ROLE OF ULTRASOUND IN PROSTATE CANCER

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TransRectal UltraSound (TRUS) is one of the most valuable tools in detection and management of prostate cancer.
TRUS

1. SCREENING
2. CANCER DETECTION
3. BIOPSY GUIDANCE
4. STAGING
5. THERAPY GUIDANCE
6. MONITORING RESPONSE TO TREATMENT
Sonographic appearances of Prostate cancer

Hypoechoic (50% to 70%)
Isoechoic (25% to 30%)
Hyperechoic
DOPPLER Doppler imaging has been evaluated for detection of neovascularity associated with cancers, especially isoechoic cancers.
THERAPY

EBRT

BRACHYTHERAPY

CRYOTHERAPY
Attempting to improve the cure rate of a treatment will increase the side effect rate, unless there is increased targeting via the addition of resources, technology, or expertise.
BRACHYTHERAPY

HDR (Temporary)
LDR (Permanent)
18 gauge (1.3 mm diam) needle for seed placement

Radiopaque contrast in the urinary bladder for fluoroscopic visualization

Perineal template

Ultrasound probe in rectum for needle guidance
CRYOTHERAPY
DISEASE-FREE SURVIVAL - CRYOTHERAPY

<table>
<thead>
<tr>
<th>Author</th>
<th>Cases</th>
<th>Follow-up Years</th>
<th>Low Risk</th>
<th>Medium Risk</th>
<th>High Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bahn¹</td>
<td>590</td>
<td>7</td>
<td>92%</td>
<td>89%</td>
<td>89%</td>
</tr>
<tr>
<td>Donnelly²</td>
<td>76</td>
<td>5</td>
<td>60%</td>
<td>77%</td>
<td>48%</td>
</tr>
</tbody>
</table>

Side Effects for Cryotherapy

- Damage to the bowel is possible but very unusual occurring less than 1% of cases.
- Blood in the urine temporary and usually minor.
- Urinary urgency after catheter removal (temporary).
- Scrotal swelling – not painful but may take 2-4 weeks to settle.
# Cryotherapy Compared with Radiation Therapy

<table>
<thead>
<tr>
<th></th>
<th>Cryotherapy</th>
<th>External Beam Radiation Therapy (EBRT)</th>
<th>Brachytherapy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Treatment Description</strong></td>
<td>1½ hour minimally invasive (needles inserted) procedure in which the prostate is frozen but not removed.</td>
<td>7-8 week treatment where radiation is aimed at the prostate but also passes through healthy tissue.</td>
<td>Permanent implantation of 80-100 radioactive pellets into the prostate.</td>
</tr>
<tr>
<td><strong>Recovery</strong></td>
<td>Single Day Surgery procedure. Resume normal lifestyle in 2-3 days.</td>
<td>5 treatments per week for 7-8 weeks at Radiation Centre. Up to six weeks of tiredness (longer if hormone therapy also used).</td>
<td>Overnight stay procedure. Up to 3 months of residual pain and bowel symptoms.</td>
</tr>
<tr>
<td><strong>Incontinence</strong></td>
<td>0% - 3%</td>
<td>0% - 12%</td>
<td>0% - 17%</td>
</tr>
<tr>
<td><strong>Impotence</strong></td>
<td>20% - 80%</td>
<td>5% - 85%</td>
<td>0% - 65%</td>
</tr>
<tr>
<td><strong>Rectal Injury</strong></td>
<td>1%</td>
<td>12% - 15%</td>
<td>5% - 20%</td>
</tr>
</tbody>
</table>
RECENT ADVANCES

3 D TRUS
Contrast enhanced TRUS
HIFU
Sonoelastography
PET/Ultrasound Imaging
3D TRUS
Contrast enhanced TRUS
HIFU
This procedure utilizes transrectal ultrasound that is highly focused into a small area, creating intense heat of 80-100° C, which is lethal to prostate cancer tissue. Since ultrasound is non-ionizing (as opposed to ionizing in radiation), tissue in the entry and exit path of the HIFU beam is not injured.
PET/ULTRASOUND IMAGING

TRUS provides anatomical detail in the prostate region that can be co-registered with the sensitive functional information from PET.
TRUS has become an extension of the urologist’s finger in early detection and to guide biopsy. With further advances in technology TRUS will likely play a greater role in delivering therapies and reducing complications. The advanced stages of Prostate cancer might become a rare entity with judicious use of imaging technologies.
Thank you