

Imaging in Gynecology.

Imaging modalities used..

- **U.S.G.** Principal way of examination (easy, available).
- Magnetic Resonance Imaging (**MRI**) routinely used in the evaluation of several gynecological malignancies and certain benign conditions,
- Computed tomography (**C.T.**), reserved for staging the distant extent of malignant disease..
- Conventional Radiology (**Hystrosalpingography**).
- PET-CT, used in the management of gynecological malignancy.

Normal U.S.G. appearance:

*2 ways of scanning:

.Through Abdominal wall (full U.B.).

.Trans vaginal ,with special probe, U.B. not necessary to be full, with better image quality.

Scanning is either longitudinal, or transverse.

On midline longitudinal scanning:

Uterus, lies immediately behind U.B.

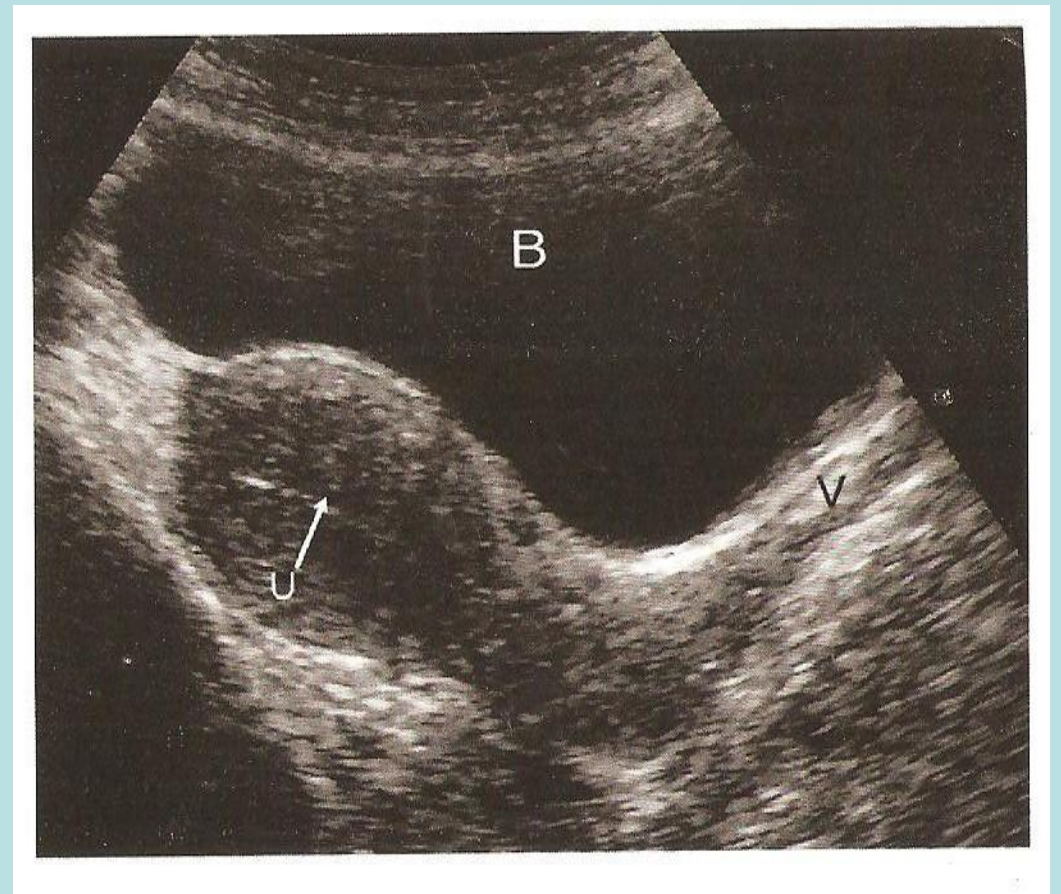
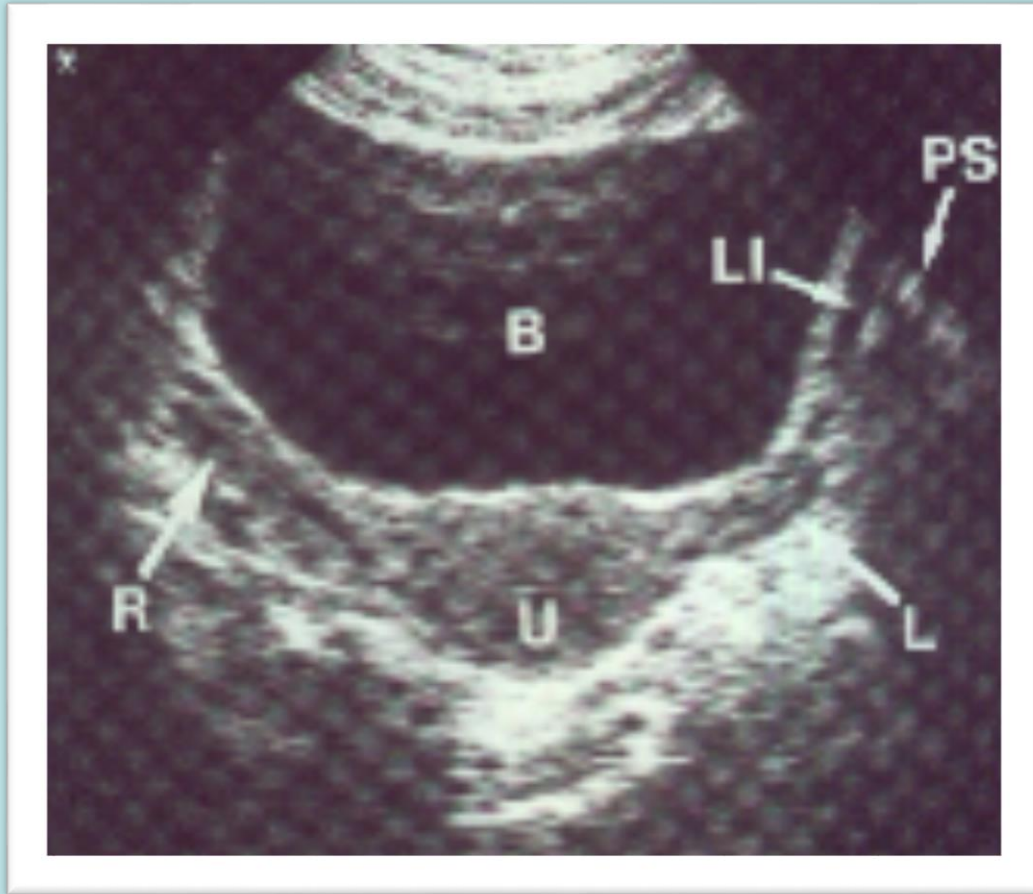
Myometrium shows low echo level.

Endometrial cavity shows high linear echo.

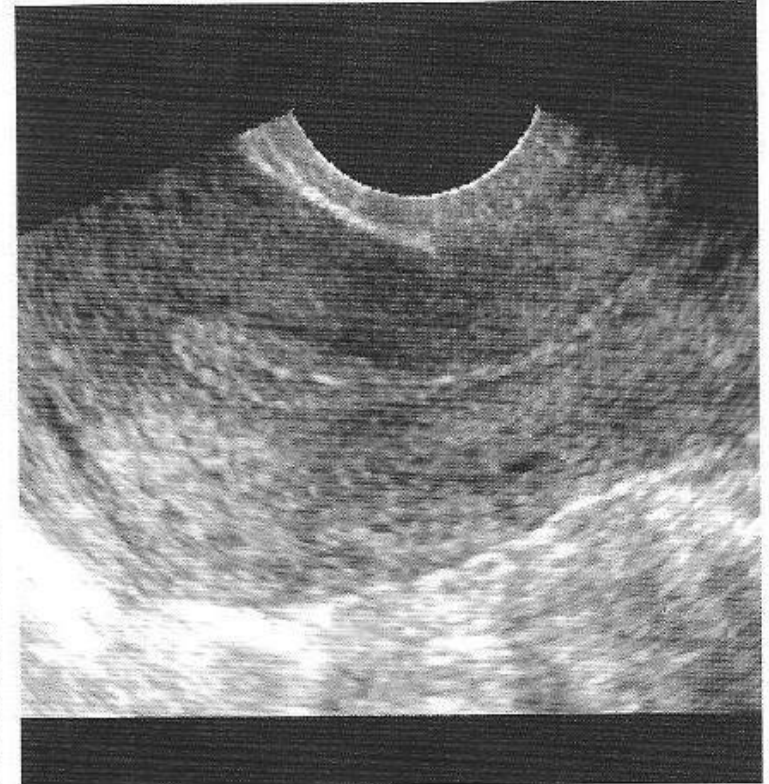
Vagina appear as tubular structure with central linear echo.

The appearance of uterus depends on age, parity & lie of uterus.

