins and number of lymph nodes removed, allows robotic surgery to deliver better results in terms of 5-year overall survival and recurrence-free survival. The robotic approach to gastric cancer surgery aims to overcome the difficulties and technical limitations that laparoscopy encounters in major surgery, in fact the three-dimensional vision, the articulation of the instruments and the good ergonomics for the surgeon, allow to perform with accuracy and precision movements, and complex steps of surgery, such as lymph node dissection and oesophagus-jejunal anastomosis packaging, reproducing the technical accuracy of open surgery. If the literature, as well as the analysed study, offers us countless data regarding the short-term oncological results of robotic surgery in the treatment of gastric cancer, satisfactory data on long-term follow-up are lacking, so that future studies are necessary.

Key Words: Gastric cancer; Robotic gastrectomy; Laparoscopy; D2 lymphadenectomy; Long-term outcomes; Morbidity

Sibio S, La Rovere F, Di Carlo S. Benefits of minimally invasive surgery in the treatment of gastric cancer. *World J Gastroenterol* 2022; In press

Core Tip: In the interesting letter of the laparoscopic and robotic approaches are compared in the treatment of gastric cancer, by analysing the prognostic factors as well as the oncological benefits brought about. While the long-term outcomes of laparoscopic surgery have been increasingly cited in recent years, only a few studies have analysed the long-term results of the robotic approach, underlining the importance of future studies. A peculiar aspect of robotic gastrectomy, however, is the ability to perform an accurate lymph node dissection which results in longer survival in advanced gastric cancer.

TO THE EDITOR

We read with interest the study by Nakauchi *et al*^[1] who retrospectively examined 814 patients with primary gastric cancer undergoing a minimally invasive R0 gastrectomy, between 2009 and 2014 in Kanazawa (Japan), comparing the laparoscopic and robotic approach and analysing the 5-year overall survival (OS) and recurrence-free survival (RFS). We looked with great interest at the results of the study that the robotic approach could improve the long-term outcomes of advanced gastric cancer. Authors observed that the robotic approach led to significantly better RFS compared to the laparoscopic approach in patients with p-Stage II/III tumors, although no significant difference in OS was detected, nor was it observed any significant difference in OS and RFS in p-Stage patients treated with laparoscopy or robotics.

We also highlighted from the study that an age > 65 years, American Society of Anesthesiologists physical status 3, total or proximal gastrectomy, and disease status T4 and N positive, are all independent prognostic^[1]. Since gastric cancer is the fifth most common malignancy in the world and the third cause of cancer death and minimally invasive surgery has become the standard approach for several GI surgery procedures, it is worth to identify the most appropriate technical approach for this disease^[2,3].

Surgical treatment remains the only therapeutic option with curative intent. Total or subtotal gastrectomy, associated with D2 lymphadenectomy, represents the therapeutic gold standard for gastric cancer. We must acknowledge that the traditional surgical

approach, open surgery, has represented for decades, and still represents, the most widespread surgical technique. Although, in fact, the use of laparoscopy has become almost constant in general surgery, the application of the laparoscopic technique to gastric surgery has shown reduced diffusion in case of malignancies. As supported by various authors, laparoscopy has still several technical drawbacks and limitations, including two-dimensional vision, stiffness of instruments, limited range of motion, amplification of hand tremors, and uncomfortable surgical placement, which make some fundamental surgical steps, such as D2 lymphadenectomy, extremely complex^[2,4].

In fact, according to the reading discussed, ¹ the pN factor is strongly associated with survival after gastric cancer treatment, confirming the thesis that laparoscopy in gastric cancer is more adequate in the earlier stages. In contrast, the safety and oncological adequacy of laparoscopic-assisted radical D2 gastrectomy for advanced gastric cancer are still under discussion^[5]. From the meta-analysis it emerges that the main variables associated with a statistically significant advantage of laparoscopic technique over open surgery are represented by: Lower blood loss, lower complication rate, faster recovery and reduced pain at the expense of a longer duration of the surgery and fewer lymph nodes removed and therefore a potential worse local control of the disease^[6,7].

