GUIDING SURGICAL MARGINS AT A CELLULAR LEVEL

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TECHNOLOGY REVIEW

Confocal Laser Endomicroscopy (CLE) is a new endoscopic modality developed to obtain precise, high-resolution images of the mucosal layer of the GI tract during standard endoscopy. Immediate diagnosis may be possible for certain diseases, and analysis of the in vivo microarchitecture is helpful to better target standard biopsies and reduce the number of biopsies required [1]. CLE functions based on low-power laser tissue illumination, with subsequent detection of the fluorescence light reflected from the tissue through a pinhole[2]. This technology has been used to help detect dysplasia in the GI tract including in Barrett's esophagus[3], gastric cancer[4, 5], and colon polyps [6].

Initial confocal laser experiences consisted of having the technology built into a dedicated confocal endoscope (Pentax Precision Instrument, Ft. Wayne, NJ). More recently, new CLE probes, known as pCLE, were developed (Cellvizio, Mauna Kea Technologies, Paris, France) that are inserted through the accessory channel of a conventional upper endoscope, colonoscope, duodenoscope or balloon enteroscope. To our knowledge, the use of CLE to map the tissue for precise surgical excision has not been reported.

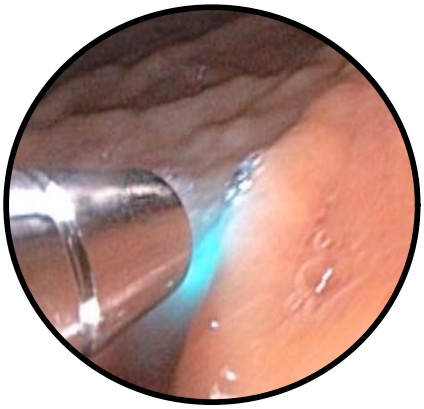

FIGURE 1
Endoscopic view of confocal endomicroscopy probe

CASE REPORT

A 68 year old male complaining of vague upper gastrointestinal symptoms underwent an esophagogastroduodenoscopy (EGD) with random biopsy. Evidence of adenocarcinoma was found.

A subsequent PET CT was negative. A repeat EGD was performed to identify the tumor's exact location and boundaries, but no gross tumor was identified. Multiple biopsies were performed, which revealed evidence of high-grade dysplasia.

The patient was then referred for a third EGD with pCLE to identify tumor margins for possible surgical resection. Along the greater curvature of the gastric body [10 cm below the esophagogastric junction (EGJ)] and distally, the folds were somewhat more prominent and erythematous (figure 1). No gross malignant feature was observed. After intravenous injection of 2.5 ml of 10% fluorescein, a Confocal Laser Endomicroscopy probe (pCLE) was inserted through the scope to carefully examine the gastric body and antrum. Multiple areas of cellular disorganization, cellular crowding and loss of normal tissue structures were noted. These changes were thought to be consistent with dysplasia (figure 2). An area of normal pattern gastric glands was noted approximately 10 cm below the EGJ along the greater curvature and proximally (well structured columnar epithelia, lack of crowding, normal vascularity) (figure 3). This area was injected in two locations with tattoo spot injection. A transition area was noted on pCLE. The patient underwent distal (60%) gastrectomy at the margins of the tattoo, and omentectomy, with reconstruction by retrocolic Billroth II gastro-jejunostomy. On pathology, minute foci of high-grade dysplasia involving the antrum were noted, with the proximal margins negative for dysplasia or metaplasia.

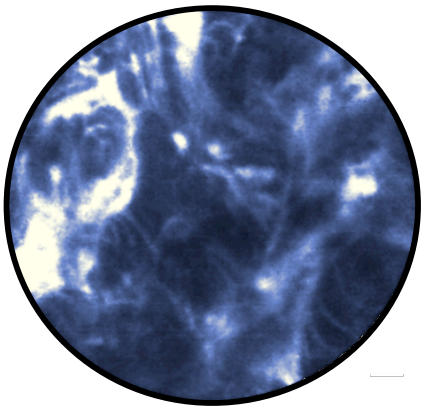

FIGURE 2
pCLE showing dysplasia

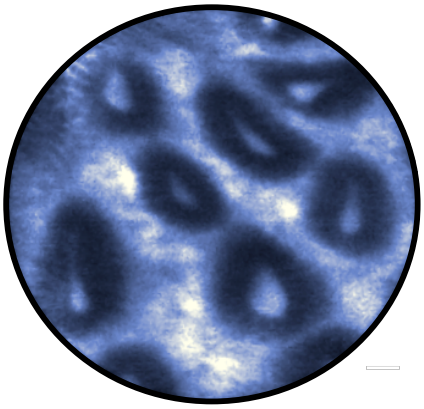

FIGURE 3
pCLE showing normal gastric cellular structure

SUMMARY

In this patient, no gross lesion or transition area was clear endoscopically, that could be used for surgical resection. Using pCLE, we were able to identify a transition area between a dysplastic and a normal appearing area of the gastric body and antrum. A clear margin was identified and the most distal normal appearing area under pCLE was tattooed. This margin was cut during surgery. To the best of our knowledge, this is the first case report using pCLE to identify the margins between normal gastric mucosa and dysplasia to aid in surgical resection. This technology may prove to be an aid to identify tumor margins during endoscopy or surgery.

REFERENCES

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