College of Health and Medical Technologies
Department of Radiology Technologies
Radiological procedures- 1

METHODS OF IMAGING THE REPRODUCTIVE SYSTEM

2 nd stage

LECTUER 14

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MSc Radiographic Imaging

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Methods of Imaging in the Female Reproductive System

1. Digital radiography
2. Hysterosalpingography
3. Ultrasonography
4. Computerized tomography (CT)
5. Magnetic resonance imaging (MRI)
6. Minimally invasive procedures (MIP) including biopsies, cyst drainage, angiography, fibroid embolization
7. Positron Emission Tomography (PET)-CT

Methods of Imaging the Male Reproductive System

(Scrotum and Testes)

1. Ultrasound (US)
2. MRI
3. Radionuclide imaging
4. Venography (including embolization of varices) and angiography

HYSTEROSALPINGOGRAPHY

Indications

1. Infertility—to assess tubal patency
2. Recurrent miscarriages—investigation of suspected incompetent cervix, suspected congenital anomaly of uterus
3. Following tubal surgery to establish tubal patency, poststerilization to confirm obstruction and prior to reversal of sterilization
4. Assessment of the integrity of a caesarean uterine scar (rare)

Contraindications

1. During menstruation
2. Pregnancy or unprotected intercourse during the cycle
3. A purulent discharge on inspection of the vulva or cervix, or diagnosed pelvic inflammatory disease (PID) in the preceding 6 months
4. Contrast sensitivity (relative)

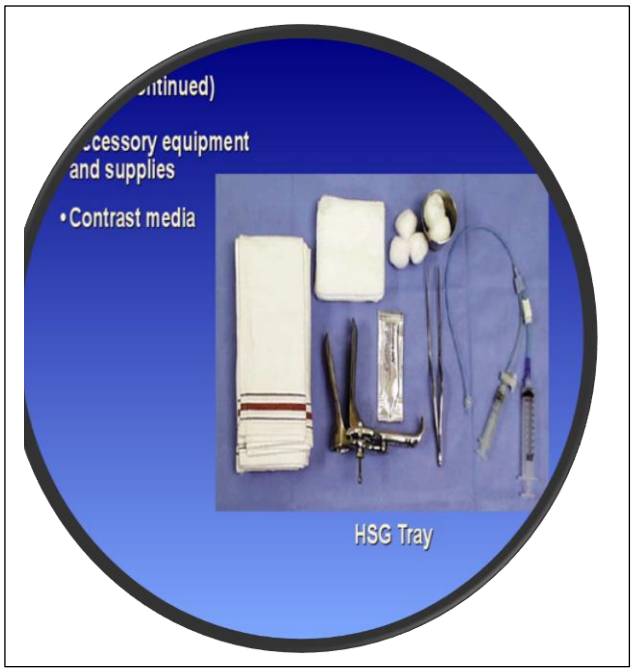
Contrast Medium

High osmolar iodinated contrast material (HOCM) or low osmolar iodinated contrast material (LOCM) 270/300 mg I mL−1 10–20 mL.

The contrast medium should be prewarmed to body temperature to avoid tubal spasm.

Equipment

1. Fluoroscopy unit with spot film device
2. Vaginal speculum
3. Vulsellum forceps
4. Hysterosalpingography balloon catheter 5-F to 7-F. In patients with narrow cervix or stenosis of cervical os, Margolin hysterosalphingography (HSG) cannula may be used. It has a silicone tip and provides tight occlusion of the cervix for contrast injection.



Patient Preparation

1. The appointment is made before day 21, or the examination can be booked between the 4th and 10th days in a patient with a regular 28-day cycle.
2. The patient should abstain from unprotected intercourse between booking the appointment and the time of the examination.
3. Apprehensive patients may need premedication. Analgesics before procedure may also help.
4. Informed consent should be obtained.1

Technique

1. The patient lies supine on the table with knees flexed, legs abducted.
2. The vulva can be cleaned with chlorhexidine or saline. A disposable speculum is then placed using sterile jelly, and the cervix is exposed.
3. The cervical os is identified using a bright light, and the HSG catheter is inserted into the cervical canal. It is usually not necessary to use a Vulsellum forceps to hold the cervix with forceps, but occasionally this may be necessary. The catheter should be left within the lower cervical canal if cervical incompetence is suspected.
4. Care must be taken to expel all air bubbles from the syringe and cannula, as these would otherwise cause confusion in interpretation. Contrast medium is injected slowly into the uterine cavity under intermittent fluoroscopic observation.
5. Spasm of the uterine cornu may be relieved by intravenous (i.v.) Buscopan or glucagon if there is no tubal spill bilaterally. Prewarming the contrast medium to body temperature and injecting slowly may also help avoid tubal spasm.

