Can High-Resolution Micro-Ultrasound Detect Extra-Prostatic Extension? A New Sonographic Feature
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INTRODUCTION
High-resolution micro-ultrasound is a novel 29 MHz ultrasound modality enabling real-time targeted prostate biopsies. This increase in resolution allows visualization of tissue characteristics which can be correlated with clinically-significant indications. Micro-ultrasound technology has been shown to be more sensitive to detect prostate cancer than conventional ultrasound and a viable, cost-effective clinical alternative to MRI for guiding and targeting prostate biopsies.

OBJECTIVE
This work reviews a small case series of subjects who underwent radical prostatectomy (RP) following micro-ultrasound targeted biopsy and seeks to determine whether the micro-ultrasound images were predictive of extra-prostatic extension (EPE).

METHODS:
• 16 subjects underwent RP following micro-ultrasound targeted biopsy.
• 18/32 prostate lobes had extra-prostatic extension (EPE) based on histopathology analysis of the RP specimen.
• ExactVu® Micro-Ultrasound platform (Exact Imaging, Markham, Canada) was used to acquire images during real-time targeted biopsy procedure.
• Micro-ultrasound images were reviewed in all subjects to propose imaging features which might be predictive of EPE.

RESULTS:
• In 15/18 prostate lobes with EPE, interruption of the posterior capsule or a hypoechoic halo surrounding the prostate along anterior and/or apical border was observed in the lobe with EPE.
• In 10/11 lobes with a hypoechoic halo, the halo was either thick, irregular or both.
• Upon examination of prostate lobes with benign findings, suspicious imaging findings were absent in 13/14.

Table 1: Sensitivity and specificity for observed posterior capsule interruption or thick/hypoechoic anterior/apical halo in 32 prostate lobes from subjects who underwent micro-ultrasound-guided prostate biopsy followed by radical prostatectomy. While the amount of data is limited, a high positive predictive value is observed, suggesting that this feature may be useful for presurgical planning.

<table>
<thead>
<tr>
<th>Sensitivity</th>
<th>Specificity</th>
<th>NPV</th>
<th>PPV</th>
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<tbody>
<tr>
<td>15/18 (83%)</td>
<td>13/14 (93%)</td>
<td>13/16 (81%)</td>
<td>15/16 (94%)</td>
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CONCLUSIONS:
• Micro-ultrasound imaging may be able to predict the presence of EPE.
• A “thick/irregular hypoechoic halo” on the anterior and/or apical prostate capsule appears to be increasingly correlated to the presence of EPE.
• More clinical data is required to corroborate this finding and more detailed examination of pathology specimens will be required to better interpret its meaning.