Minimizing the Gleason Score upgrade from biopsy to prostatectomy specimen through mpMRI and template mapping fusion Biopsy

Daniel Eberli, Oliver Gross, Ashkan Mortezavi, Lilian Neuhaus, Tullio Sulser
University Hospital of Zurich, Department of Urology
Assay with low sensitivity

- Accuracy of detecting important Change 60% =

- To make this test better we have to repeat or to take more samples
History of prostate biopsy

- 1922: Transperineal needle biopsy  
  Barringer, B.S. Carcinoma of the prostate. Surg Gynecol Obstet. 1922; 34: 168–176

- 1926: Open perineal biopsy  
History of prostate biopsy

- 1930: First series of perineal prostate needle aspiration biopsy

History of prostate biopsy

- 1937: First transrectal biopsy  
History of prostate biopsy


- **1986:** Introducing of PSA-test


- **1989:** Sextant method. Hodges et al.

- **2000:** 12-cores biopsies. Naughton et al., 2000

- **2001:** Saturation biopsy (20 cores). Stewart et al.
Transperineal biopsy

- 1981: First report with TRUS guidance
  
  Holm and Gammelgaard

- Nowadays used with the brachytherapy grid

- Fusion with mpMRI

- Infectious complications are more frequent after transrectal biopsy
  
**IS a biopsy of MRI-suspicious lesions enough?**

<table>
<thead>
<tr>
<th>Targeted MR/Ultrasound Fusion Biopsy Results</th>
<th>No Cancer</th>
<th>Gleason 6</th>
<th>Gleason 3+4 Low Volume&lt;sup&gt;a&lt;/sup&gt;</th>
<th>Gleason 3+4 High Volume&lt;sup&gt;b&lt;/sup&gt;</th>
<th>Gleason ≥4+3</th>
<th>Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>No cancer</td>
<td>439</td>
<td>74</td>
<td>12</td>
<td>12</td>
<td>5</td>
<td>542</td>
</tr>
<tr>
<td>Low-Risk Cancer</td>
<td>38</td>
<td>84</td>
<td>12</td>
<td>10</td>
<td>3</td>
<td>147</td>
</tr>
<tr>
<td>Gleason 6</td>
<td>17</td>
<td>14</td>
<td>9</td>
<td>19</td>
<td>7</td>
<td>66</td>
</tr>
<tr>
<td>Gleason 3+4 Low volume&lt;sup&gt;c&lt;/sup&gt;</td>
<td>14</td>
<td>21</td>
<td>7</td>
<td>4</td>
<td></td>
<td>75</td>
</tr>
<tr>
<td>Intermediate-Risk Cancer</td>
<td>26</td>
<td>13</td>
<td>12</td>
<td>19</td>
<td>103</td>
<td>173</td>
</tr>
<tr>
<td>High-Risk Cancer</td>
<td>534</td>
<td>206</td>
<td>52</td>
<td>89</td>
<td>122</td>
<td>1003</td>
</tr>
</tbody>
</table>

**MRI missed 15% of intermediate and high risk tumors**

Template mapping fusion biopsy

- 20 cores (template)
- 2 core from each suspicious lesions in mpMRI
- Accuracy for detecting significant prostate cancer >90% [1]

Fusionierte Darstellung aus 3D Ultraschall und mpMRI
## Patients and methods

<table>
<thead>
<tr>
<th>Data</th>
<th>Median (Range)</th>
</tr>
</thead>
<tbody>
<tr>
<td>n = 201</td>
<td>06/2013 – 06/2015</td>
</tr>
<tr>
<td>primary biopsy</td>
<td>71, 35%</td>
</tr>
<tr>
<td>secondary biopsy</td>
<td>130, 65%, 42 negative prior biopsy 88 with diagnosis of PCa</td>
</tr>
<tr>
<td>Age</td>
<td>65 (42 – 78) years</td>
</tr>
<tr>
<td>PSA</td>
<td>6,8 (0.2 – 245) µg/l</td>
</tr>
<tr>
<td>Prostate volume</td>
<td>43 (13 – 176) ml</td>
</tr>
<tr>
<td>Intervention time</td>
<td>30 (10 – 90) min</td>
</tr>
<tr>
<td>Core number</td>
<td>46 (16 – 68)</td>
</tr>
<tr>
<td>Transurethral catheter post-interventional removal</td>
<td></td>
</tr>
</tbody>
</table>
Results

Prostate cancer detection rate: n = 139 (69%)
Among transrectal guided biopsy negative patients: n = 16 (38%)

Post-interventional complications in 26 (13%) patients
• Urinary retention 16 (8%)
• UTI 8 (4%)
• Prostatitis 1
• Epididymitis 1

Prognostic factor:
• Prostate volume correlated with UR
  ➢ 11/84 (13%) > 50ml vs 5/117 (4%) < 50ml (p = 0.033)
• No correlation with number of cores, operation time
## Methods

<table>
<thead>
<tr>
<th></th>
<th>Transrectal biopsy (TB)</th>
<th>Template mapping fusion biopsy (TMB)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Setting</strong></td>
<td>Local anesthesia</td>
<td>General or spinal anesthesia</td>
</tr>
<tr>
<td><strong>No. of cores</strong></td>
<td>12</td>
<td>2 x 20 + 2 cores from MRI lesions</td>
</tr>
<tr>
<td><strong>Time</strong></td>
<td>15 min</td>
<td>30 min</td>
</tr>
<tr>
<td><strong>Approach</strong></td>
<td>Transrectal</td>
<td>Transperineal</td>
</tr>
</tbody>
</table>
Methods

- Retrospective Analysis

- 347 Patients who underwent RP

- Conventional biopsy (transrectal): 299 patients

- Template mapping fusion biopsy (TMB): 48 patients

- Comparison of histopathological Report of the biopsy cores vs. the RP specimen
Methods

- Retrospective Analysis

- 347 Patients who underwent RP

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Up-/Downgrading if Gleason 7a and 7b is differentiated

### Conventional 12x biopsy

- **Downgrade**: 14.1%
- **True**: 56.2%
- **Upgrade**: 29.7%

### Template mapping biopsy

- **Downgrade**: 31.2%
- **True**: 52.1%
- **Upgrade**: 16.7%
Up-/Downgrading if no differentiation is made of 7a and 7b

Conventional 12x biopsy

- **DOWNGRADE**: 9.4%
- **TRUE**: 67.9%
- **UPGRADE**: 22.7%

Template mapping biopsy

- **DOWNGRADE**: 16.6%
- **TRUE**: 77.1%
- **UPGRADE**: 6.3%
Results

- Overall 30% of the conventional PB demonstrated an Gleason upgrade
- 15% of the PB demonstrated an Gleason increase of 2 steps
- Only 16.7 % of TMB demonstrated an Gleason upgrade
- Gleason uprgade on TMB was limited to 1 step
- Upgrade on TMB was limited to:
  - Gleason 6 to 7a
  - Gleason 7a to 7b
Conclusions

- mpMRI with TMB allows for more precise risk stratification
- Optimal diagnosis with minimal Risk of underestimating the disease burden is crucial in aspect of:
  - Select patients for focal treatment
  - Select patients for Active Surveillance
  - Prevention of overtreatment by radical therapy option
- This diagnostic strategy will help counselling patients before any treatment strategy
- TMP shows excellent results, especially in high grade PCa
- Downgrading seems to be more likely for TMB compared to conventional biopsy