Note: Opiates increase pain by stimulating smooth muscle contraction.

Images

The radiation dose should be kept as low as possible. Intermittent screening should be performed to the minimal requirement. Images should demonstrate the following:

1. Endometrial cavity, demonstrating or excluding congenital abnormalities or filling defects.
2. Full view of the tubes demonstrating spill. If occluded, show the extent and level of block.
3. If there is abnormal loculation of contrast, a delayed view may be useful.

Aftercare

1. It must be ensured that the patient is in no serious discomfort nor has significant bleeding before she leaves.
2. The patient must be advised that she may have spotting or occasional vaginal bleeding for 1–2 days and pain which may persist for up to 2 weeks.
3. Prophylactic broad-spectrum antibiotics are routinely given in several centres and are good practice.

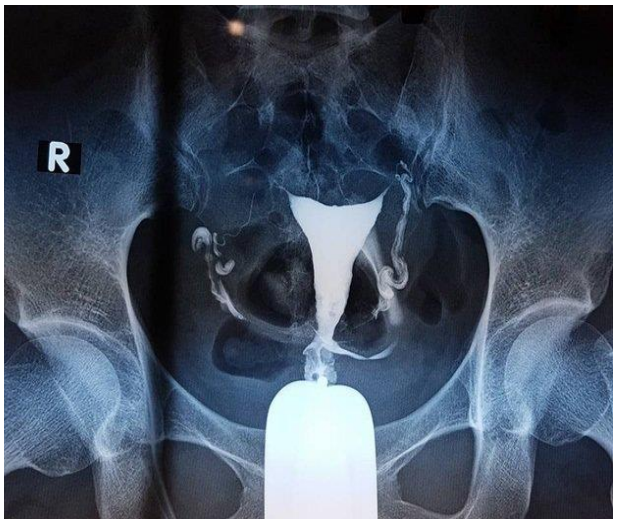
Complications

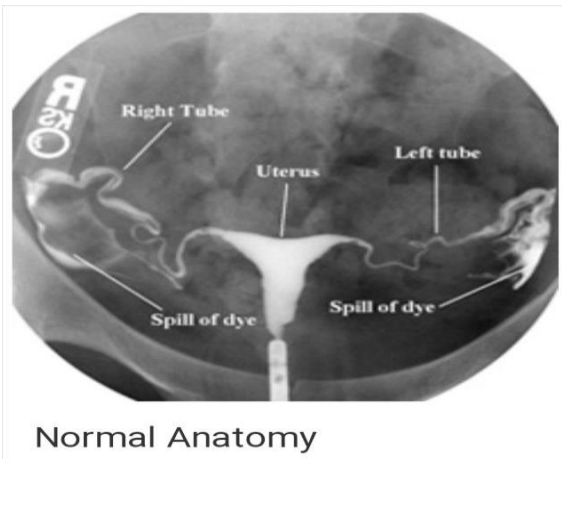
Due to the contrast medium

Allergic phenomena—especially if contrast medium is forced into the circulation.

Due to the technique

1. Pain may occur at the following times:
(a) When using the speculum
(b) During insertion of the cannula or inflation of balloon, some patients may have developed vasovagal syncope—'cervical shock'.
(c) Uterine or tubal distension proximal to a block or spasm
(d) With peritoneal irritation during the following day, and up to 2 weeks
2. Bleeding from trauma to the uterus or cervix
3. Transient nausea, vomiting and headache
4. Intravasation of contrast medium into the venous system of the uterus results in a fine lace-like pattern within the uterine wall. It is of little significance when water-soluble contrast medium is used. Intravasation may be precipitated by direct trauma to the endometrium, timing of the procedure near to menstruation or curettage, tubal occlusion or congenital abnormalities.
5. Infection—which may be delayed. Occurs in up to 2% of patients and is more likely when there is a previous history of pelvic infection.





Normal Anatomy

ULTRASOUND OF THE FEMAL REPRODUCTIVE SYSTEM

This can be performed transabdominal (TA) and/or transvaginal (TV).

