ACCURACY OF VOLUMETRIC LASER ENDOMICROSCOPY FOR DYSPLASIA IN BARRETT’S ESOPHAGUS: A PROSPECTIVE COHORT STUDY

Technologies and Procedural Innovation

Endoscopy: New Imaging Technology

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Background: Sampling error reduces the accuracy of the Seattle biopsy protocol to detect dysplasia and esophageal adenocarcinoma (EAC) among patients undergoing endoscopic surveillance for Barrett’s Esophagus (BE). Volumetric laser endomicroscopy (VLE) is an emerging technology that uses infrared light to produce real-time high-resolution cross-sectional imaging of the esophagus, providing surface and subsurface wide-field cross-sectional imaging with an axial resolution of 7 μm and a depth of 3 mm. We aimed to determine the accuracy of VLE to detect dysplasia and cancer in a prospect cohort of patients undergoing surveillance for BE.

Methods: Patients undergoing endoscopic surveillance for BE were selected for prospective enrollment into a parent study that aims to identify novel epigenetic biomarkers for cancer development. High-definition white light endoscopy (WLE) was performed with narrow band imaging (NBI), followed by VLE. All mucosal abnormalities identified by WLE, NBI or VLE were targeted for biopsy or endoscopic mucosal resection. Random 4-quadrant biopsies were also obtained every 1-2cm along the length of BE. VLE diagnosis was dichotomized into BE with or without dysplasia/cancer based on criteria for abnormal gland structure and surface effacement. VLE interpretation was performed by three endoscopists (AT, MS, JI) blinded to the endoscopy findings and pathology diagnosis. Pathology diagnosis of dysplasia or EAC was confirmed by an experienced GI pathologist (MW). Sensitivity, specificity, positive and negative predictive values for VLE using pathology as the gold standard were calculated.

Results: The Table illustrates our main results. A total of 42 participants were enrolled; however, VLE images were not interpretable in 2 due to a large hiatal hernia that precluded balloon apposition to the mucosa. 17 participants had no dysplasia by pathology; 7 were diagnosed as indefinite for dysplasia; 5 had low-grade dysplasia (LGD); 9 had high-grade dysplasia (HGD); and 2 were diagnosed with EAC. VLE had a sensitivity, specificity, negative predictive value and positive predictive value for the detection of confirmed low- or high-grade dysplasia or cancer of 87.5%, 45.8%, 84.6% and 51.9%, respectively.

Conclusions: VLE is able to rule out the presence of LGD, HGD and cancer in 85% of cases. The specificity (and positive predictive value) is limited; however, this deficiency has low impact on clinical management and costs. VLE may be useful to ensure BE patients undergoing surveillance are correctly risk-stratified.
<table>
<thead>
<tr>
<th>Pathology Diagnosis</th>
<th>No Dysplasia</th>
<th>Indefinite</th>
<th>LGD</th>
<th>HGD</th>
<th>EAC</th>
</tr>
</thead>
<tbody>
<tr>
<td>VLE Diagnosis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Dysplasia</td>
<td>10</td>
<td>1</td>
<td>0</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Dysplasia</td>
<td>7</td>
<td>6</td>
<td>5</td>
<td>7</td>
<td>2</td>
</tr>
</tbody>
</table>

VLE: volumetric laser endomicroscopy
Indefinite: indefinite for dysplasia
LGD: low-grade dysplasia
HGD: high-grade dysplasia
EAC: esophageal adenocarcinoma
VLE accuracy

Disclosure: A. W. Templeton: Boston Scientific: Consulting; Medtronic: Consulting; M. Westerhoff: No Conflicts; W. Burke: No Conflicts; B. Dickinson: No Answer; A. Singla: No Conflicts; J. M. Inadomi: Cernostics: Consulting; Exact Sciences: Advisory Committees or Review Panels; M. D. Saunders: No Conflicts;