

Editorial

Recently, major developments in video imaging have been taken place; among them, the use of near-infrared fluorescence imaging is emerging as major contribution to intraoperative decision making during minimal access surgical procedures. Many infrared imaging systems are developed to determine the potential role of infrared imaging as a tool for localizing anatomic structures and assessing tissue viability during laparoscopic and robotic surgical procedures.



As we know, human eye cannot see infrared or ultraviolet rays, we can only see the visual spectrum of the light. However, infrared emitted by near-infrared fluorescence indocyanine green (ICG) can be captured by camera, an advantage now we have in the laparoscopy. There are some dye which emits the infrared fluorescence like ICG, manufactured by the Kodak Company in 1954. After two years, the FDA has approved the ICG for the mapping and angiography of the retina.

The ICG very tightly bind with the plasma protein and once injected in the peripheries circulates throughout our circulatory system. Thereafter, it can be mapped by the laparoscopic camera. In cholecystectomy, we can clearly see the cystic duct which is stained by the ICG. On setting the infrared sensitivity ON, the infrared light will be stimulated by the blood vessels, it will be absorbed by the ICG, and in IR mode, it reflects the infrared light, the filter of the camera will allow this infrared light to be seen. Different IR modes can magnify the infrared light; like in the Olympus camera, IR mode 1 and IR mode 2 can be used for more precise viewing. In IR mode it will be colored and we can see the infrared, and in IR mode 2 it will be black and white image, but it can show us more perfusion. Different companies are coming with different techniques of using infrared in their electronic circuits but overall their use is similar.

The ICG has a very short half-life; only it secretes into the liver and then comes out of body. It is very safe and noise to image ratio is very good, i.e. it has very less noise and very good and high quality image. In cholecystectomy, we have to inject the ICG 45 minutes before the procedure: the entire Calot's triangle will be visualized, we can see the common hepatic duct, common bile duct and cystic duct. The liver is also seen and the liver is also completely perfuses with ICG that also will emit the infrared green. You can use it for different type of procedure like in the cholecystectomy to prevent the injury of CBD. In the other procedure like sleeve gastrectomy, we inject the ICG only 2 minutes before the procedure. It can also be used for the liver resection and for the nodules of metastasis of the liver. It can also be for the sentinel lymph node mapping in cervical cancer and sleeve gastrectomy to find out the circulation of the blood circulation near the gastrosophageal junction. In the mesorectal resection of the colon, it is injected approximately 5–7 minutes before the procedure. ICG-based fluorescence imaging is very helpful in localization of prostate cancer and metastatic lymph nodes. There is role of ICG for laparoscopic and robotic partial nephrectomy. The near-infrared technology will be able in the future to better outline the way we perform endoscopy, laparoscopy and robotic surgery and therefore to improve significantly patient outcomes and hospital costs.

RK Mishra
Editor-in-Chief

Chairman
World Laparoscopy Hospital
Gurugram, Haryana, India