Indications

1. Pelvic mass
2. Pregnancy—normal and suspected ectopic
3. Precocious puberty or delayed puberty
4. Pelvic pain
5. Assessment of tubal patency
6. In assisted fertilization techniques
7. Postmenopausal bleeding
8. Menstrual problems, location on intrauterine device (IUD)
9. Ovarian cancer screening

Contraindications

None.

Patient Preparation

1. Transabdominal scan—full bladder

Transvaginal scan—empty bladder

2. Patient consent1

It is advisable to always have a chaperone.

Equipment

TA 4–10-MHz curvilinear transducers; TV 9–13-MHz endovaginal transducers.

Reporting Gynaecological Ultrasound The following format may be useful to assess the female reproductive system:

1. Uterine size in three dimensions. Note any congenital anomalies, presence of fibroids (include size and location) or adenomyosis.

2. Endometrial thickness. Assess relationship with the timing of menstrual cycle—namely, trilaminar appearance, presence of polyps.

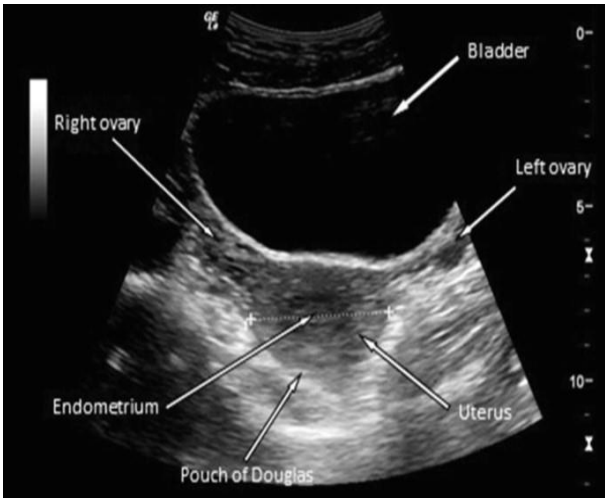
3. Three dimensional ovarian measurements and volume. Presence of features including polycystic ovaries, significant cysts or mass lesions. Colour Doppler is useful in the assessment of complex adnexal mass lesions, which helps differentiate retracted clot from solid components with blood supply.

4. Comment on adnexae for extraovarian lesions.

5. Examine the cul-de-sac for presence of endometriotic deposits or mass lesions. Note presence of free fluid or ascites. Several software enhancements are available to improve resolution. Tissue harmonic imaging is useful for more definitive evaluation of indeterminate appearances. 3D and 4D ultrasound are also currently widely available and mainly used in obstetric imaging. In gynaecology, 3D endometrial imaging may be useful, but generally adds little clinical value. MRI scan offers more diagnostic value.

Contrast Medium

Galactose monosaccharide microparticles (Echovist) were used as a specific contrast agent in the assessment of tubal patency (HyCoSy), with spillage of the microparticles into the peritoneal cavity implying patency. This product is no longer available for clinical use. Sonovue (sulphur hexafluoride microbubbles) is not currently licensed for intrafallopian use. Currently a gel containing a mixture of hydroxy ethyl cellulose and glycerol mixed with purified water is used to create a foam (ExEm foam), to perform Hysterosalpingo Foam Sonography (HyFoSy). The foam is injected into the uterine and fallopian tubes, and high-resolution ultrasound images are obtained. Fluoroscopic hysterosalpingography, however, remains the most reliable and safe investigation currently.



ULTRASOUND OF THE SCROTUM

Indications

1. Suspected testicular tumour
2. Suspected epididymo-orchitis
3. Hydrocele
4. Acute torsion. In boys or young men in whom this clinical diagnosis has been made and for whom emergency surgical exploration is planned, ultrasound should not delay the operation. Although colour Doppler may show an absence of vessels in the ischaemic testis, it is possible that partial untwisting resulting in some blood flow could lead to a false-negative examination.
5. Suspected varicocele
6. Scrotal trauma

Contraindications

None.

Patient Preparation

Explanation of procedure and verbal consent is usually obtained.

