

**Republic of Iraq**  
**Ministry of Higher Education**  
**Al-Mustaqbal University**  
**Radiology Techniques Department**  
**Second Stage \ Special Radiological Procedures-1**



## **Lecture No. (15)**

### **Computed Tomography of the Reproductive System**

**&**

### **MRI of the Reproductive System**

**By**

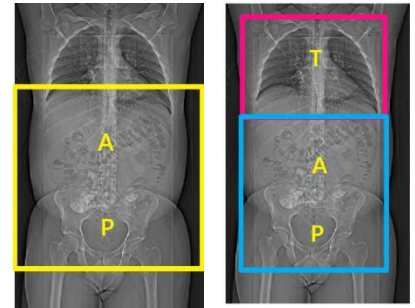
**Dr. Samer Adnan**

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# Computed Tomography of the Reproductive System

## Indications

1. **Staging** ovarian, endometrial and cervical cancers
2. To evaluate causes of raised CA125 levels
3. In postoperative settings such as evaluation for intestinal obstruction or collections



## Technique

**CT staging** is usually performed with oral and i.v. contrast.

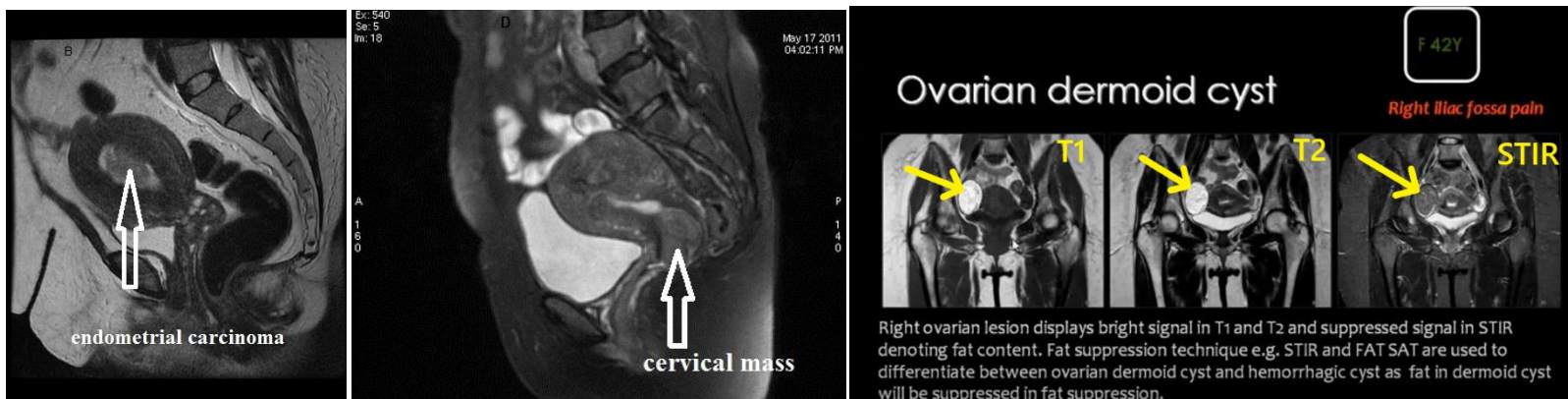
\*Imaging of the abdomen and pelvis in the portal venous phase is the usual practice in most centres.

\*The thorax may be scanned in the arterial phase, or **alternatively** single run thorax, abdomen and pelvis may be obtained in the venous phase, which has become more popular in many centres with the advent of faster scanners.

\***CT** is **mainly** used for staging of gynaecological malignancy but also in acute pelvic emergencies.

\***Local** staging in endometrial and cervical cancers is **better** performed with MRI.

\*Characterization of ovarian mass lesions is also **best** performed with MRI



\*CT of the thorax, abdomen and pelvis is indicated in endometrial cancers with advanced local disease, aggressive histology and in sarcomas.

\*CT of the abdomen may be indicated in assessment of cephalad extent of nodal disease in cervical cancer.

