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Can robotic surgery lead the way in the treatment of rectal cancer?

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Total mesorectal excision (TME), introduced by Heald et al. [1], is a standard procedure and an essential oncologic surgical principle for mid to low rectal tumors. The concept of TME is to promote preservation of structures, allow *en bloc* resection of tumor and lymphoid tissue, and provide better functional and oncologic outcomes. However, TME procedures are not always successful due to challenges such as narrow and deep pelvis, advanced tumor, and lack of surgeon's anatomical understanding, which can jeopardize the oncologic outcome. Achieving a complete, high quality TME requires a solid knowledge of the complex pelvic anatomy and well-designed instruments that can work in confined spaces. Therefore, the development of surgical methods that increase the accuracy of TME through innovative devices and techniques is closely related to the outcome of rectal cancer treatment.

Reyes et al. [2] conducted a comparative study of surgical and pathologic outcomes in rectal cancer surgery using open and robotic surgery. The study was the first to compare pathologic outcomes of arterial ligation site, ligated vessel length, and resection margin in specimens from robotic and open surgery. The results showed no significant differences between the 2 surgical methods in distal resection margin and circumferential resection margin, complete mesorectal fascia, vessel length, and total harvested lymph node. Several studies have reported better outcomes with robotic TME than laparoscopic TME in terms of completeness of TME [3]. Furthermore, the recent COLRAR trial [4] showed no significant differences in pathological outcomes, such as completeness of TME, circumferential resection margin, and the number of harvested lymph nodes, between laparoscopic and robotic surgery.

Robotic surgical systems offer several advantages, including advanced stereoscopic 3-dimensional vision, tremor-free movements, and precise rotation and joint movements that enable accurate surgery while preserving nerve and vascular structures in narrow and limited spaces [5]. Furthermore, new and evolving versions of robotic consoles allow for easier multiquadrant access to different anatomical regions or complete robotic surgery through a single docking [6]. Robot-assisted stereotactic real-time navigation surgery is performed using a robotic platform and navigation interface [7]. While this technology is not yet widely available due to several limitations, surgical systems that incorporate navigation will enhance surgeons' perception of the surgical field during complex surgeries in the future.

However, there is still insufficient evidence, including the study by Reyes et al [2], to support the claim that robotic surgery improves oncological outcomes when compared to laparoscopic or open surgery. While the technical advantages of robotic surgery in rectal cancer are increasing, oncological superiority must be established for it to be widely accepted. Therefore, future well-defined randomized studies on the pathological and oncological outcomes of advanced tumors will be essential.

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ARTICLE INFORMATION

Conflict of interest

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