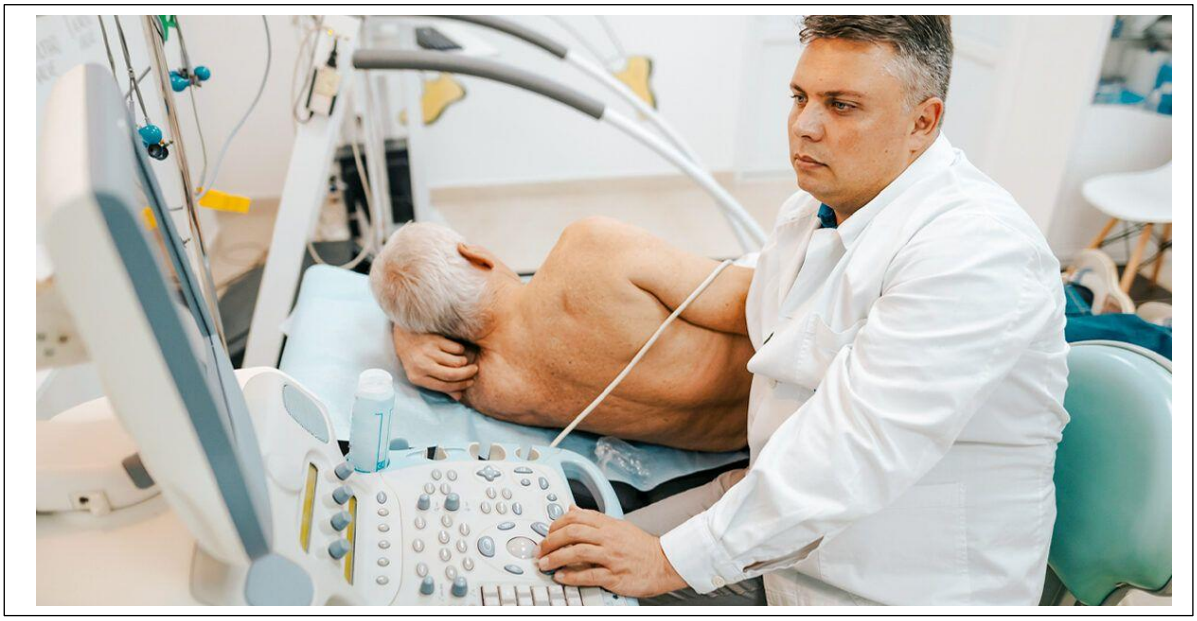
Equipment

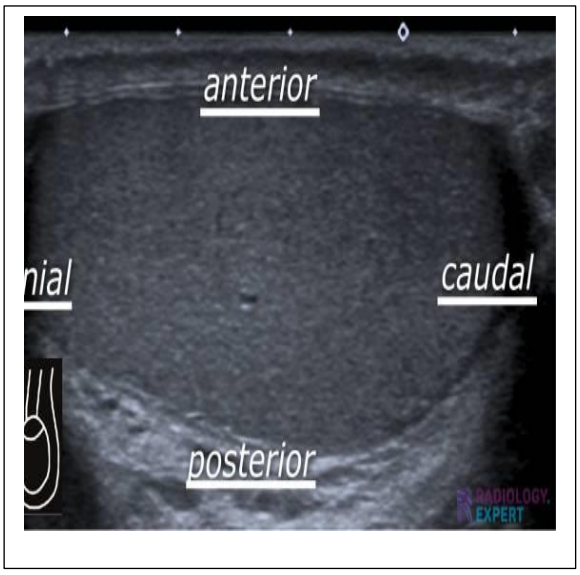
7.5–15-MHz transducer. Linear array for optimum imaging.

Technique

1. Secure environment with patient privacy protected.
2. Patient supine with legs together. Some operators support the scrotum on a towel draped beneath it or in a gloved hand.
3. Both sides are examined with longitudinal and transverse scans, enabling comparison to be made.
4. Real-time scanning enables the optimal oblique planes to be examined.
5. In comparing the ‘normal’ with the ‘abnormal’ side, the machine settings should be optimized for the normal side, especially for colour Doppler. Of note, the settings should then not be changed until both sides have been compared.
6. Patient could also be scanned standing upright and a Valsalva manoeuvre can be performed if a varicocele is suspected.

7. Testicular size and volume, echogenicity and presence of focal lesions to be noted. Epididymes are seen posterolaterally. Presence of cysts and inflammatory changes needs to be noted. Also look for hydrocele, evident as free fluid outside the testes in the tunica.





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