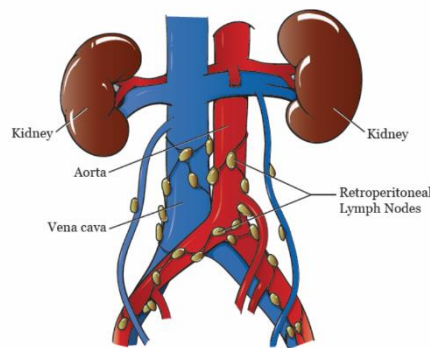
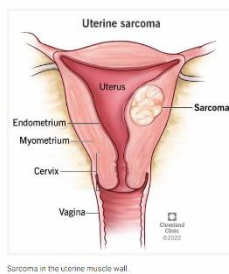
\*CT of abdomen and pelvis is generally used for staging of ovarian cancer, and to assess nodal disease, peritoneal, omental and diaphragmatic disease. \*If pleural effusion is present, the thorax should also be imaged.

#### What is uterine sarcoma?

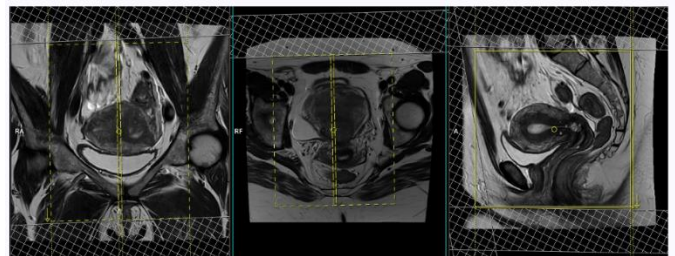
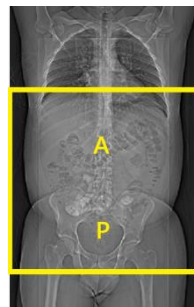
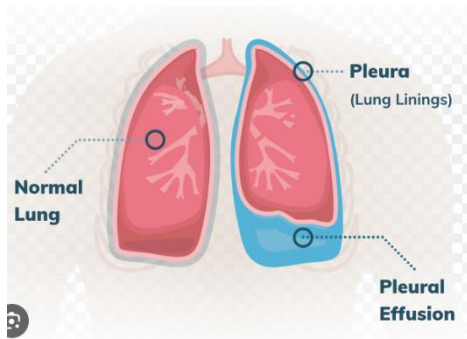
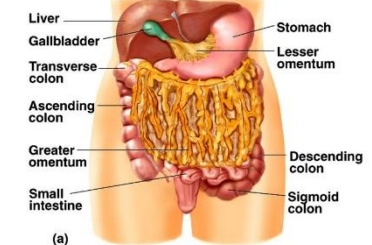
Uterine sarcoma is a type of uterine cancer that typically forms in the muscle layer of your uterus (myometrium). Most uterine cancers form in the lining of your uterus (endometrium) and are called endometrial cancers or carcinomas. Sarcomas, on the other hand, are much less common. There are also other rare types of sarcoma that start in the supporting cells of the uterine lining.

#### Is uterine sarcoma aggressive?

Uterine sarcoma typically grows faster and spreads more quickly than more common endometrial cancers. Still, not all uterine sarcomas are equally aggressive. Your provider will consider where the sarcoma is located and what type it is to determine how aggressive it is.



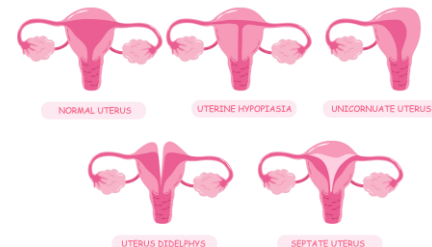
#### Lesser & Greater Omentum



## MRI of the Reproductive System

### Indications

1. Staging of cervical and endometrial cancer
2. Characterization of complex ovarian mass
3. Suspected Müllerian tract anomalies

