Editorial

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Can assistants' skills be used to improve colorectal cancer surgery outcomes in a way similar to the "butterfly effect"?

Je-Ho Jang
Department of Surgery, Eulji University School of Medicine, Daejeon, Korea

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Operative outcomes in colorectal cancer depend on several variables, including tumor characteristics (size, depth of invasion, and lymph node metastasis), and patient characteristics (underlying comorbidities, anatomical variations, prior operation history, obesity, and malnutrition). These are well known factors whereas surgical characteristics (experience of the surgeon, choice of surgical approach, intraoperative event like bleeding, conversion to open surgery), and the surgical environments (surgical units with adequate experience and superior outcomes with abundant medical resources including proficiency of the endoscopist and the assistants) are not well known.

In laparoscopic colorectal surgery, certain operative outcomes, such as anastomotic leakage, bleeding, or the conversion rate, can influence the oncologic outcomes [1, 2]. For better results, it is ideal to improve the surgical procedure, the operating room environment, and perioperative care. Minimally invasive laparoscopic surgery for colorectal cancer has also been developed as a way to achieve better outcomes, demonstrating many advantages over open surgery. In addition to simple cosmetic aspects, minimally invasive laparoscopic surgery induces early functional recovery, producing less pain and adhesions, and providing a better surgical view in confined spaces [3, 4]. However, there are hurdles, such as discrepancies in the 2-dimensional visualization of 3-dimensional stereoscopic objects, restrictions on instruments, absence of tactile sense, the requirement to adapt to the new laparoscopic anatomy, and the need for proficiency of endoscopists and surgical assistants [5, 6]. These disadvantages may be primarily caused by the instrument tips moving paradoxically in relation to hand motion or by the loss of coaxial visual-motor alignment [7, 8]. Optimal laparoscopic performance to achieve better outcomes in colorectal cancer surgery requires proper triangulation of the instrument and camera port, but during some procedures, particularly in multiquadrant abdominal surgery, the laparoscopic surgeon and the surgical assistant may occasionally encounter circumstances where the visual and operative fields are not properly aligned. Typically, the surgical assistant is more exposed to these circumstances. The surgeon and the assistant become confused due to the mirror image of the operating field's visual-spatial discordance, which frequently degrades work performance [9-11]. Several studies have measured surgical performance under mirror-image conditions in experimental settings, and interestingly, reverse-alignment surgical skills are not derivative from surgical skills developed in a video trainer with forward orientation, and the volume and type of cases encountered by residents during the course of training are insufficient for the full development of reverse-alignment surgical skills [11]. As a result, developing reverse-alignment surgical abilities does not arise from laboratory training in forward-alignment situations, and the learning curves for laparoscopic surgery should be mastered in a practical setting both for surgeons and surgical assistants in order to develop transferable and durable reverse-alignment surgical abilities. Open laparotomy has its own learning curve, of course, but more practice is needed for surgeons and assistants to surmount these challenges for laparoscopic surgery. Reportedly, for colon resection, an operator needs about 30 to 70 experiences to overcome the learning curve [5, 6]. However, few studies have focused on assistants' proficiency, especially for reverse-alignment skills, and there has not been much research on whether the assistants' reverse-alignment skills really affect the outcomes of surgery. Therefore, this study makes a valuable contribution by demonstrating the impact of the surgical assistant on surgical outcomes [12]. Hwang et al. [9] reported that 30 to 40 procedures were needed for surgical assistants to develop their grasping skills, which stabilized with adequate practice without the use of special tools. Ac-

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Correspondence to: Je-Ho Jang, M.D.
Department of Surgery, Daejeon Eulji University Hospital, Eulji University School of Medicine, 95 Dunsanseo-ro, Seo-gu, Daejeon 35233, Korea
Tel: +82-42-259-1335, Fax: +82-42-259-1335
E-mail: jhjang@eulji.ac.kr
ORCID: https://orcid.org/0000-0001-8935-6449

cording to their analysis, the mechanism of overcoming the learning curve was analyzed as adopting the reverse alignment by mentally inverting the image before attempting manipulation. Haveran et al. [13] suggested that both camera and monitor positioning must be highlighted as a crucial part of laparoscopy, especially for beginners in laparoscopic colorectal surgery, in order to maximize laparoscopic work efficiency. Regarding robotic surgery, although the 3-dimensional magnified view is preferable and the assistants' mirror image is absent, robotic surgical systems are still expensive and occasionally out of reach for some patients or hospitals.

