



MR Imaging of the Female Pelvis

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The traditional imaging modality of choice for the female pelvis is ultrasound. Using specialized probes, ultrasound produces high-resolution images that provide a high level of diagnostic accuracy for pelvis pathology. While ultrasound is less expensive than MR, an MR scan provides rich, tissue-specific information. There are also inherent limitations to ultrasound; it has a limited field-of-view (FOV); bowel gas can potentially obscure pelvic organs; large-sized patients can pose challenges in achieving good imaging results; and the technique is dependent on the skill and experience of the operator, which leads to variations in image quality. As a result, many patients undergo additional imaging exams.

Clinical preference is changing with increased accessibility to MRI. MRI offers multi-planar capabilities and exquisite soft tissue contrast that helps differentiate lesions. It also does not have the FOV limitations that exists with ultrasound.

The inherent tissue contrast that MRI offers is superior when imaging the female pelvis. For female pelvis examinations, we at Royal Women's Hospital typically look at post-contrast imaging, including T1, and T2-weighted images in multiple planes. The boost in signal that we see with our 3.0T versus our 1.5T scanner means that we can obtain higher resolution scans, which in turn aids in better lesion definition.

Clinical case

A 57-year-old female was referred for an MR scan to determine the size and nature of a pelvic mass. Prior studies included ultrasound and CT, where lung nodules were noted. The patient also underwent a histological work up.

MR scan of the pelvis was performed on a GE Signa HDx 3.0T scanner utilizing the HD torso array coil. Sequences performed include T2, T1, fast recovery fast spin echo (FRFSE), and diffusion-weighted imaging (DWI).

Protocols

Diffusion – DWI
 Spin Echo (SE) / EPI
 B value: 1000 s/mm²
 TR 7000/TE 80
 Bandwidth: 250 kHz
 Coil: Torso Array coil
 Slice thickness: 8 mm skip
 2 to cover the entire pelvis
 Matrix: 192 x 224
 FOV : 38 cm x 38 cm
 Asset: On
 Scan time: 3.50 min

T2 Fast Recovery Fast
 Spin Echo
 TR 5400/TE 80
 ETL: 18
 FOV: 38 x 38
 Bandwidth: 41 kHz
 Matrix: 320 x 224
 (ZIP 512)
 FCF/NPW/TRF/512 ZIP

T1 + Fat Suppression
 TR800/TE 8
 ETL : 3
 FOV : 38 x 38
 Bandwidth: 62 kHz
 Matrix : 512 x 256
 (ZIP 512)
 NPW/TRF/FC

About the facility

The Royal Women’s Hospital in Melbourne is Australia’s largest specialty hospital dedicated to improving the health of women and newborn babies. Established in 1856, the hospital has led efforts for the advocacy and advancement of women’s healthcare. In addition, the Royal Women’s is the first and currently the only facility in Australia and New Zealand to offer MR-guided focused ultrasound, which is coupled with a GE Signa HDx 3.0T MR.

Results

DWI is common place in neurological studies. We found that when used in the body, this sequence helps visualize lesions with high conspicuity and, in this case, highlighted a bony metastatic lesion within the pelvis and femora. The MRI aided in soft tissue and the surrounding bony pelvis diagnosis.

Conclusion

The large, soft-tissue mass was identified as consistent with a uterine sarcoma. Uterine sarcomas are malignant tumors that arise from the smooth muscle or connective tissue of the uterus. The bony metastases in the pelvis were shown very clearly on the diffusion-weighted sequence. The high-fidelity gradients and system homogeneity on the Signa HDx 3.0T means we can run sequences such as diffusion on all body parts with high image quality. ■

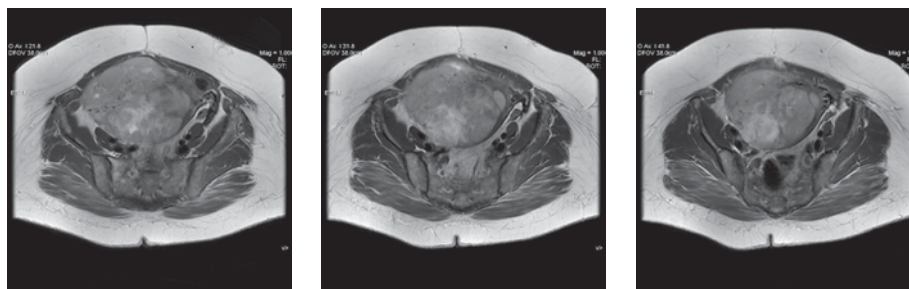


Figure 1. Axial T2 Fast Recovery Fast Spin Echo sequences in all three planes. This sequence demonstrates the heterogeneous nature of the lesion as well as any fluid-filled components.

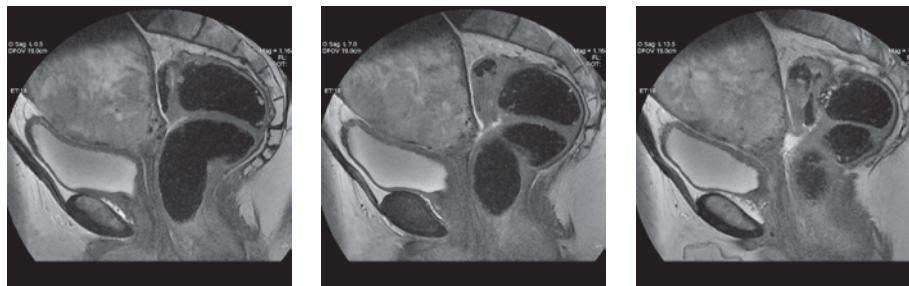


Figure 2. Sagittal imaging of the pelvis demonstrates the mass relative to surrounding structures.

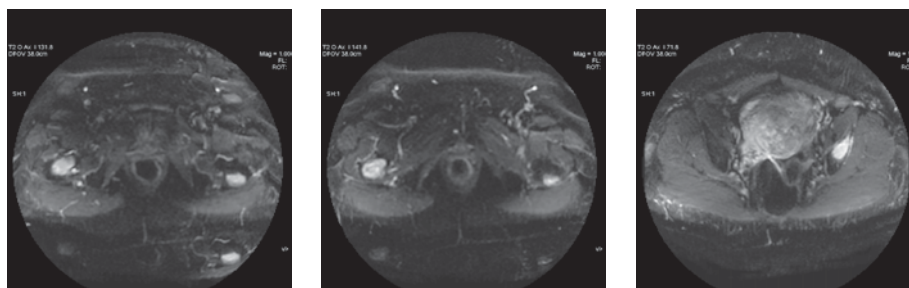


Figure 3. Spin Echo EPI diffusion, with a b value of 1000, demonstrates the bony metastases well.

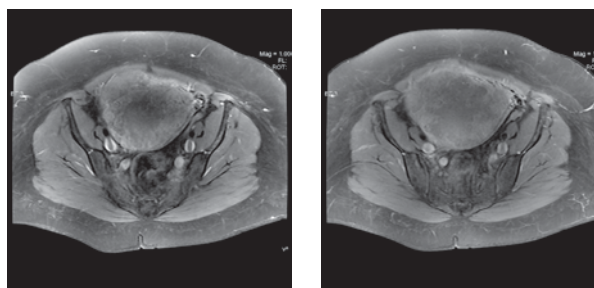


Figure 4. Axial T1 fat sat images.