Imaging of Cervical Carcinoma

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Cervical Carcinoma

- Third most common gynecological malignancy.
- Majority of cervical carcinomas are squamous cell carcinomas arising from SCJ.
- Adenocarcinomas tend to be located in cervical canal.
Diagnosis of Cervical Malignancy

- Physical Examination
- Chest radiology
- Intravenous urography
- Cross sectional imaging (CT/MRI)
Ultrasound

- Early tumors (stage- I & II) not detected by US

Signs
- Enlargement of cervix
- Irregularity of cervical outline
- Haemato/ Pyometra
- Hydroureteronephrosis / bladder invasion
CT

- Visualization of small primary tumor limited.
- Currently used in staging of advanced disease (MR superior)
- Guide biopsy of nodes
- Plan RT ports
<table>
<thead>
<tr>
<th>FIGO Staging</th>
<th>MR Imaging Staging</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 Carcinoma in situ</td>
<td>Not visible</td>
<td>Surgery</td>
</tr>
<tr>
<td>I Confined to cervix</td>
<td></td>
<td></td>
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<tr>
<td>IA Microscopic</td>
<td></td>
<td></td>
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<tr>
<td>IA-1 Stromal invasion &lt;3 mm</td>
<td>No tumor visible</td>
<td>Surgery</td>
</tr>
<tr>
<td>IA-2 &gt;3 mm, &lt;5-mm invasion, &lt;7-mm width</td>
<td>Small enhancing tumor may be seen</td>
<td>Surgery</td>
</tr>
<tr>
<td>IB Clinically visible (&gt;5 mm)</td>
<td>Tumor visible, intact stromal ring surrounding tumor</td>
<td>Surgery</td>
</tr>
<tr>
<td>IB-1 &lt;4 cm</td>
<td>...</td>
<td>Surgery</td>
</tr>
<tr>
<td>IB-2 ≥4 cm</td>
<td>...</td>
<td>Radiation therapy</td>
</tr>
<tr>
<td>II Extends beyond uterus but not to pelvic wall or lower one-third of vagina</td>
<td></td>
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<tr>
<td>IIA Vaginal extension, no parametrial invasion</td>
<td>Disruption of low-signal-intensity vaginal wall (upper two-thirds)</td>
<td>Surgery (if &lt;4 cm), radiation therapy (if &gt;4 cm)</td>
</tr>
<tr>
<td>IIB Parametrial invasion</td>
<td>Complete disruption of stromal ring with tumor extending into the parametrium</td>
<td>Radiation therapy</td>
</tr>
<tr>
<td>III Extension to lower one-third of vagina or pelvic wall invasion with hydronephrosis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IIIA Extension to lower one-third of vagina</td>
<td>Invasion of lower one-third of vagina</td>
<td>Radiation therapy</td>
</tr>
<tr>
<td>IIIB Pelvic wall invasion with hydronephrosis</td>
<td>Extension to pelvic muscles or dilated ureter</td>
<td>Radiation therapy</td>
</tr>
<tr>
<td>IV Located outside true pelvis</td>
<td></td>
<td></td>
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<tr>
<td>IVA Bladder or rectal mucosa</td>
<td>Loss of low signal intensity in bladder or rectal wall</td>
<td>Radiation therapy</td>
</tr>
<tr>
<td>IVB Distant metastasis</td>
<td>...</td>
<td>Radiation therapy</td>
</tr>
</tbody>
</table>
Stage III
MRI

- MRI provides highly accurate information on exact extent of tumor
- Coils
- Sequences:
  - T2W Saggital & Axial
  - TIW (SPGR / FI2d) FS
  - Dynamic Post Contrast
Cervical cancers appear as intermediate / hyperintense masses on T2-weighted MRI.

Staging of cervical carcinoma with MRI is based on the classification of FIGO.

Dynamic MR improves small tumor detection & depth of stromal and parametrial invasion.
Normal Anatomy

a. Reproductive age women
   Uterine Corpus: Zonal anatomy exquisitely demonstrated on T2-weighted images
   Endometrium: High signal intensity
   Junctional zone: Band of low signal intensity
   Myometrium: Intermediate signal intensity
Normal Anatomy Cont....

Cervix: Trans-axially, cervix appears as ring or doughnut
Epithelium and mucus: Central area of high signal intensity
Fibrous stroma: Middle area of low signal intensity Thickness of this zone varies from 3 to 8 mm
Smooth muscle: Outer area of intermediate signal intensity
Normal Anatomy Cont...

- In axial plane mucosa and muscular wall are seen as H shaped double layer of high and low signal intensity, respectively.
- Perivaginal venous plexus lies beyond muscular wall of vagina seen as layer of high signal intensity.
b) Post menopausal women

- Uterine corpus becomes smaller and approximately equal in size to cervix
- Zonal anatomy is indistinct
Cervical Carcinoma

Stage 1B
Cervical Carcinoma
Cervical Carcinoma

II b
Cervical Carcinoma

III a
Cervical Carcinoma
Cervical Carcinoma

IV b
Use of MRI for evaluation of post operative care

Post Conization
Local recurrence after radiation therapy
Monitor Therapeutic Response

Post RT
MRI may have prognostic importance in cervical carcinomas

- More the percentage of tumor volume regression, estimated on T2-weighted images, greater disease free survival after radiation therapy
- Low tumor vascularity, assessed with contrast enhanced MRI appears to correlate with higher incidence of local recurrence in patients treated with radiation therapy alone
Conclusion

- MR: Most effect modality
  - For detection & staging of primary tumor
  - Showing recurrent disease
  - Monitor therapeutic response
- CT & MR are equally effective for nodal involvement
- PET improves specificity & sensitivity of these techniques
Thank You