Saggital axis of uterus

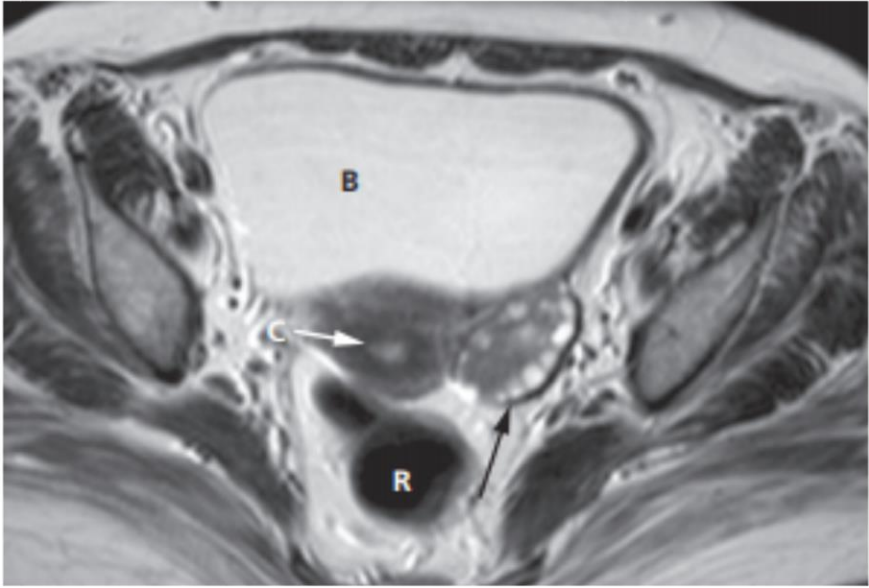


Endovaginal USG

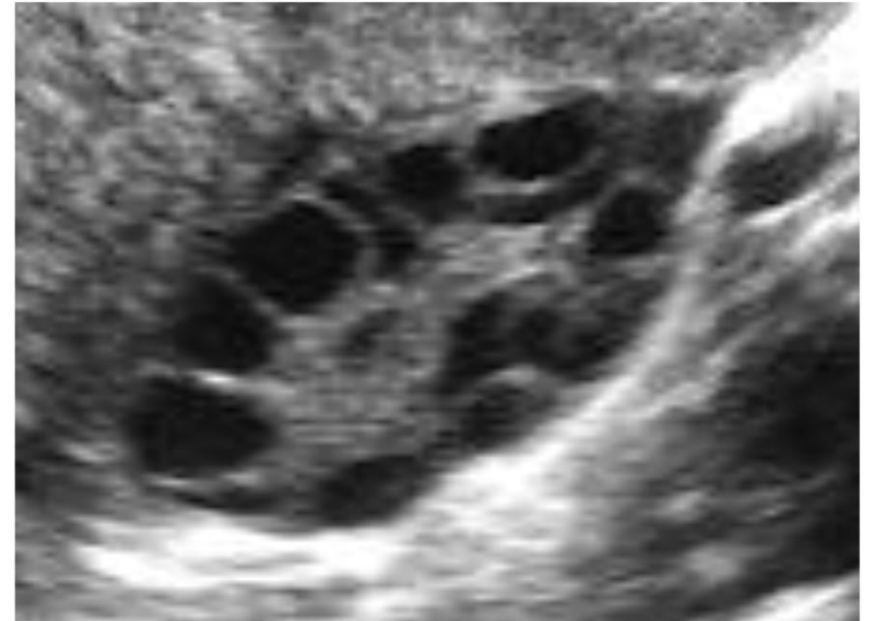
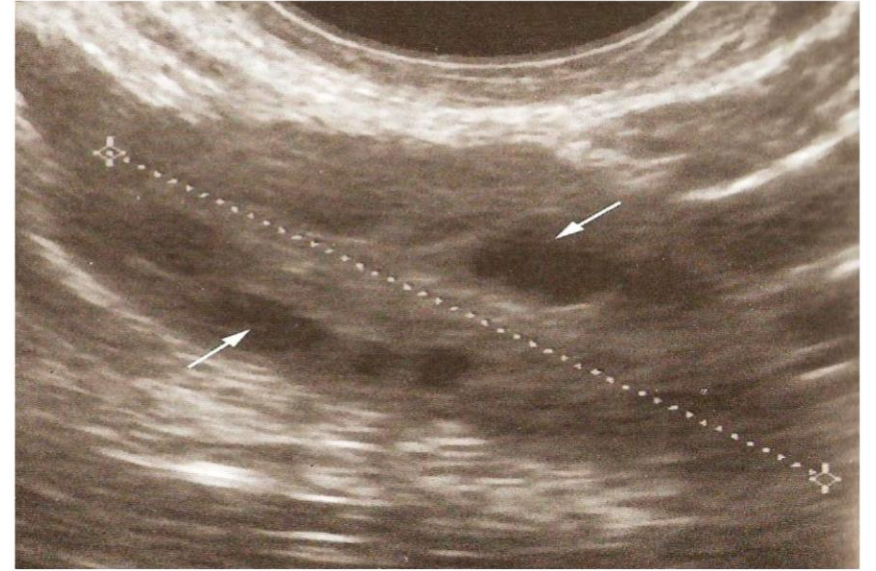


B

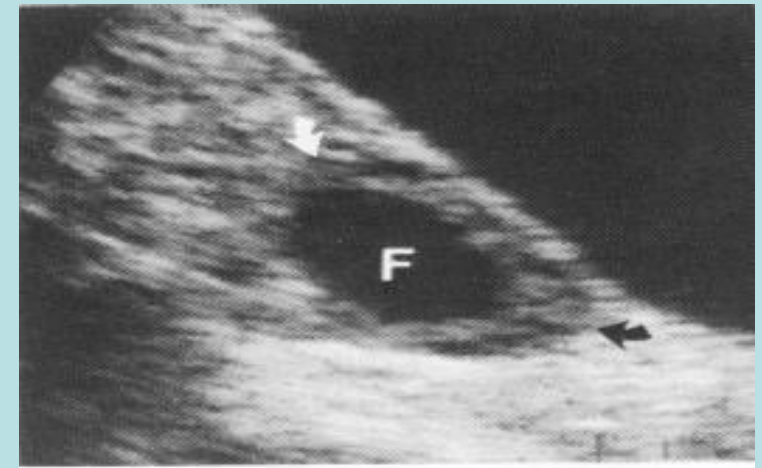
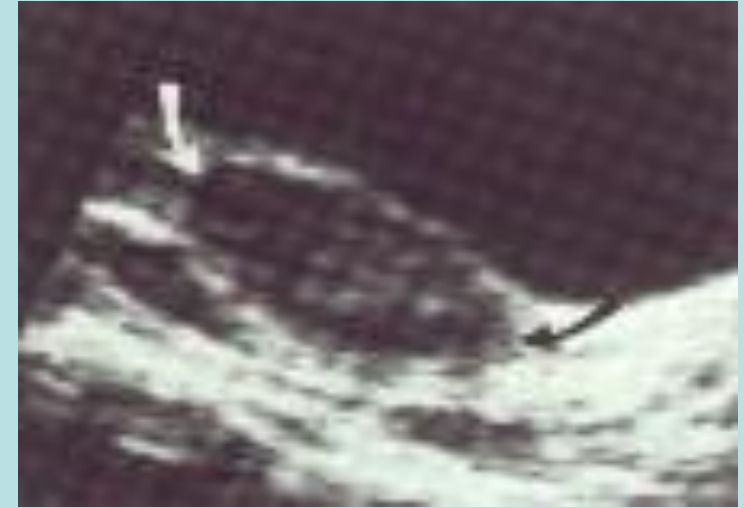
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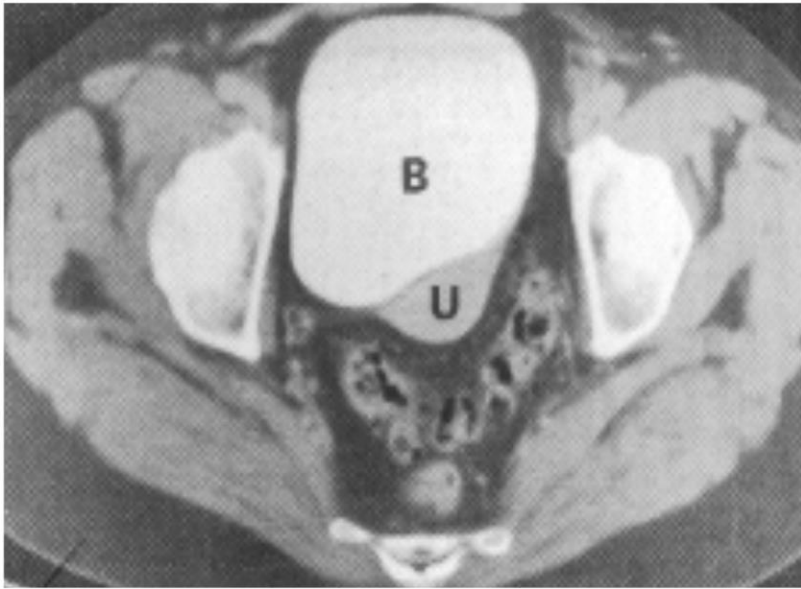


- The Fallopian Tubes are too small to be visualized.
- The Ovaries usually visualized lateral to uterus near side wall.
- Normal size during bearing age (2.5-5.0cm) in greatest diameter.
- After menopause ovaries atrophy.



- Hormonal changes :
- **Early phase of cycle** , several cysts seen representing developing follicles.
- **At 8th day**, one follicle becomes dominant,
- may reach 2-2.5cm in diameter prior ovulation.
- **At ovulation**, follicle ruptures & decrease in size (**Corpus Luteum**).
- Then degenerate if no intervening pregnancy.





Normal C.T. Appearance:

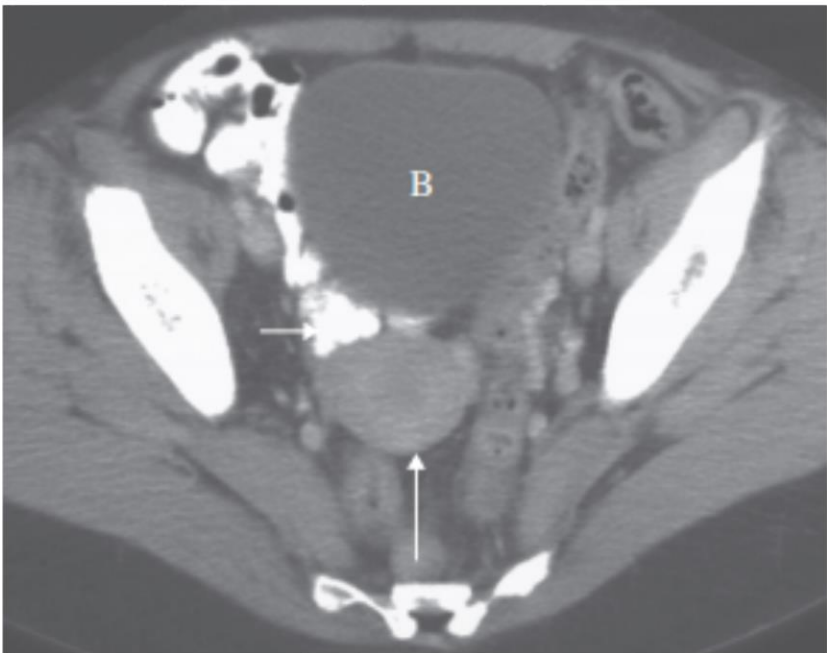
Cervix appear as rounded soft tissue structure about 3cm in diameter.

