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Title **Indocyanine-green in facilitating surgeon's decision for bowel anastomosis in colorectal surgery**

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Introduction

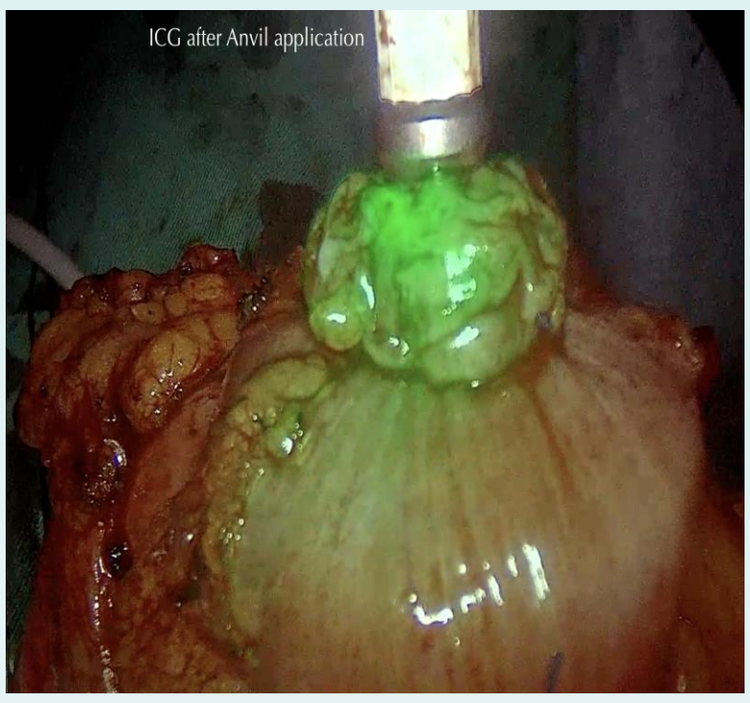
Indocyanine Green (ICG) is a fluorescent dye utilized in laparoscopic colorectal surgery that improves visualization, enables perfusion assessment, aids in lymphatic mapping, and offers real-time guidance for surgeons

Case report

A middle-aged man presented with painless rectal bleeding and significant weight loss. A colonoscopy revealed a rectosigmoid colon tumor, and a biopsy confirmed it to be adenocarcinoma. His serum CEA was found to be raised. Contrast-enhanced CT scan staging showed a resectable rectosigmoid tumor with no distant metastasis. He subsequently underwent laparoscopic anterior resection with anastomosis to remove the tumor. In this case, we used ICG to aid in the assessment of bowel perfusion prior to anastomosis. An ICG fluorescence image-guided laparoscopy was used to help the surgical team evaluate tissue perfusion before performing the anastomosis. Post operatively patient had ileus but resolved upon discharge. No anastomotic leak noted.
His final histopathological examination (HPE) came back to be T3N1M0 moderately differentiated adenocarcinoma with lymphovascular invasion. Adjuvant FOLFOX was initiated.

Intraoperative pictures

Picture 1: ICG before bowel transection.



Picture 2: ICG showing good perfusion after Anvil application.

Discussion

An anastomotic leak(AL) is a critical complication that any surgeon might encounter, allowing intestinal contents to escape and causing severe sepsis. The likelihood of an anastomotic leak varies significantly based on patient factors, surgeon factors, and the anatomical location of the anastomosis. Leaks between the colon and rectum are particularly frequent, with rates ranging from 5% to 19%[1,2] .

ICG is a fluorescent dye that assists in evaluating tissue perfusion and provides real-time feedback[3,4]. According to a systematic review and meta-analysis, ICG effectively reduces the incidence of anastomotic leaks[5]. Using the Karl-Storz Image 1 S™ RUBINA system, we routinely perform bowel perfusion assessments with ICG during laparoscopic colectomy at various stages: before bowel transection, prior to anastomosis, and after anastomosis. ICG also helps in identifying important blood vessels and the ureter. This practice has enabled us to reduce our anastomotic leak rate[5].

Several studies have highlighted the role of ICG in reducing AL. The PILLAR II study (Perfusion Assessment in Laparoscopic Left-Sided/Anterior Resection) found a 1.4% reduction in AL when ICG was used. Additionally, a comprehensive systematic review in 2023 revealed a significant correlation between ICG use and reduced leak rates, particularly in the rectum[6].

The limitation of ICG include limited depth penetration, interference from tissues, uneven dye distribution, high costs, need for specialized training and equipment, potential for false results and risk of allergic reaction.

Conclusion

ICG is a safe, easy and effective way to aid surgeon assessing bowel perfusion assessment before anastomosis. We recommend this to be a standard procedure in laparoscopic surgery.

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