Efforts are still ongoing to help assistants solve the mirror image issue using laparoscopic simulators or converting monitors. In the era of minimally invasive laparoscopic surgery, we should continue to be interested in techniques of instructing and educating surgical assistants in order to help them avoid reverse alignment and achieve better results. A butterfly effect from assistants' improved performance may be anticipated, making laparoscopic colorectal surgeons' procedures safer and simpler and resulting in improved outcomes.

CONFLICT OF INTEREST

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ORCID

Je-Ho Jang, https://orcid.org/0000-0001-8935-6449

REFERENCES

1. Ramphal W, Boeding JR, Gobardhan PD, Rutten HJ, de Winter LJ, Crolla RM, et al. Oncologic outcome and recurrence rate following anastomotic leakage after curative resection for colorectal cancer. Surg Oncol 2018;27:730-6.
2. Lee SC, Huh JW, Lee WY, Yun SH, Kim HC, Cho YB, et al. Long-term oncologic outcome and risk factors after conversion in laparoscopic surgery for colon cancer. Int J Colorectal Dis 2020;35:395-402.
3. Weeks JC, Nelson H, Gelber S, Sargent D, Schroeder G; Clinical Outcomes of Surgical Therapy (COST) Study Group. Short-term quality-of-life outcomes following laparoscopic-assisted colectomy vs open colectomy for colon cancer: a randomized trial. JAMA 2002;287:321-8.
4. Jayne DG, Guillou PJ, Thorpe H, Quirke P, Copeland J, Smith AM, et al. Randomized trial of laparoscopic-assisted resection of colorectal carcinoma: 3-year results of the UK MRC CLASICC Trial Group. J Clin Oncol 2007;25:3061-8.
5. Reissman P, Cohen S, Weiss EG, Wexner SD. Laparoscopic colorectal surgery: ascending the learning curve. World J Surg 1996;20:277-82.
6. Schlachta CM, Mamazza J, Seshadri PA, Cadeddu M, Gregoire R, Poulin EC. Defining a learning curve for laparoscopic colorectal resections. Dis Colon Rectum 2001;44:217-22.
7. Gallagher AG, Ritter EM, Lederman AB, McClusky DA 3rd, Smith CD. Video-assisted surgery represents more than a loss of three-dimensional vision. Am J Surg 2005;189:76-80.
8. Emam TA, Hanna G, Cuschieri A. Ergonomic principles of task alignment, visual display, and direction of execution of laparoscopic bowel suturing. Surg Endosc 2002;16:267-71.
9. Hwang MR, Seo GJ, Yoo SB, Park JW, Choi HS, Oh JH, et al. Learning curve of assistants in laparoscopic colorectal surgery: overcoming mirror imaging. Surg Endosc 2010;24:2575-80.
10. Cresswell AB, Macmillan AI, Hanna GB, Cuschieri A. Methods for improving performance under reverse alignment conditions during endoscopic surgery. Surg Endosc 1999;13:591-4.
11. Gould JC, Frydman J. Reverse-alignment surgical skills assessment. Surg Endosc 2007;21:669-71.
12. Lee S. The impact of assistants' reverse alignment surgical skill proficiency on laparoscopic colorectal surgery. Ann Coloproctol 2022;38:432-41.
13. Haveran LA, Novitsky YW, Czerniach DR, Kaban GK, Taylor M, Gallagher-Dorval K, et al. Optimizing laparoscopic task efficiency: the role of camera and monitor positions. Surg Endosc 2007;21:980-4.