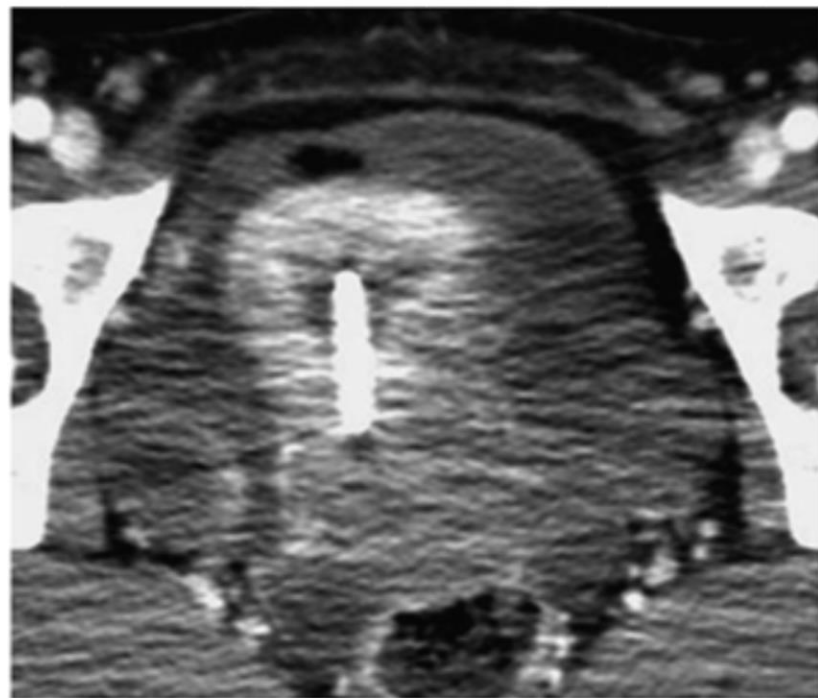
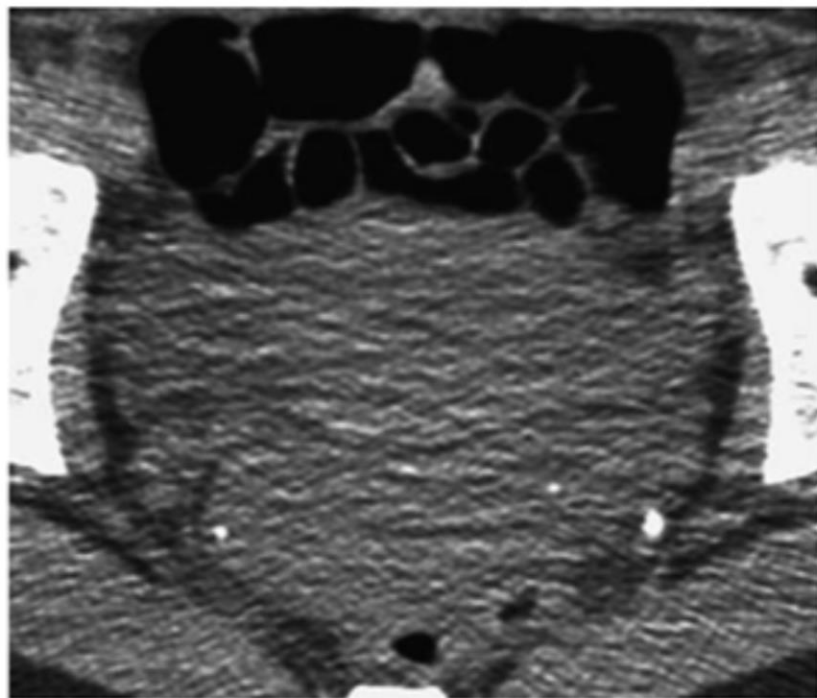
Body of uterus merges with cervix, appearance depending on uterine lie.

Fallopian Tubes & Broad ligaments are not visible

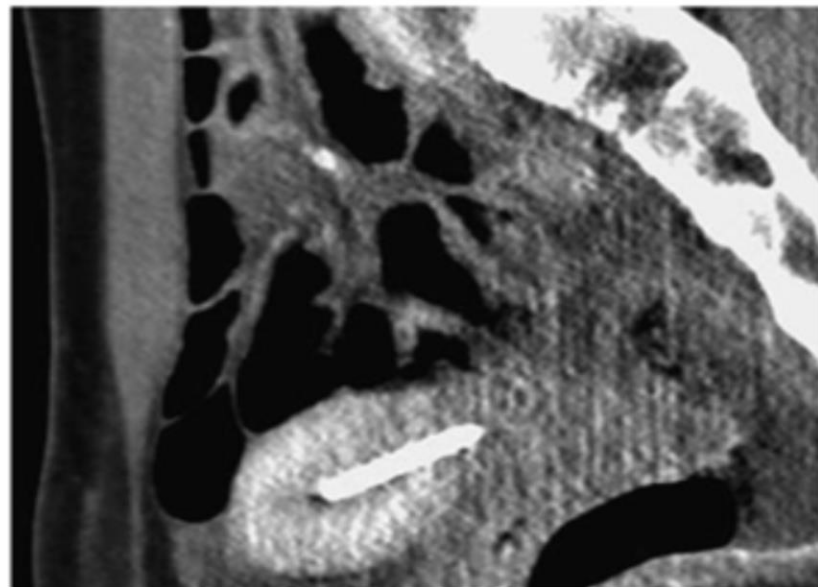
Ovaries usually not identified.

Parametrium appear of fat density.