Alongside laparoscopy, robotic technology has allowed the overcoming of the technical difficulties of laparoscopy, thanks to the three-dimensional vision, the articulation of the instruments and the acquisition of greater ergonomics for the surgeon, offering a better therapeutic approach to the minimally invasive treatment of stomach tumors. Thus, with the increasing experience of surgeons and the technical implementations of the robotic system, the results, in the short and medium term, of robotic gastric surgery can almost be compared with open and laparoscopic surgery.

We fully agree with the authors, who have shown significantly lower morbidity in the group of patients treated with robotics than in the laparoscopic group, as widely discussed in many studies. A recent meta-analysis, which compared laparoscopy with robotics in the treatment of gastric cancer, highlighted that the robotic approach appears to achieve better surgical results in the short term, also thanks to the ability to

recover a higher rate of lymph nodes, in particular those which are the most difficult to reach, namely the lymph node stations n. 7, 8a, 9 and 11p, with the further possibility of ensuring a more appropriate staging and chemotherapy plan^[8].

A study conducted in Japan reported, among the advantages of robotic surgery, a lower intraoperative blood loss, with a consequent reduction in the dissemination of cancer cells in the peritoneal cavity during surgery and, therefore, a better prognosis. Another aspect highlighted is a lower risk of dehiscence of the oesophagus-jejunal anastomosis, along with a lower incidence of internal hernias^[9-11]. From the short-term results it emerges therefore that robotic gastrectomy is a safe technique that potentially allows to extend the number of patients treatable with a minimally invasive approach, overcoming the technical difficulties of laparoscopy, offering some benefits in terms of blood loss, conversion rate, overall number of lymph nodes removed and in suprapancreatic areas, procedure-specific postoperative morbidity and shorter length of hospital stay^[12].

Robotic gastrectomy is a safe and effective surgical technique when performed by experienced surgeons, however, it is associated with a longer duration of surgery and a higher economic value than laparoscopy and the open approach^[13,14]. Indeed, one of the factors that slows down the spread of robotic surgery is the particular technical expertise required while handling the robotic devices, resulting in a steeper learning curve for the specialized operator. The cost and longer timeframe of robotics make future studies necessary^[15], as well as the need for randomized controlled trials comparing the two techniques with a long-term follow-up, since, considering the long-term results, probably due to the recent diffusion of this technique, publications are still scarce^[16].

Precisely because of the higher cost of robotics, we want to underline one of the limitations of the study here discussed, represented by possible errors in the selection of patients. In fact, people of higher economic status, could opt for the robotic treatment that the surgeon, on his side, could be more willing to satisfy. On the one hand, robotic devices and longer operating times determine, especially in Western countries, higher

costs of the robotic approach than open or laparoscopic surgery; on the other hand, especially in some cases reported in the Western countries, fewer post-operative complications were highlighted with the robotic technique, resulting in lower hospitalization costs, as well as shorter hospital stays^[17].

In conclusion, the study discussed here provides valid results on the correct therapeutic management of patients with gastric cancer, with the prospect of offering the overcoming of the difficulties and technical limitations that laparoscopy encounters in major surgery. Essentially, laparoscopic D2 lymphadenectomy remains a challenging procedure: In particular, the dissection of the lymph nodes along the celiac, the hepatic and splenic arteries make this approach technically complicated and time-consuming even for well-trained surgeons. ⁴ It is in this context that robotics is worth looking at and it represents a useful tool that overcome some limitations of conventional laparoscopic techniques, even if greater surgical and anaesthetic times and the higher costs have to be considered if compared to open surgery.

However, in accordance with the international literature that attributes better results to robotic surgery in perioperative outcomes, an advantage in terms of blood loss, and fewer postoperative complications compared to open surgery, future studies of higher quality are necessary due to the lack of data on long-term results, given the relatively recent diffusion of the technique. In a long-term perspective, given the need for further studies on larger samples of patients from Western countries, we believe that robotic technology for gastric cancer surgery, for the many advantages it offers, can become a gold standard^[18].

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