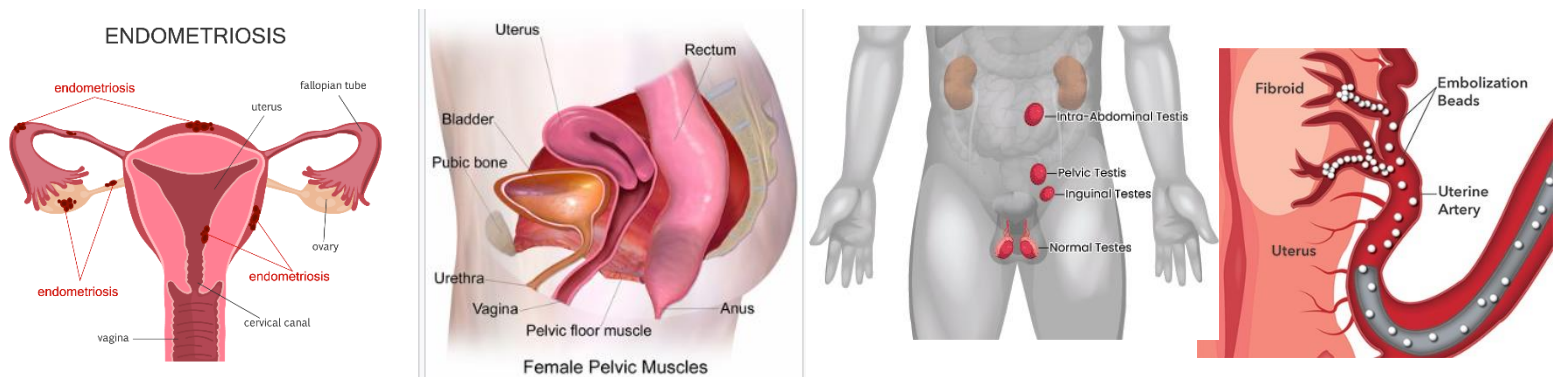


4. Investigation of endometriosis

5. Assessment of pelvic floor

6. Scrotal MRI can be used to further characterize an US-demonstrated mass as intra or extratesticular and to **determine the location of** intraabdominal undescended testis.

7. **Localization and morphology of** uterine fibroids *prior* to consideration for uterine artery embolization



## Artifacts

-Artifact from small-bowel peristalsis and, to a **lesser extent**, colonic peristalsis can occasionally be a **problem in the pelvis**, and Buscopan 20 mg i.v. can be used to **minimize this**.

-Respiratory motion artifact is *less of* a problem in the **pelvis** *than* in the **upper abdomen**.

-Movement from anterior abdominal wall fat can be **suppressed** using a saturation band.

## Pulse Sequences

**Multiparametric imaging** is used currently in gynaecological malignancies, as in other areas of the pelvis. A **combination** of \*T2 weighted images and \*dynamic contrast enhanced (DCE) magnetic resonance (MR) images, **coupled** with \*diffusion weighted images (DWI) and \*apparent diffusion coefficient (ADC) mapping, **increases the accuracy of diagnostic interpretation**.



\*For midline structures (uterus, cervix and vagina), sagittal T2-weighted spin-echo sequences can be supplemented with further axial sequences angled to regions of interest as required.

\*Inclined axial images perpendicular to the long axis of the **uterus** or the long axis of the **cervix** are helpful for uterine and cervical abnormalities, respectively. This technique is also **mandatory** for accurate local staging of uterine and cervical cancers.

\*The ovaries can be assessed with axial T1-weighted and T2-weighted spin-echo sequences in three planes.

\*T1-weighted fat saturated sequences are used to identify **haemorrhage** (e.g. within endometriomas) and to help characterize fat containing masses.

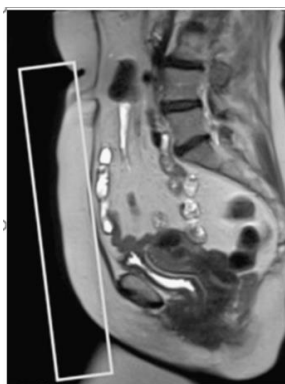
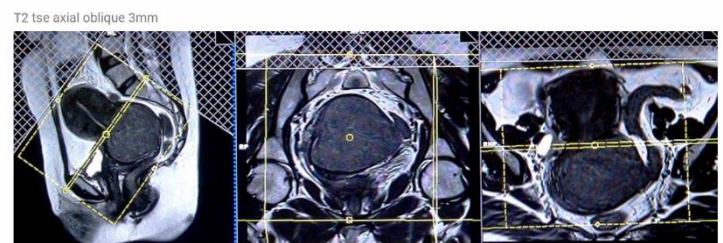
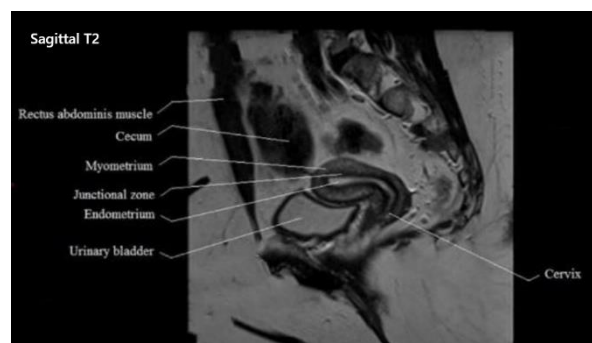


FIGURE 5-3  
Saturation band. Gray rectangle represents optimal location near field artifact.

