



## CASE REPORT

# Indocyanine Green Perfusion Assessment during Colonic Interposition for Graft Necrosis after Esophagectomy

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### Summary

In spite of many technical advances, esophagectomy remains a morbid procedure. The most dreaded complication is the leakage at the esophagogastric anastomosis, often determined by the tenuous vascular perfusion of the gastric conduit. As in other gastrointestinal anastomosis, assessment of the anastomotic perfusion with fluorescence angiography could decrease this complication. We present a case in which Indocyanine Green (ICG) dye fluorescence was used to assess vascular perfusion for colonic interposition after graft necrosis in a patient with previous esophagectomy.

**Case Report**

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**Procedure**

A 72-year-old Caucasian male with a past medical history of type 2 diabetes mellitus, hypertension, hyperlipidemia, myocardial infarction, gastric ulcer, gastroesophageal reflux disease (GERD), presented to the clinic complaining of lower chest discomfort and progressive dysphagia to both liquid and solid food for approximately four months. At the endoscopy he was found to have a long segmental papillomatous lesion in the distal esophagus and extending into the proximal stomach. Pathological examination of the biopsy confirmed a squamous cell carcinoma. Computed tomography (CT) of the chest and abdomen was negative for metastases. Endoscopic US and later pathology confirmed well-differentiated squamous cell carcinoma pT3 N0 stage. After discussion in the multidisciplinary meeting, and appropriate preoperative treatment, he was scheduled for a minimally invasive laparoscopic and thoracoscopic distal esophagectomy.

The procedure began with a diagnostic laparoscopy to rule out the presence of metastatic disease. After kocherization of the duodenum and a pyloroplasty, the gastroepiploic arcade was identified and preserved. The dissection was then carried out to the level of the gastroesophageal (GE) junction where a hard mass was located. The right and left crura were visualized and partially incised, enabling the tumor to be completely mobilized into the lower mediastinum. Using a meticulous technique, the tumor was detached from adhesions to both crura, and the right and left pleura. Once the esophagus was circumferentially dissected up to the level of the inferior pulmonary ligament, a greater curvature based gastric tube was fashioned. The left gastric artery was transected at the origin and lymphadenectomy was performed. Vascular perfusion of the gastric conduit was assessed with ICG fluorescence angiography. esophagectomy.

After a jejunostomy tube was inserted, the patient was turned in a left lateral decubitus position. The thoracoscopic approach began by dividing the inferior pulmonary ligament. The azygous vein was divided, and the thoracic lymphadenectomy performed. After division of the proximal portion of the esophagus, the specimen was removed.

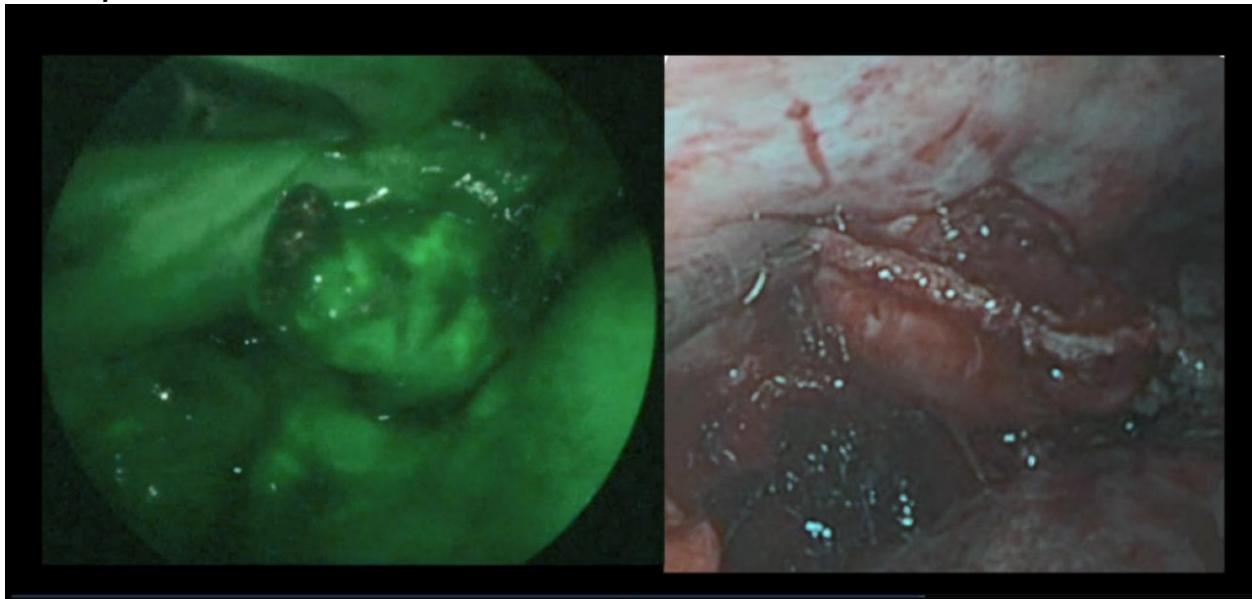
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The procedure began with a midline laparotomy. The ascending, transverse, and descending colon were mobilized. Using 3.5 cc of intravenous ICG, the colonic perfusion was evaluated by sequentially clamping the middle colic and left colic. After an additional intravenous injection of ICG (3 cc), a fluorescence angiogram was performed. There was an excellent perfusion of both the esophagus and the gastric conduit (**Fig. 1**). The esophago-gastrostomy was completed using a 21 mm circular stapler. The chest was drained and closed. On postoperative day 3, the patient had a sudden drop in hemoglobin with hypotension and he was started on vasoactive support. Because of the persistent hypotension, an endoscopy was performed and demonstrated an ischemic conduit with gastric graft necrosis. The patient was taken back to the OR and the ischemic graft was resected thoracoscopically. Next, a laparoscopic exploration to divide the stomach distally required conversion to a laparotomy because of a significant hemoperitoneum. Upon further exploration, there was a large ruptured subcapsular splenic hematoma, explaining the hypotensive episode. A splenectomy was performed. The distal stomach was exteriorized via a gastrostomy tube. Additionally, a proximal cervical esophagostomy was undertaken.

