Redefining MRI:
From Image to Insight

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Female Pelvis

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Magnetic resonance imaging (MRI) of the female pelvis plays a pivotal role in the diagnosis, staging, and treatment planning of gynecologic malignancies. With evolving guidelines and technical improvements, optimization of patient preparation and imaging protocols is essential to ensure high diagnostic accuracy.

• Patient Preparation:

Adequate preparation is crucial for optimal image quality. A minimum of 4-hour fasting is recommended to reduce bowel motion artifacts. Moderate bladder filling facilitates visualization of pelvic organs. Antiperistaltic agents such as hyoscine butylbromide (Buscopan) or glucagon are widely used to suppress bowel peristalsis. Optional use of rectal or vaginal gel may improve delineation of local invasion in selected cases.

•Core MRI Sequences:

High-resolution T2-weighted images in sagittal, axial oblique, and coronal oblique planes form the cornerstone of pelvic MRI. T1-weighted images with and without fat suppression aid in detecting hemorrhage, fat-containing lesions, and lymph node assessment. Diffusion-weighted imaging (DWI) provides complementary information on tumor detection, cellularity, and treatment response. Post-contrast T1-weighted imaging, including dynamic contrast-enhanced (DCE) sequences, enhances assessment of tumor extent and vascularity.

• For endometrial cancer, high-resolution sagittal and oblique axial T2-weighted imaging combined with T1-weighted and diffusion-weighted sequences remain the backbone of local staging. Contrast-enhanced imaging is crucial: early dynamic phases (30–60 seconds) best delineate tumor–myometrium contrast for assessing invasion, while delayed phases (~2:30 minutes) may further improve visualization of deep myometrial infiltration. This multiphase approach enhances accuracy in preoperative risk stratification.

• In cervical cancer, protocol refinements include thin-slice high-resolution T2-weighted imaging in sagittal, axial oblique, and coronal planes aligned with the cervical canal, supplemented by DWI for tumor detection and post-treatment surveillance. Contrast-enhanced imaging is valuable in equivocal cases, and updated FIGO staging systems emphasize MRI's role in evaluating parametrial invasion and nodal status.

• For adnexal masses, recent consensus such as the O-RADS MRI risk stratification system highlights the importance of multiparametric MRI, incorporating T2WI, DWI, and dynamic contrast-enhanced imaging to classify indeterminate adnexal lesions. This structured approach enhances lesion characterization, reduces diagnostic ambiguity, and guides management.

• Future directions in female pelvis MRI:

Advanced diffusion techniques (DTI/IVIM), quantitative DCE, AI & Radiomics, and motion-robust/accelerated imaging (Compressed Sensing, Propeller/BLADE) are emerging to improve lesion characterization and protocol efficiency.

Conclusion

Updated female pelvis MRI protocols integrate meticulous patient preparation, optimized sequence selection, and indication-specific contrast timing. These refinements improve diagnostic confidence, reduce pitfalls, and align imaging practice with current ESUR and O-RADS recommendations, ultimately enhancing standardized assessment and clinical decision-making.

Keywords: *Female pelvis MRI, MRI protocol, Gynecologic malignancy, O-RADS MRI*