



PROBE-BASED CONFOCAL LASER ENDOMICROSCOPY (pCLE) IMPROVING ESOPHAGEAL DYSPLASIA DETECTION & GUIDING THERAPEUTIC INTERVENTION IN A SINGLE PROCEDURE

Uzma Siddiqui, MD
Smilow Cancer Hospital, Yale University

TECHNOLOGY REVIEW

Probe-based Confocal Laser Endomicroscopy (pCLE) is a new imaging technique that provides real time, microscopic views of the mucosa during ongoing endoscopy. Images are obtained by scanning the mucosal surface with low-power laser light that is passed through a fiber-optic bundle. This technology makes it possible to image individual cells and tissue architecture, allowing the endoscopist to adapt patient management based on the nature of the tissue, in real-time, *in vivo*.

CASE REPORT

A 65 year old male with longstanding gastro-esophageal reflux disease (GERD) and short-segment Barrett's esophagus (BE) underwent surveillance endoscopy at an outside facility. No focal lesion was observed during the endoscopic procedure. A random biopsy was found to have high-grade dysplasia (HGD) with focal areas highly suspicious for intramucosal carcinoma.

Given the above pathologic findings, instead of being referred to surgery for possible resection, the patient was scheduled for a GI endoscopy procedure with pCLE so as to assist in identifying possible focal lesions and perform an endoscopic mucosal resection (EMR) if feasible. Endoscopy showed BE-appearing mucosa in the distal esophagus from 38-40cm and a large hiatal hernia. Again, under white light exam and narrow band imaging, there did not appear to be any focal lesion or nodule.

The patient was then prepared for pCLE by administering 2.5ml of 10% fluorescein via intravenous injection. A GastroFlex UHD Confocal Miniprobe¹ (Cellvizio®, Mauna Kea Technologies) was inserted through the working channel of the gastroscope and was positioned on the BE segment. pCLE imaging initially demonstrated criteria associated with non-dysplastic BE, with cellular patterns showing well-organized columnar epithelium and goblet cells (Fig. 1-2). Upon further inspection, an area within the BE segment at the gastro-esophageal junction (GEJ) revealed images associated with dysplasia including irregular glands, vascular leakage of fluorescein into the interstitium, and multiple areas of cellular disorganization (Fig. 3). In this region of dysplasia, there did appear to be one focal 8mm nodule at the GEJ where the cellular disorganization and irregularity of the glands was more marked and thought to contain features associated with possible malignancy. EUS was performed and was unremarkable.

Using pCLE imaging as a guide, an argon plasma coagulation probe was used to mark the boundaries of the EMR site so as to delineate possible malignancy and dysplasia. EMR was performed and the final pathology showed HGD and intramucosal carcinoma within the columnar component of the GEJ mucosa. Mucosal resection margins were negative for dysplasia and malignancy.

SUMMARY

Intra-mucosal carcinoma was found on a random biopsy located within a short segment of BE mucosa in the distal esophagus. Without knowing the depth of invasion or the location of the carcinoma, endoscopic therapy may not have been a feasible option. pCLE was utilized to help identify and target a suspicious area within the BE segment and allowed for EMR with pathology-proven clean resection margins. In this patient, pCLE was the only² diagnostic technology available to accurately identify the location of malignancy and help the patient avoid an invasive surgical resection.

REFERENCES

1. GastroFlex UHD™ Confocal Miniprobe™ is a trademark of Mauna Kea Technologies.
2. V.J. Konda, J.S. Chennat, J. Hart and I.Waxman. Confocal laser endomicroscopy: potential in the management of Barrett's esophagus. *Diseases of the Esophagus: Official Journal of the International Society for Diseases of the Esophagus / I.S.D.E.* 2010

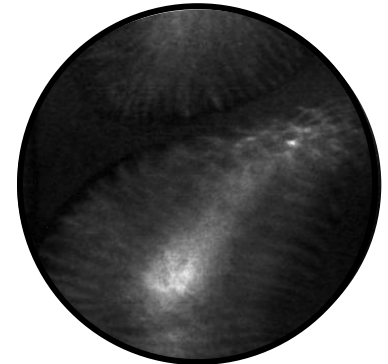


FIGURE 1
pCLE image of intestinal metaplasia

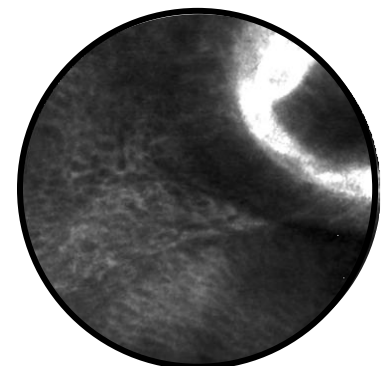


FIGURE 2
Confocal endomicroscopy demonstrating the border of healthy squamous and intestinal metaplasia

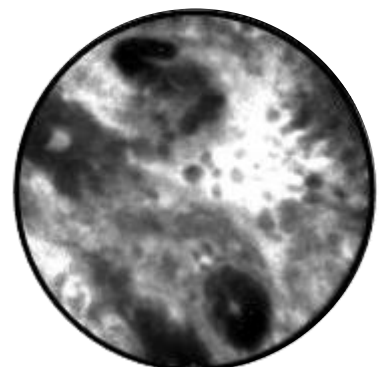


FIGURE 3
pCLE imaging of intra-mucosal carcinoma, increased vascularity and a black disorganized cellular appearance