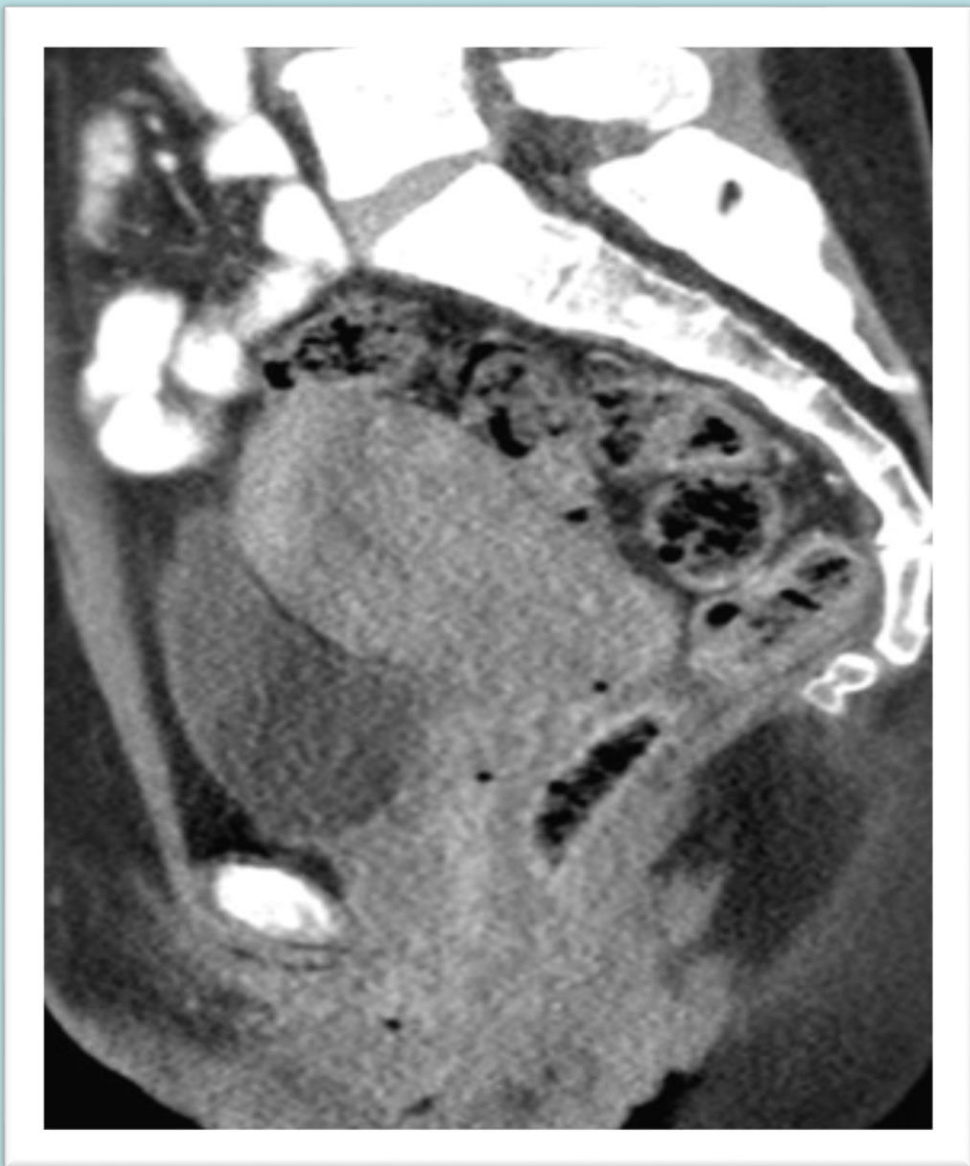




b



CT scan



Normal M.R.I. appearance

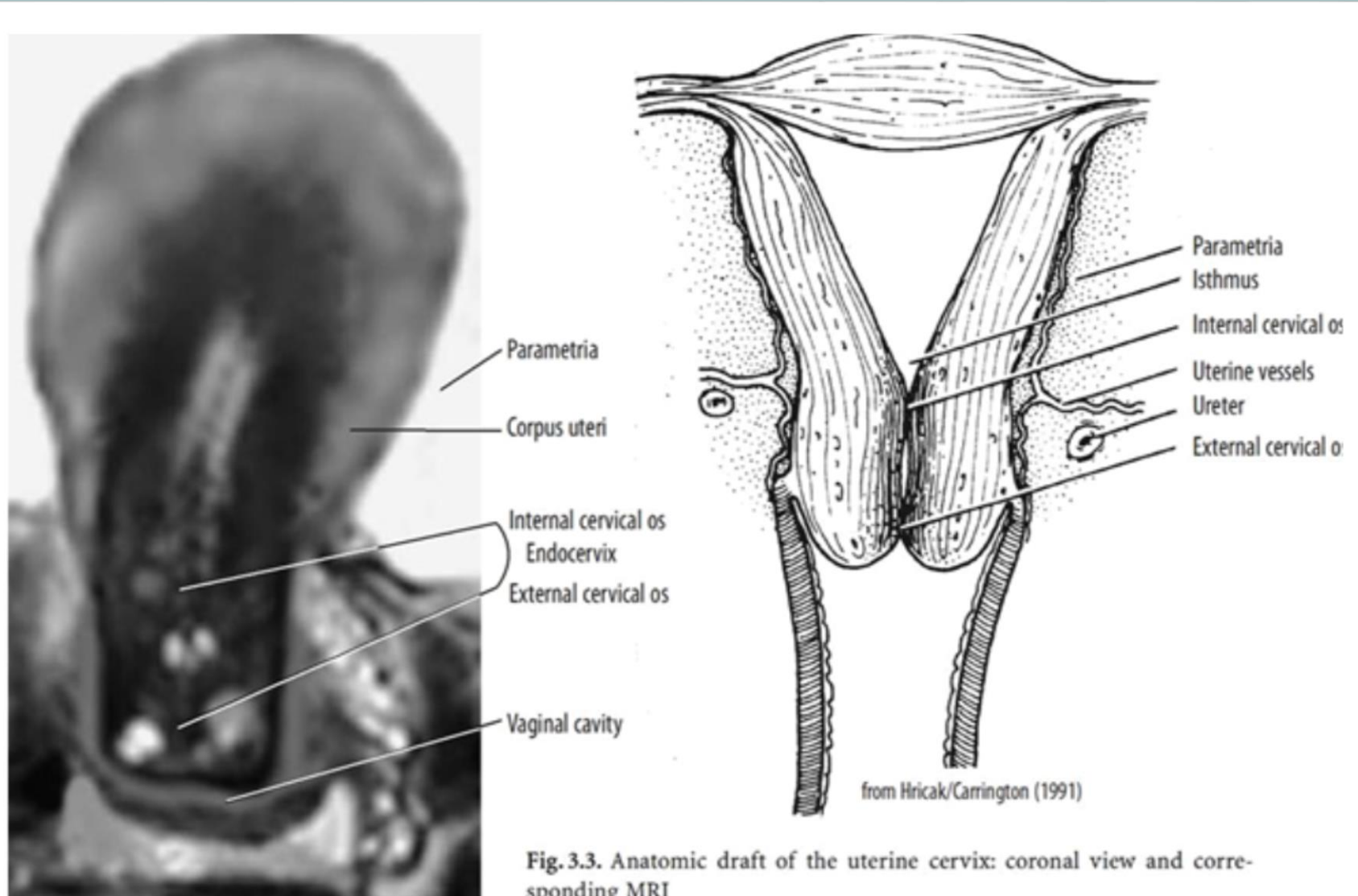
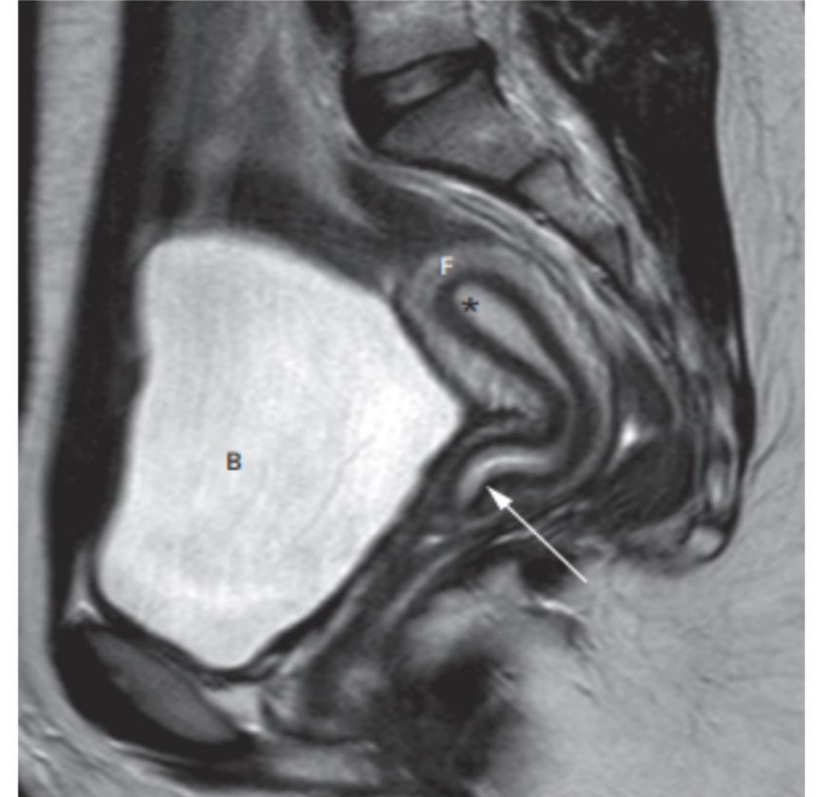
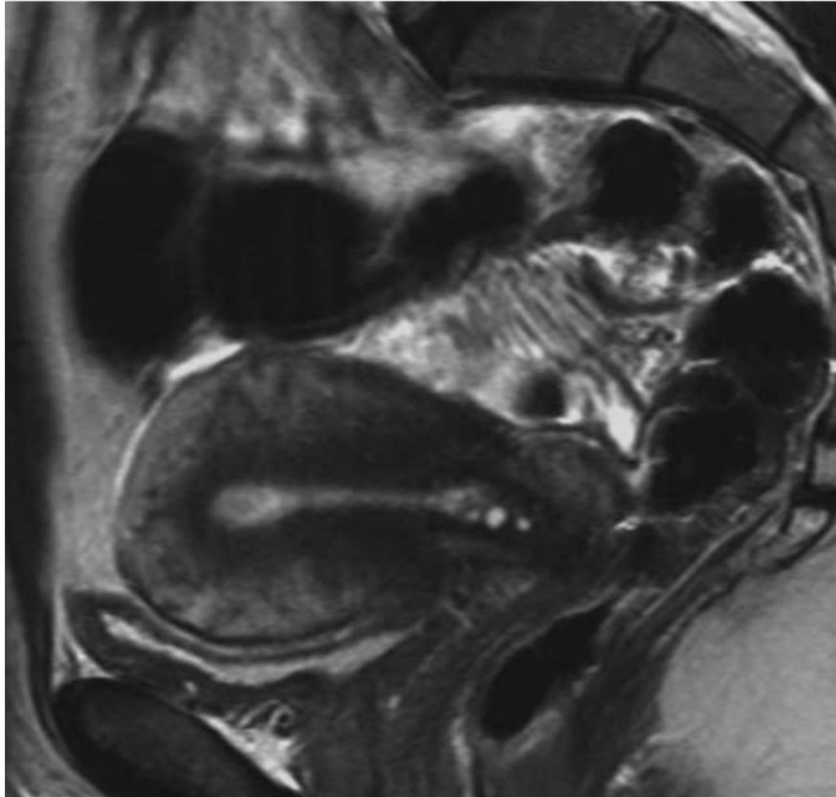
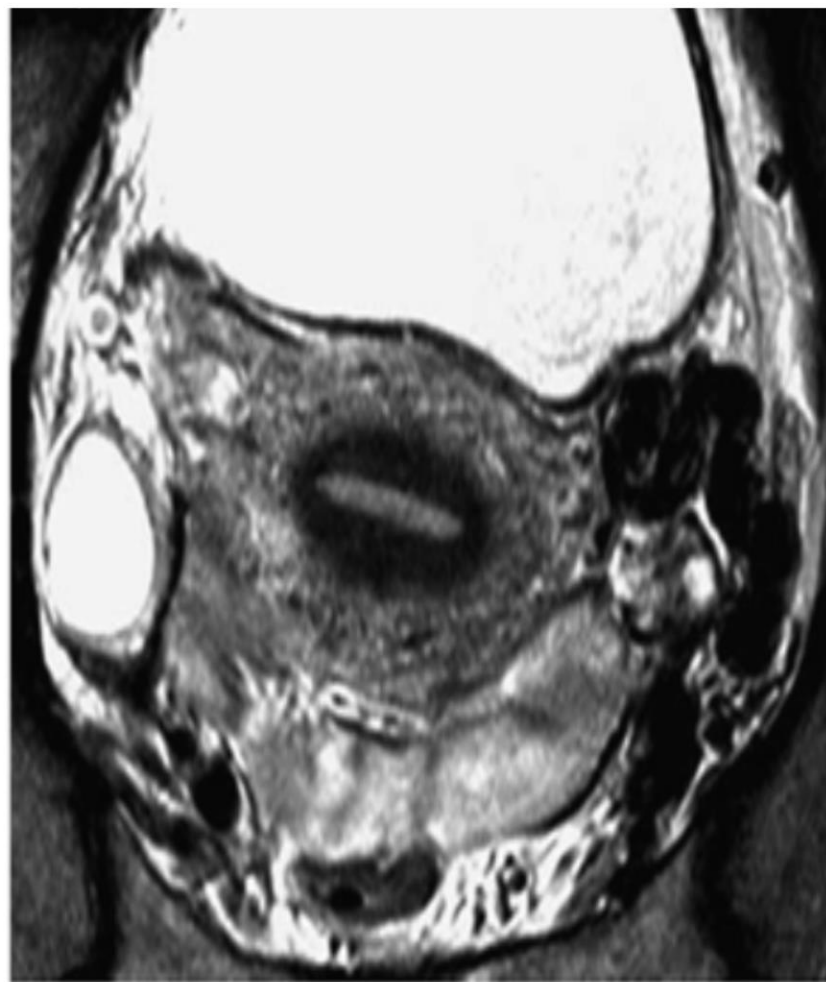


Fig.3.3. Anatomic draft of the uterine cervix: coronal view and corresponding MRI

MRI Appearance

- Due to excellent soft tissue contrast afforded by MRI the pelvic anatomy is very well demonstrated.
- Multi-planar sections: sagittal, transverse, & coronal images.
- Ovaries & Broad ligament can be identified.





