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## **Direct Indocyanine Green Injection into the Gallbladder: A Safe Technique to Enhance Biliary Anatomy Visualization during Laparoscopic Cholecystectomy**

Laparoscopic cholecystectomy (LC) is a commonly performed procedure in digestive surgery, yet iatrogenic bile duct injury (BDI) remains a concern despite safety measures. Fluorescence imaging of the biliary system may reduce such complications. This randomized controlled trial evaluated the efficacy of intra-cholecystic indocyanine green (ICG) injection for intraoperative biliary visualization. Fifty patients undergoing elective LC at Kasr Al-Ainy Hospital and TBRI Hospital (September 2021–March 2022) were randomly assigned to either ICG-assisted LC (n=25) or conventional LC (n=25). The primary outcome was delineation of the extrahepatic biliary tree using near-infrared fluorescence (NIF) imaging. ICG injection successfully provided clear visualization of the extrahepatic biliary anatomy in 20 of 25 cases. In the conventional LC group, nine patients had incomplete common bile duct delineation, though cystic ducts were adequately identified in all cases to avoid complications. Operative time was shorter in the ICG group ( $78 \pm 15$  min) compared with the conventional group ( $101 \pm 11.9$  min). No intraoperative complications occurred in either group. Direct gallbladder ICG injection allows rapid and reliable visualization of extrahepatic biliary structures, facilitates dissection, reduces operative time, and may provide additional protection against BDI. These findings suggest that intraoperative ICG fluorescence is a safe and effective adjunct to standard LC, enhancing anatomical identification and surgical efficiency.

### **Biography**

Mr. Mohamed Kaddah is a general surgeon with over 5 years of experience, currently working as a surgical registrar in the UK. He has published a master's thesis, presented at international conferences, and is actively involved in clinical audits, research, and surgical education. His interests include hepatobiliary surgery, minimally invasive procedures, and quality improvement initiatives to enhance patient outcomes.