Case Report
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Intraoperative use of indocyanine green fluorescence during transabdominal preperitoneal (TAPP) laparoscopic repair of bilateral inguinal hernias: a case report and brief literature review

Abstract

Inguinal hernia is one of the most common conditions in general surgery. Laparoscopic repair using the transabdominal preperitoneal (TAPP) technique presents challenges in anatomical identification, which can increase the risk of vascular injury. This article presents the case of a 48-year-old male patient with bilateral inguinal hernias who underwent laparoscopic TAPP repair assisted by indocyanine green (ICG) fluorescence. Following intravenous injection of ICG, the inferior epigastric vessels and spermatic vessels were clearly visualized, allowing for safe dissection and proper placement of the polypropylene mesh. The procedure was completed without complications, and the patient had a favorable outcome. ICG fluorescence is shown to be a complementary tool that improves anatomical visualization and may reduce the risk of vascular injury.

Keywords: indocyanine green, bilateral inguinal hernia, fluorescence, image-guided surgery, TAPP

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Introduction

Inguinal hernia is one of the most common surgical conditions worldwide. Laparoscopic repair using the TAPP technique has established itself as an effective alternative due to advantages such as reduced postoperative pain, faster recovery, and better visualization of the myopectineal orifice. However, this approach requires precise anatomical knowledge to avoid vascular injury, especially to structures such as the inferior epigastric vessels, spermatic vessels, and structures within the so-called "triangle of death."[1,2] Indocyanine green fluorescence-guided surgery has proven useful in various areas of modern surgery, allowing for the visualization of vascular structures and the assessment of tissue perfusion in real time using near-infrared imaging systems.[3,4]

Case presentation

A 48-year-old male patient with no relevant medical history presented with bilateral inguinal pain and a progressively enlarging mass that had been present for several months. Physical examination revealed reducible bilateral inguinal protrusions that increased with the Valsalva maneuver. Ultrasound confirmed the diagnosis of bilateral inguinal hernia.

Bilateral laparoscopic repair was performed using the TAPP technique. Under general anesthesia, the patient was placed in the Trendelenburg position, and pneumoperitoneum was established using a Veress needle. Three trocars were inserted: one 10-mm umbilical trocar and two 5-mm trocars on both flanks. Prior to peritoneal dissection, an intravenous dose of 2 ml of indocyanine green was administered, followed by irrigation with saline solution. Approximately 40 seconds later, the inferior epigastric vessels, spermatic vessels, and external iliac artery were clearly identified by fluorescence.

Subsequently, a preperitoneal dissection was performed, and a polypropylene mesh was placed to cover the bilateral myopectineal orifices. The mesh was secured while avoiding the vascular structures previously identified by fluorescence. The procedure was completed without intraoperative complications, and the patient had a favorable postoperative course (Table 1) (Figures 1,2&3).

Table 1 Main Applications of Indocyanine Green Fluorescence in General Surgery.[3]

Surgical areas	ICG application
Hepatobiliary surgery	Visualization of the Biliary Tract
Colorectal Surgery	Anastomosis perfusion assessment
Oncologic surgery	Sentinel lymph node identification
Vascular surgery	Tissue perfusion assessment
Abdominal wall surgery	Identification of the epigastric vessels, corona mortis, and perforating vessels.

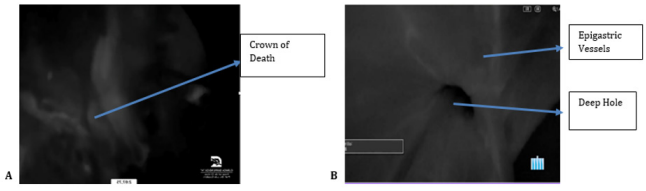

Figure 1 Intraoperative visualization using indocyanine green fluorescence, which allows for the identification of the inferior epigastric vessels and vascular structures of the "triangle of death" during laparoscopic TAPP repair.

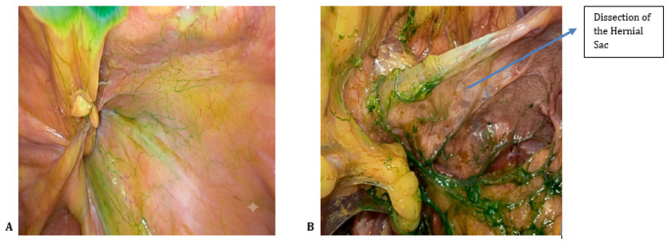

Figure 2 a) Assessment of Fruchaud's myopectineal orifice is the cornerstone of laparoscopic TAPP repair; b) Dissection of the hernial sac is a critical step in hernia surgery.

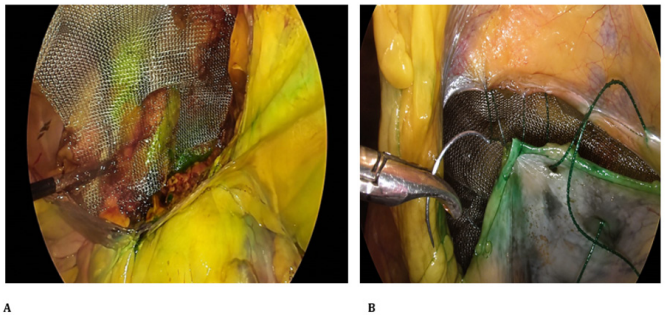

Figure 3 a) Identification of vascular structures prior to fixation of the polypropylene mesh; b) Closure of the peritoneal flap with 3-0 Vylock sutures.

Discussion

Correct identification of vascular structures is essential to prevent complications during laparoscopic inguinal hernia repair. Vascular injuries, although rare, can cause significant bleeding and complicate the procedure.[5,6] Indocyanine green is a fluorescent dye that binds to plasma proteins and emits fluorescence when illuminated with near-infrared light. This property allows for real-time visualization of vascular structures during surgery.[7,8] Its use has expanded widely in hepatobiliary, colorectal, and oncologic surgery, and has recently begun to be explored in abdominal wall surgery.[9]

In the case presented, ICG fluorescence allowed for the identification of relevant vascular structures, such as the inferior epigastric vessels and spermatic vessels, prior to prosthetic fixation, potentially contributing to a safer surgical procedure. The integration of indocyanine green fluorescence into laparoscopic abdominal wall surgery could serve as a useful tool for improving surgical safety, especially during the learning curve for the TAPP technique.

Conclusion

Indocyanine green fluorescence during laparoscopic repair of bilateral inguinal hernias is a feasible and safe technique that improves intraoperative visualization of vascular structures and could help reduce the risk of iatrogenic injuries, as well as assess intestinal perfusion.

Informed consent

Informed consent was obtained from the patient for the publication of this clinical case. The patient provided written informed consent to undergo surgery with ICG.

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None.

Conflicts of interest

The authors declare that they have no conflicts of interest.

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