a

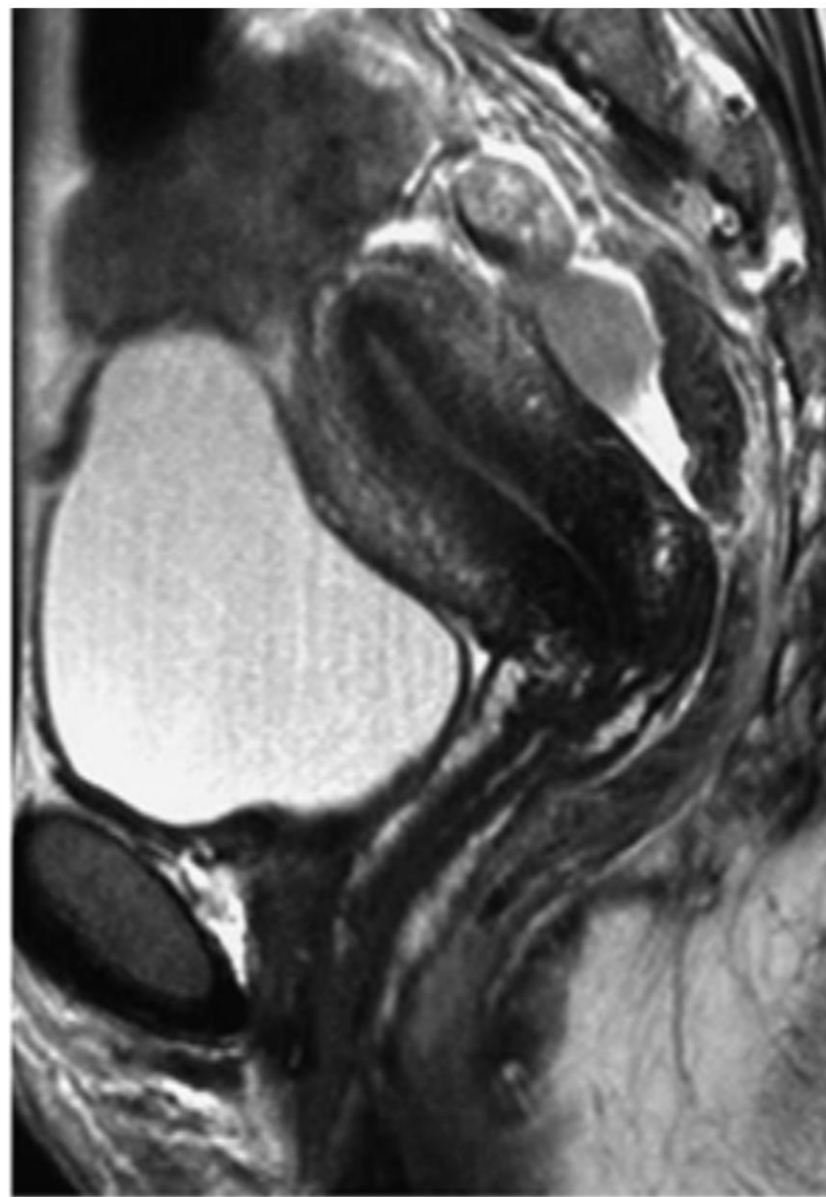
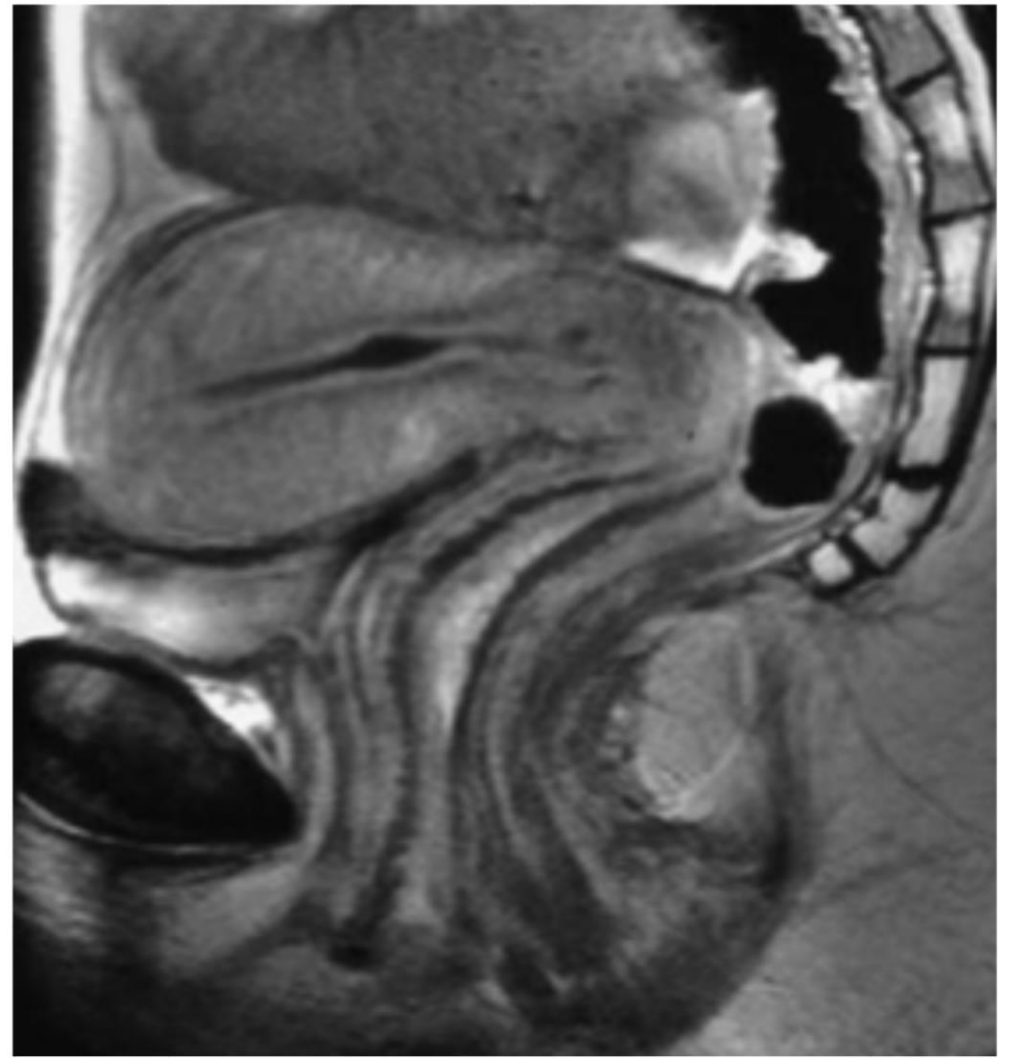
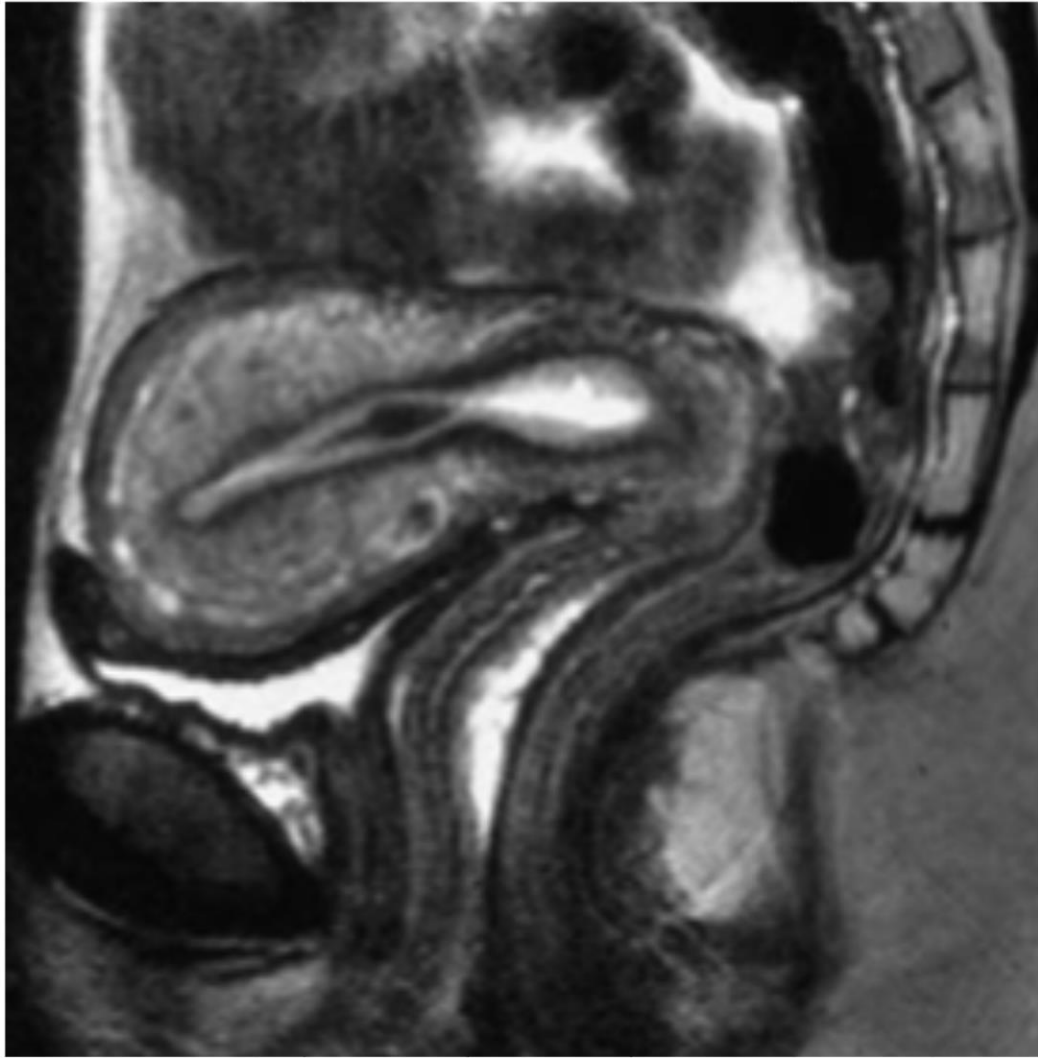
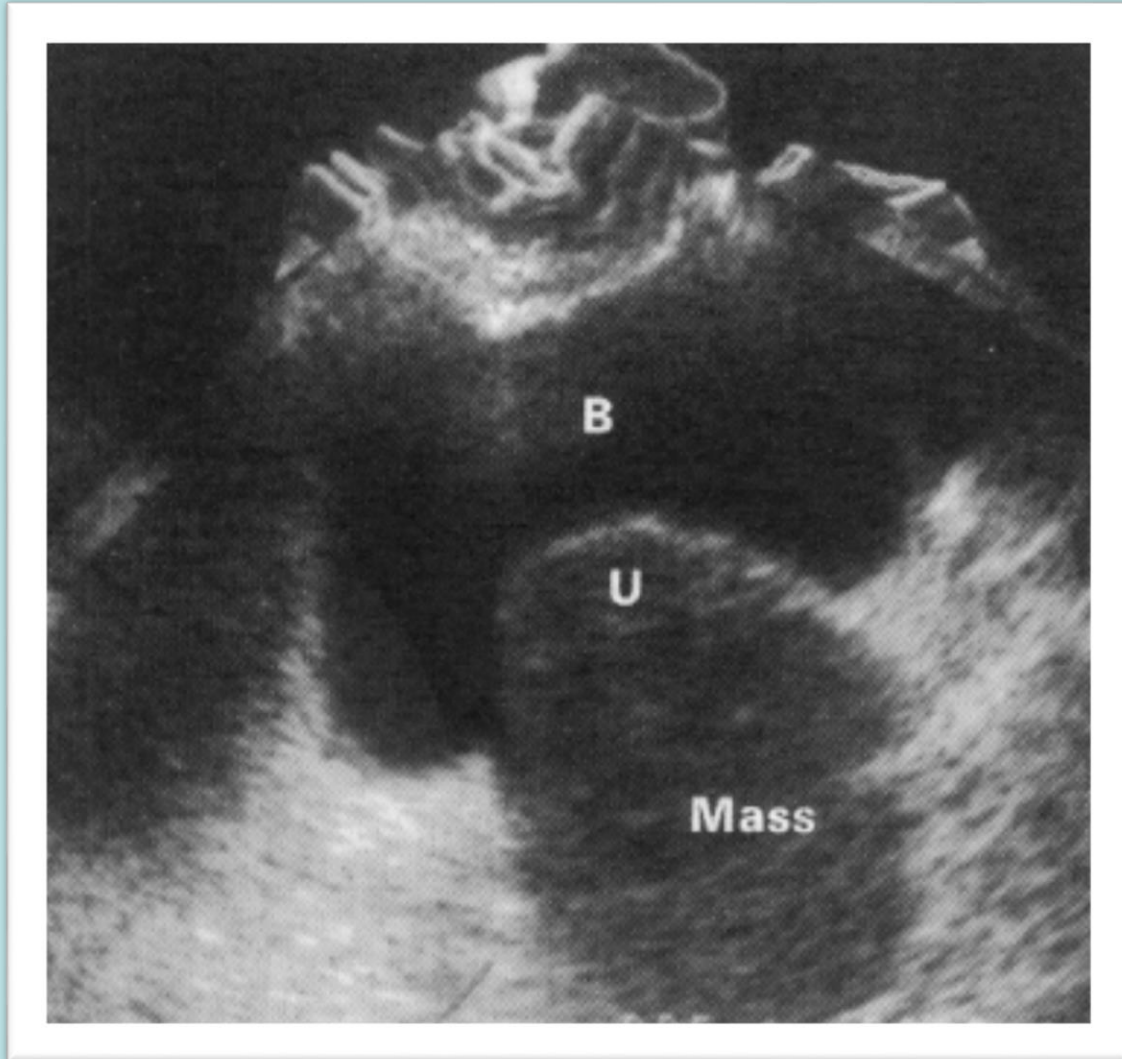