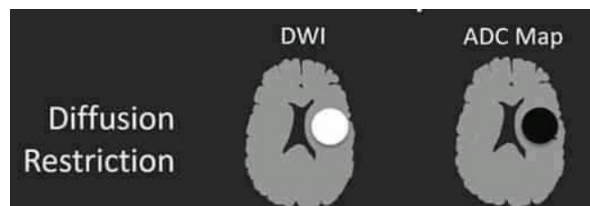
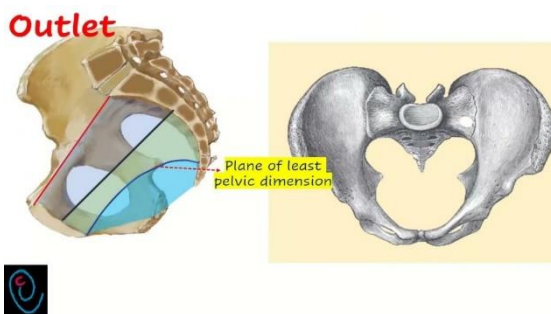


\*Perfusion imaging of the **uterus** can be used to assess the effectiveness of uterine fibroid therapy.

\*Diffusion weighted imaging (DWI) can also be **complementary** to conventional T2-weighted images in assessing the extent and staging of gynaecological malignancy.

\*Varying **B values** can be useful to assess restricted diffusion. Generally **restricted diffusion** is more suggestive of malignancy.

\*MRI is also used to measure the pelvic outlet in pelvimetry, in order to **avoid ionizing radiation**.



## Scrotal Magnetic Resonance

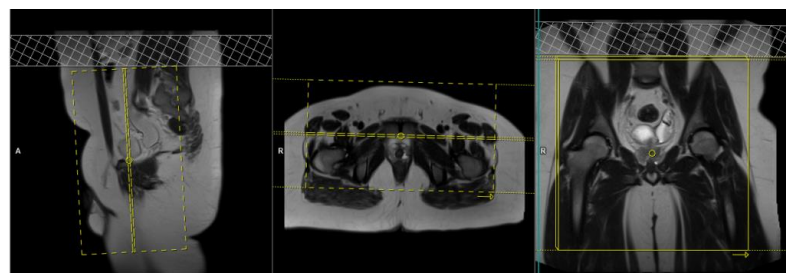
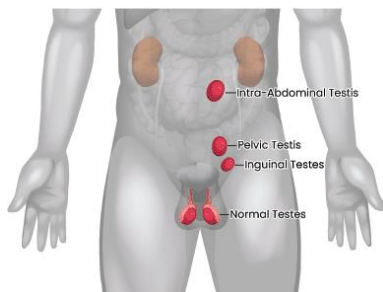
This is generally performed with the **scrotum** supported as in US, using a surface coil.

\***High-resolution axial, sagittal and coronal T2-weighted** spin echo scans are obtained **with** a **T1-weighted** scan to identify haemorrhage.

\*Large field-of-view (FOV) scans should be performed to assess the **inguinal canal** for the presence of a hernia.

\*Gadolinium i.v. can be given if necessary to **assess perfusion**.

\***Scans should include the pelvis and kidneys** if an undescended testis is being investigated.



1. Which sequences are commonly used in scrotal magnetic resonance imaging (MRI) to identify hemorrhage?

- A. High-resolution axial T1-T2 weighted spin echo scans
- B. High-resolution axial T2-weighted spin echo scans
- C. High-resolution sagittal T2-weighted spin echo scans
- D. High-resolution coronal T2-weighted fast spin echo scans
- E. low-resolution coronal T2-weighted fast spin echo scans

2. Local staging in endometrial and cervical cancers is better performed with?

- A. Conventional US
- B. CT
- C. MRI
- D. Color Doppler ultrasound
- E. ERCP

3. The most indication of MRI reproductive system is

- A-Endometriosis
- B. Hydrocele
- C. Pyonephrosis
- D. Bladder fistulae
- E. None of the above

4. CT staging in gynecological malignancy usually performed with

- A. Native study
- B. Oral contrast
- C. IV contrast
- D. Rectal contrast
- E. B & C

5. is mainly used for both staging of malignancy and acute pelvic emergencies.

