

Video vignettes

Indocyanine green fluorescence-guided laparoscopic lateral lymph node dissection for rectal cancer

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Short running title: ICG-guided laparoscopic LLN dissection

In Japan, lateral lymph node (LLN) metastasis is considered to be regional metastasis rather than distant metastasis, and so lateral lymph node dissection (LLND) has been the standard procedure for locally advanced rectal cancer. The recent JCOG0212 trial that compared total mesorectal excision (TME) alone with TME plus prophylactic LLND failed to demonstrate non-inferiority for the TME-alone group.¹ In our institution, LLND is selectively performed for the rectal cancer patients with LLNs clinically suspected of having metastasis.² Technical difficulties can cause incomplete dissection of LLNs, allowing them to remain in the pelvic space. In recent years, near-infrared fluorescence imaging with indocyanine green (ICG) has developed as a useful tool to guide lymphatic drainage in colorectal surgery.^{3,4} Because ICG fluorescence provides the real-time information on lymphatic flow, it can be helpful to dissect LLNs completely.⁵

In the present video, we show a novel application of ICG during laparoscopic TME with LLND to prevent incomplete dissection of LLNs (see **Video**). ICG (2.5 mg/0.5 mL) was injected around the tumor transanally before surgery. Following completion of TME, left-sided LLND performed along the following four planes of the lateral compartment: lateral (external iliac vessels and internal obturator muscle), medial (ureterohypogastric fascia), distal (obturator foramen and Alcock canal), and inferior planes (sacral nerve plexus and piriformis muscle). ICG imaging clearly revealed hypogastric nerve and pelvic splanchnic nerve (S3 and S4) were involved in the ICG-stained LLN confirmed to be pathologically positive, which was useful for the combined resection. After completing LLND, ICG imaging was performed again to check the existence of the remaining lymph nodes in the pelvic sidewall. Preoperative therapy was not performed in this case.

ICG-guided laparoscopic LLND allows surgeons to identify LLNs and lymphatic drainage of rectal cancer with high reliability. Further studies are needed to address more benefits of this surgical procedure.

Reference

1. Fujita S, Mizusawa J, Kanemitsu Y, et al. Mesorectal excision with or without lateral lymph node dissection for clinical stage II/III lower rectal cancer (JCOG0212): a multicenter, randomized controlled, noninferiority trial. *Ann Surg.* 2017;266:201-207.
2. Yamamoto T, Kawada K, Hida K, et al. Optimal treatment strategy for rectal cancer based on the risk factors for recurrence patterns. *Int J Clin Oncol.* 2019 Feb 5. doi: 10.1007/s10147-019-01400-6. [Epub ahead of print]
3. Watanabe J, Ota M, Suwa Y, Ishibe A, Masui H, Nagahori K. Real-time indocyanine green fluorescence imaging-guided complete mesocolic excision in laparoscopic flexural colon cancer surgery. *Dis Colon Rectum.* 2016;59:701-705.
4. Chand M, Keller DS, Joshi HM, Devoto L, Rodriguez-Justo M, Cohen R. Feasibility of fluorescence lymph node imaging in colon cancer: FLICC. *Tech Coloproctol.* 2018;22:271-277.
5. Kim HJ, Park JS, Choi GS, Park SY, Lee HJ. Fluorescence-guided robotic total mesorectal excision with lateral pelvic lymph node dissection in locally advanced rectal cancer: a video presentation. *Dis Colon Rectum.* 2017;60:1332-1333.