Fig. 3.8a,b. MRI of a healthy woman during early proliferative phase (T2-weighted TSE in axial and sagittal plane)



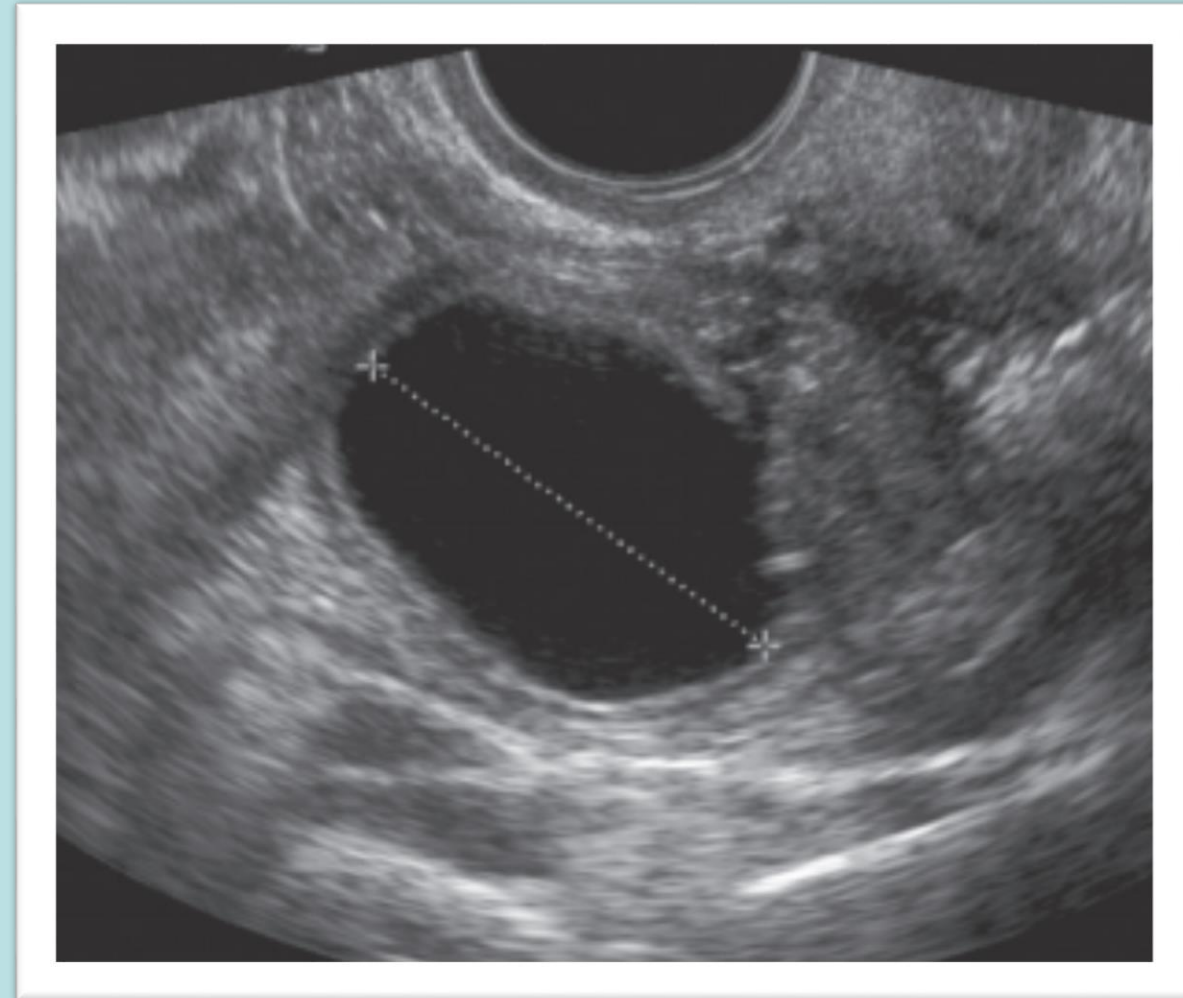
Pelvic masses:



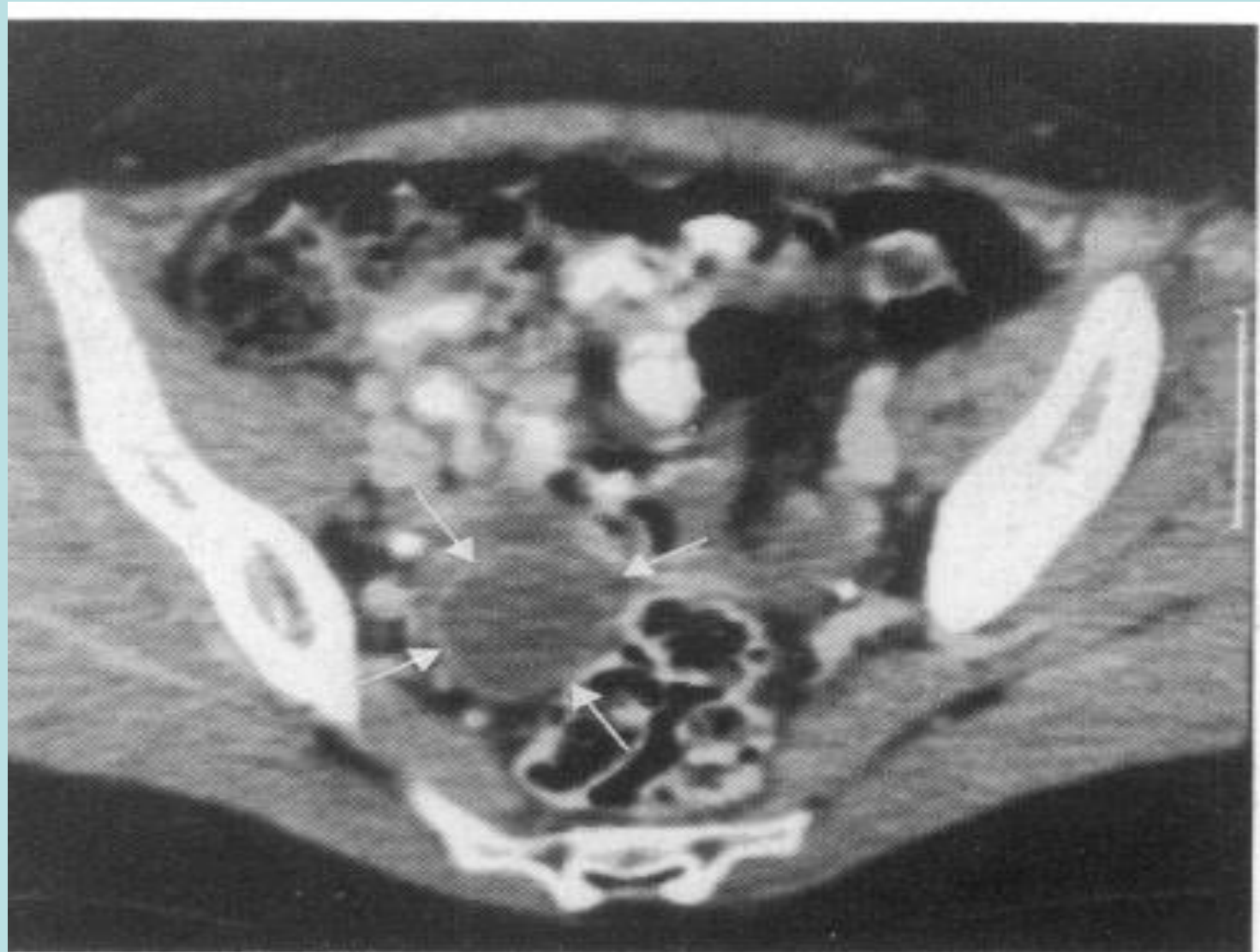
- **U.S.G.:** *Cyst ,or solid.*
- *Some time limitation of both **U.S.G, &C.T.** in determination from which organ the mass arises.*
- *The distinction b/w ovarian masses and uterine masses is possible by **MRI.***

