Fluorescence Guided Measuring and Foregut Applications of Novel Near-Infrared Calibration Tube

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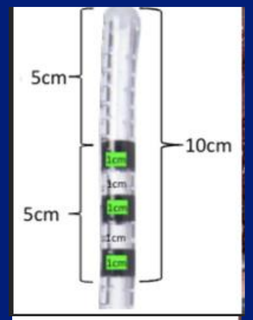
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Background

- Intraoperative measuring of minimally invasive surgical procedures can be challenging
- Current methods of obtaining accurate measurements include passing a ruler or string of known length into the abdomen, estimating length based on known width of surgical grasper, or using a measurement mark on shaft of a grasper
- These methods are time consuming, inaccurate and introduce risk of leaving a foreign body
- Near Infrared light penetrates biological tissue more efficiently than visible light and can be used to improve measuring techniques

Technology

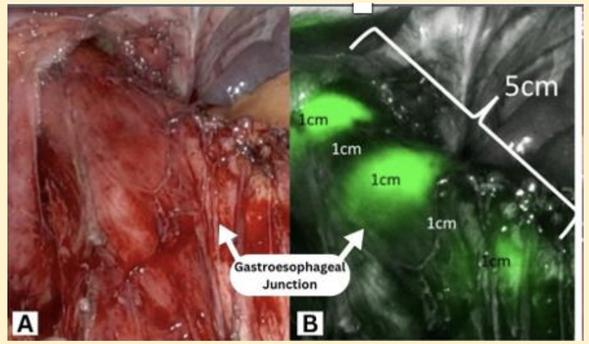
- Endolumik Inc. has commercialized a fluorescence guided calibration tube (FGCT) which uses a NIR light source to improve intraoperative visualization and measurements
- The FGCT is a single-use device with the sizes of 36 and 40 Fr that contain LEDS that generate light in the same wavelength as indocyanine green which is able to be visualized with the laparoscopic scope
- Three black stripes at the distal end of the tube, combined with LED spacing 2 cm apart enables fluorescence-guided measurements of up to 10 cm
- The distal end of the tube was designed as a ruler with the final 3 LEDS creating 5 cm and proximal 2 LEDs combined with alternating stripes to create a second 5 cm length that enable incremental measurements of 5, 6, 7, 8, 9 and 10 cm shown in the images to the right





Results

- The FGCT was used in 30 minimally invasive foregut operations including hiatal hernia repair with fundoplication, paraesophageal hiatal hernia repair, and heller myotomy
- Fluorescence guided measuring techniques were utilized to evaluate the adequacy of esophageal mobilization in hiatal hernia repair by measuring the distance between the top of the hiatus and gastroesophageal junction (B)

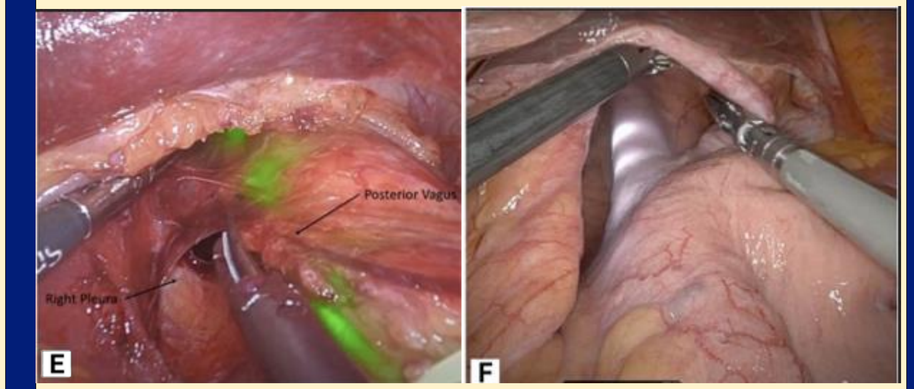


- It was utilized to the measure the myotomy length in the heller myotomy (C and D)



Results

- In hiatal hernia repair, the FGCT enhanced visualization of the mediastinal esophagus (F) and improved surgeon confidence during the mediastinal dissection by enabling better visualization of the vagus nerve (E)



Conclusions

- The FGCT enabled fluorescence guided dissection and measuring techniques by providing transillumination through esophagogastric tissues and improving surgeon identification of the esophagus and vagus nerve
- The FGCT increased visual cues and in the operative field and improved surgeon confidence during mediastinal dissection
- Further study is warranted to quantify the impact of increased visual cues on surgeon intraoperative confidence

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