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# PRECISION SURGERY FOR COLORECTAL CANCER: IMPLEMENTING INDOCYANINE GREEN FLUORESCENCE IMAGING

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Indocyanine green fluorescence (ICG) imaging is a game-changing new technology for colorectal cancer surgery. It changes the way surgery is done from anatomy-based resection to physiology-guided precision surgery. The main new thing about it is that it lets you see things in real time during surgery, which was not possible with regular white light alone. Surgeons can now objectively evaluate tissue perfusion prior to creating an anastomosis, effectively mitigating the feared complication of anastomotic leak. Anastomotic leak happens in a percent of patients and leads to higher death rates, longer hospital stays, and worse cancer outcomes. A recent meta- analysis of multiple randomized controlled trials revealed that Indocyanine Green guidance decreases clinical anastomotic leaks by roughly one- third.

This is a big step forward for surgical safety because Indocyanine Green lets surgeons find bowel segments that aren't getting enough blood flow and change the transection site to stop leaks that would only show up days after surgery.

Indocyanine Green fluorescence imaging is a big step forward in oncologic precision beyond perfusion assessment. This is especially true for evaluating lymph nodes, which is important for staging cancer. Correctly staging colorectal cancer requires getting enough lymph nodes and finding metastatic nodes. This directly affects decisions about adjuvant chemotherapy and predicts prognosis. Indocyanine Green lets surgeons see lymphatic drainage pathways in real time during surgery, which helps them find sentinel lymph nodes, which are the first nodes to drain the tumor. The prospective ISCAPE trial showed that Indocyanine Green-guided lymphatic mapping had a 95.6 percent sensitivity for finding metastatic lymph nodes in the fluorescent area. This means that almost all cancer-positive nodes were found in the visualized area. This ability makes lymphadenectomy more complete, lowers the chance of under-staging, and may even allow for customized lymph node dissection in some cases, which avoids the complications of extended resection while still getting accurate staging. Also, Indocyanine Green tattooing for tumor localization has been shown to be better than regular ink. It makes clear fluorescence visible through the mesentery, which makes it easier to do precise minimally invasive resection while also increasing lymph node yield, which helps with accurate staging.

Another sign of ICG imaging’s innovation is how flexible it is. In complicated cases, it can be used for two things: before surgery to map the lymph nodes and during surgery to check perfusion to make sure the anastomosis is safe. This can all be done in one operation without any extra risk or cost. Indocyanine Green fluorescence imaging is an example of the kind of innovation that really improves patient outcomes and sets the standard for the future of colorectal surgery. It allows for objective, real-time decision-making, lowers the risk of the most feared complication of anastomotic leak, and improves the accuracy of lymph node staging that determines prognosis and adjuvant therapy.