Ovarian masses

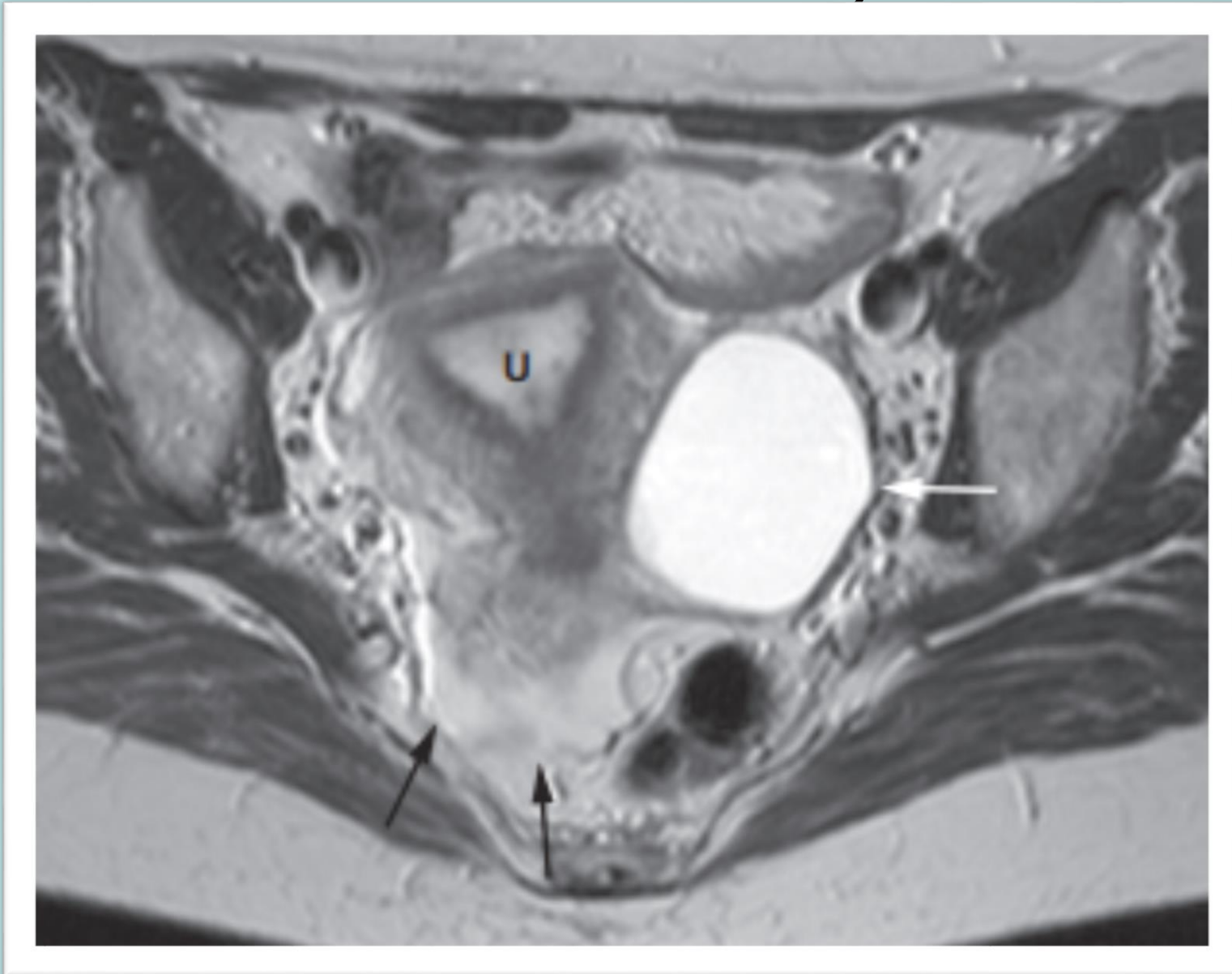
- Sometimes Follicle or corpus luteum persists as follicular cyst or corpus luteal cyst .
- Easy determination by U.S.G, C.T. & MRI.
- Follicular cyst are asymptomatic & regress spontaneously.
- Corpus luteal cyst often seen in 1st trimester ,usually resolve ,but may rupture or twist.
- If hemorrhage occur it gives a characteristic USG appearance.



Follicular cyst of Rt Ov. By CT

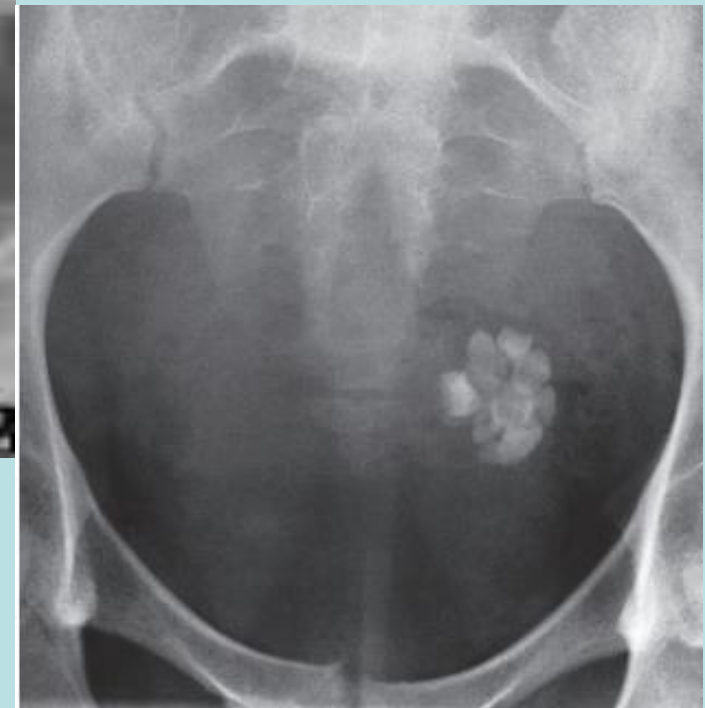
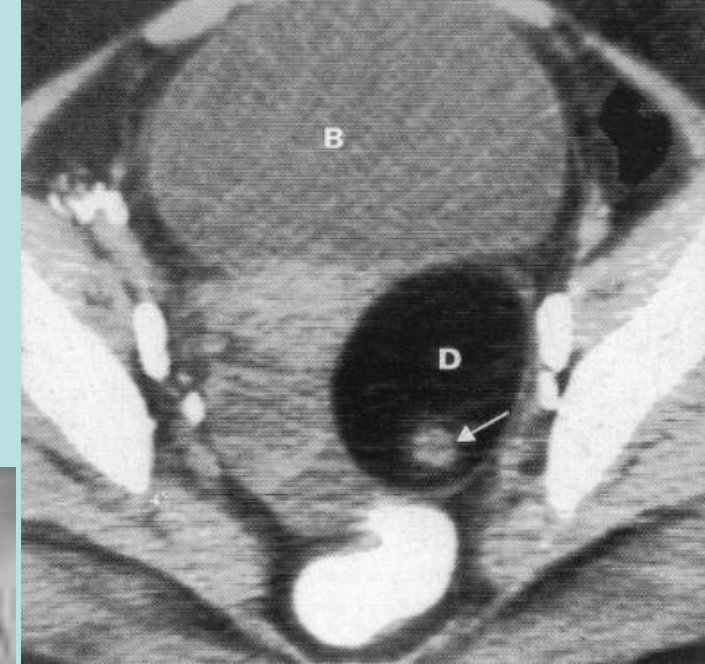


MRI follicular cyst



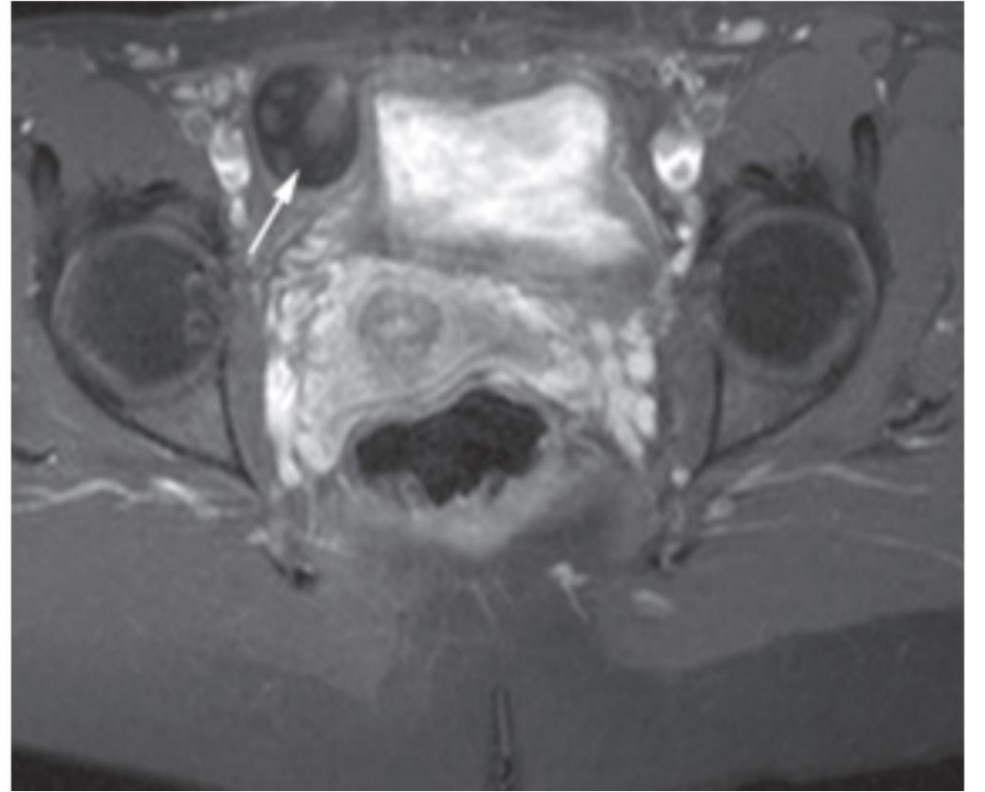
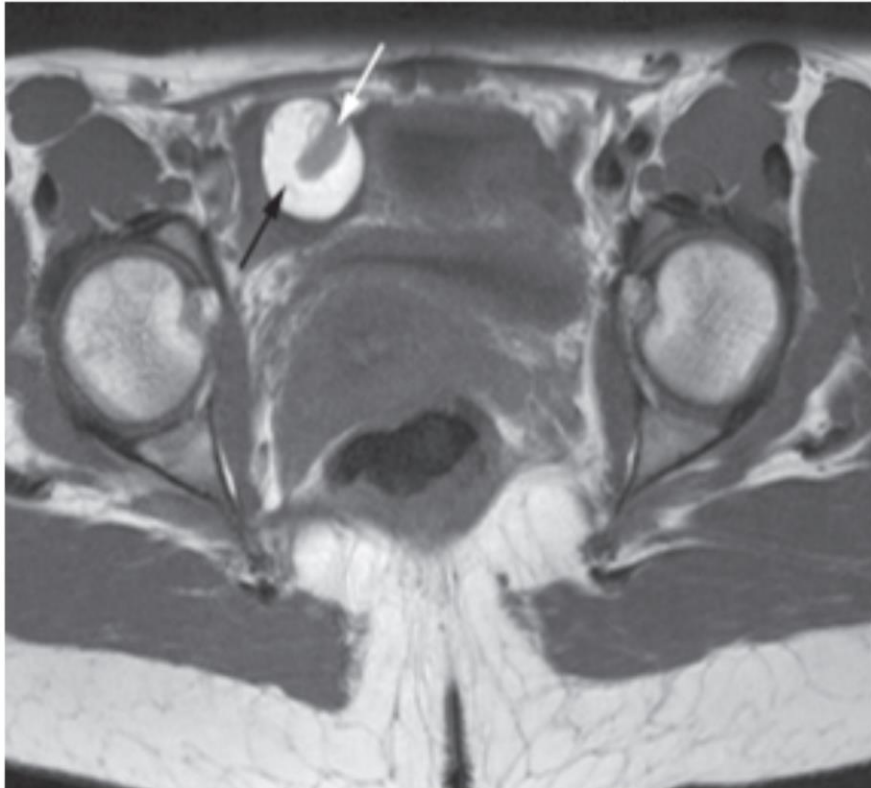
Ovarian tumours: *cont.*

- **Dermoid cyst:**
- diagnostic key points..
- Fat within it.
- Calcified component, Teeth are commonest.
- Can be diagnosed by USG, CT, MRI& even plain X-ray.