- A. CT
- B. Color doppler
- C. ERCP
- D.B-mode ultrasound
- E. MRI

6. Which pulse sequences are commonly used in magnetic resonance imaging of the reproductive system to enhance diagnostic accuracy?

- A. T2-weighted images
- B. Dynamic contrast-enhanced MR images
- C. Diffusion-weighted images
- D. Apparent diffusion coefficient (ADC) mapping
- E. All of the above

7. Diffusion-weighted imaging (DWI) is primarily used as a complementary tool to conventional T2-weighted images for:

- A. Assessing the presence of uterine fibroids
- B. Evaluating endometrial thickness
- C. Determining the size of ovarian cysts
- D. Assessing the extent and staging of gynecological malignancy
- E. None of the above

9. Regarding CT technique of the female reproductive system, one is false.....

- A. CT staging is usually performed with oral and I.V contrast
- B. Abdomen and pelvis may be obtained in the venous phase
- C. Staging in endometrial and cervical cancers is better performed with MRI
- D. Characterization of ovarian mass lesions is best performed with ultrasound
- E. If pleural effusion is present, the thorax should also be imaged

10. In computed tomography of the reproductive system, which of the following(s) is/are correct.

- A. CT staging is usually performed with oral and i.v. contrast.
- B. Imaging of the abdomen and pelvis in the portal venous phase is the usual practice in most centers.
- C. CT is typically performed without the use of contrast agents.
- D. CT is primarily used for evaluating tubal patency.
- E. A and B

11. Which of the followings is not considered a sequence of MRI pelvis in female?

- A. T2 W
- B. Dynamic contrast enhanced images
- C. DWI
- D. ADC
- E. None of the above

11. Regarding the scrotal MRI, all of The followings are true except .....

- A. Gadolinium i.v. Can be given if necessary to assess perfusion
- B. T2 & T1-weighted scan to identify hemorrhage.
- C. Small field-of-view (FOV) for presence of inguinal hernia
- D. Using a surface coil
- E. Scans should include the pelvis and kidneys if an undescended testis

12. Perfusion imaging of the uterus is primarily used for

- A. Assessing the effectiveness of uterine fibroid therapy
- B. Evaluating endometrial abnormalities
- C. Detecting pelvic inflammatory disease
- D. Assessing ovarian function
- E. Assessing ovarian disease



13. MRI for evaluating an undescended testis should include the
- A. Pelvis only                      B. Kidneys only                      C. Testicles only                      D. Pelvis and kidneys
  - E. Ureter only
14. When typical field of view needed for groin hernia assessment:
- A. Should a head coil be used for groin hernia assessment?
  - B. Should a small FOV scan be used to assess the inguinal canal for a hernia?
  - C. Should contrast be routinely used for groin hernia scans?
  - D. Should scans include the kidneys for a suspected groin hernia?
  - E. Is a large FOV scan necessary to assess the inguinal canal for a hernia?
15. Here's a shorter question focusing on the anatomic area imaged for an undescended testis:
- A. Is a large field-of-view (FOV) scan necessary to evaluate an undescended testis?
  - B. Should a large field-of-view (FOV) scan be used for an inguinal hernia evaluation?
  - C. Does an undescended testis require imaging of the pelvis and kidneys?
  - D. Does an inguinal hernia require imaging of the pelvis and kidneys?
  - E. Is gadolinium contrast always used in hernia evaluations?
16. Which of the following statements is true regarding MRI used for assessing effectiveness of uterine fibroid therapy?
- A. Is diffusion-weighted MRI helpful in assessing uterine fibroid therapy?
  - B. Can perfusion MRI be used to evaluate the success of uterine fibroid treatment?
  - C. Are conventional T2-weighted images sufficient for diagnosing gynecological malignancies?
  - D. Does restricted diffusion always indicate malignancy in gynecological cancers?
  - E. Should both perfusion and diffusion MRI be used for all gynecological exams?
17. Which of the MRI sequences used for evaluating the ovaries?
- A. Sagittal T2WI.                      B. T1-weighted and T2-weighted sequences in all three planes.
  - C. T1WI sequences                      D. DWI in all three planes.                      E. Perfusion imaging.
18. How can artifacts from small-bowel peristalsis be minimized during pelvic imaging?
- A. Use of respiratory motion artifact suppression                      B. Administration of Buscopan
  - C. Application of saturation band on anterior abdominal wall fat
  - D. Use of diffusion weighted images                      E. Use T2-weighted spin echo (SE) images