## Procedure

Two months after the last procedure, the patient was taken to the OR for colonic interposition. The procedure began with a midline laparotomy. The ascending, transverse, and descending colon were mobilized. Using 3.5 cc of intravenous ICG, the colonic perfusion was evaluated, by clamping sequentially, the middle colic and left colic. This allowed for accurate identification of the optimally perfused colon section to utilize as a conduit (**Fig. 2**). Then, the left colic artery and the colon were divided. The right colon was brought up to the neck via a substernal route. An esophagocolostomy was performed with a double layer of running and interrupted 3-0 absorbable sutures. The rest of the gastrointestinal tract continuity was reestablished with a jejunal-colonic anastomosis and an ileal-descending colon anastomosis.

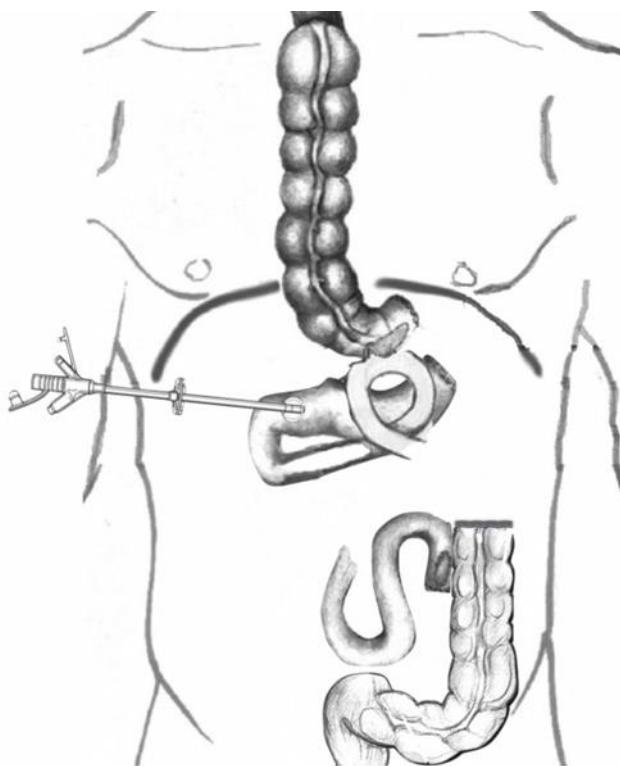
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**Figure 1.** Left. Esophago-gastrostomy with adequate vascular perfusion evaluated by ICG fluorescence. Right esophageal stump with white light prior to anastomosis.



**Figure 2.** Colonic perfusion and ICG

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**Figure 3. Colonic interposition**

## CONCLUSION

Gastric conduit ischemia after esophagectomy can occur in a delayed fashion secondary to the use of vasoactive support. In these instances, colonic interposition (**Fig 3**) is the preferred salvage procedure. The vascular perfusion assessment of the colonic conduit is paramount in the success of such a complex operation. ICG fluorescence angiography is a simple and effective technique to assess vascular perfusion.

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*Disclosures:* DGB, LM, SP have none; SS accepts consulting fees from Medtronic (Fridley, MN), RJR, FD, and ELM accept consulting fees as advisory board members for Diagnostic Green (Farmington Hills, MI). RJR accepts consulting fees from Stryker (Kalamazoo).

*Indocyanine Green for Injection, USP is available, in the USA via Diagnostic Green’s distributor HUB Pharmaceuticals LLC. Call 1-844-ICG-VIAL (424-8425) or e-mail at [info@diagnosticgreen.com](mailto:info@diagnosticgreen.com) for more information. In certain territories across the EMEA, the product is sold under the Verdye name. For territory specific information, go to [www.diagnosticgreen.com](http://www.diagnosticgreen.com).*