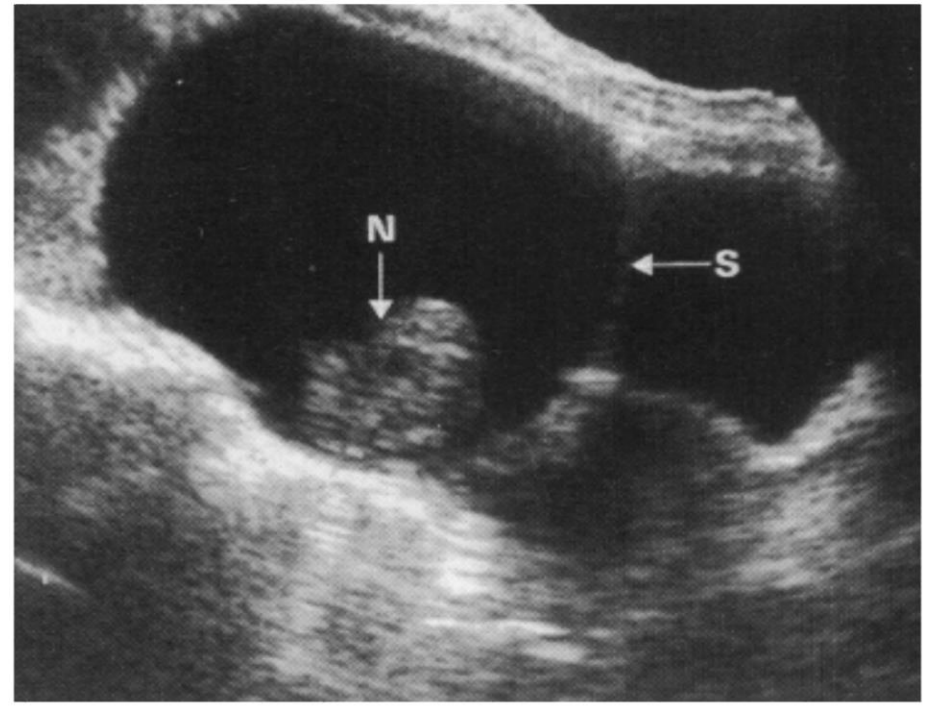
Benign Dermoid cyst.

(a) Axial T1-weighted MRI demonstrating a complex cyst that contains high signal intensity material, indicating the possible presence of lipid (black arrow). An internal solid component is also seen (white arrow). (b) Axial T1-weighted image with fat saturation demonstrating an almost complete drop of signal intensity within the cyst, consistent with the presence of lipid (arrow). This confirms the diagnosis of a Dermoid cyst. There was no enhancement of the internal solid component.



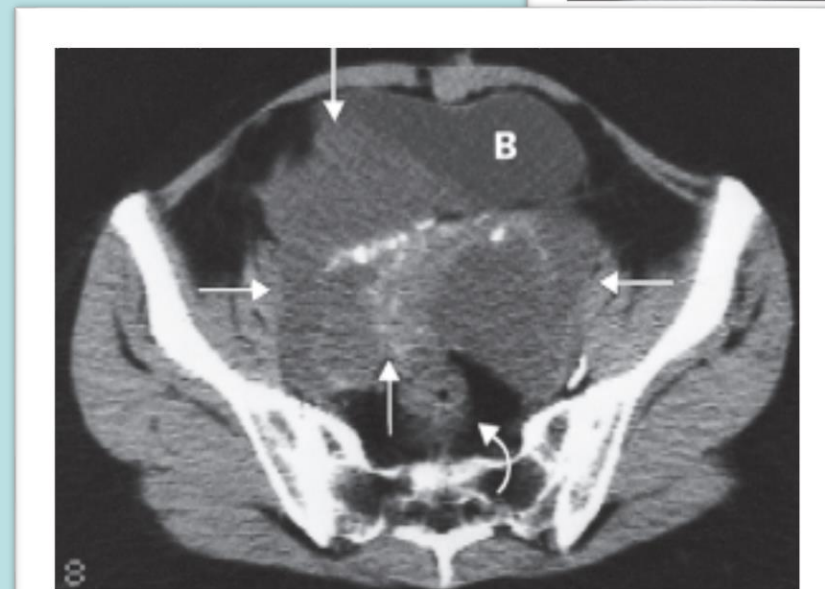
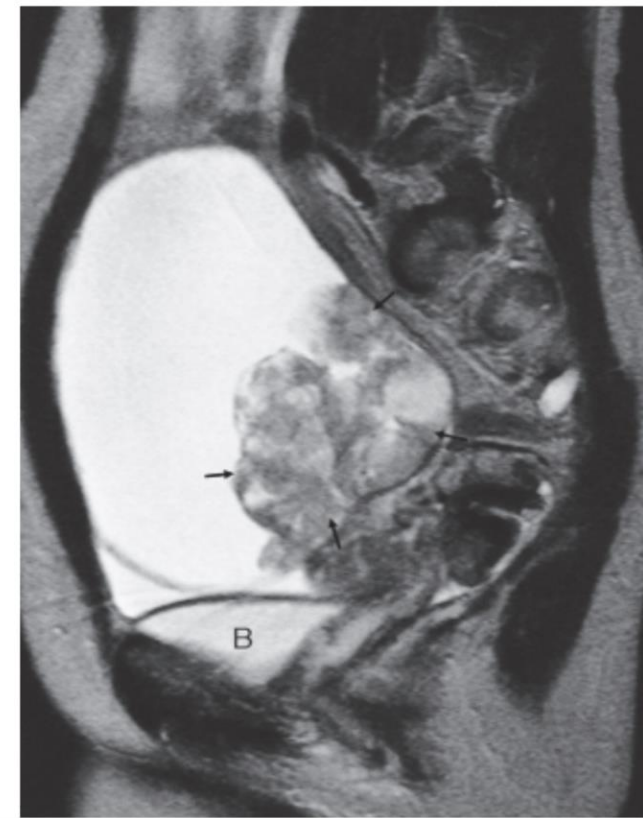
OVARIAN TUMOURS

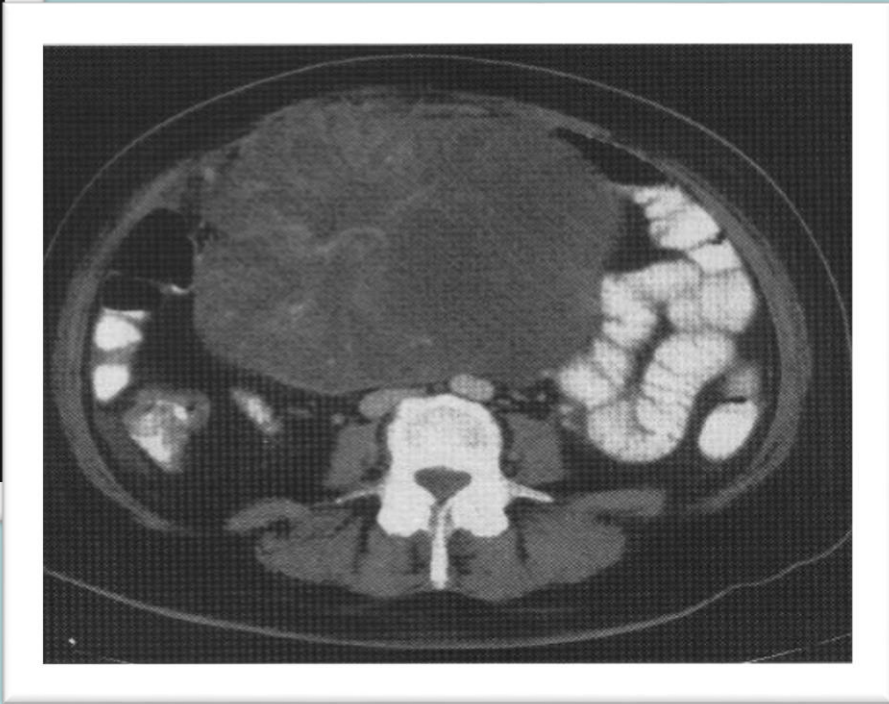
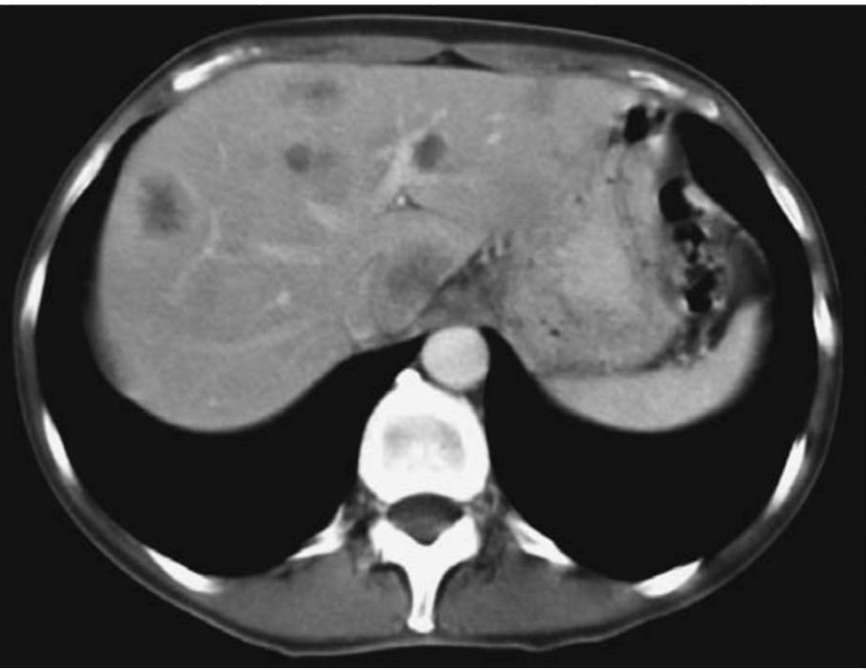
- **Cystadenoma, &cystadenocarcinoma** are the commonest.
- Can be cystic, solid, or mixture .
- Cystic tumors may be multi-locular.
- Invasion to the adjacent structures or metastasis indicates malignancy.
- MRI,U.S.& C.T. show size, consistency& location of Ovarian mass but not whether its malignant or benign unless there is local invasion or distinct spread.



Ovarian tumour

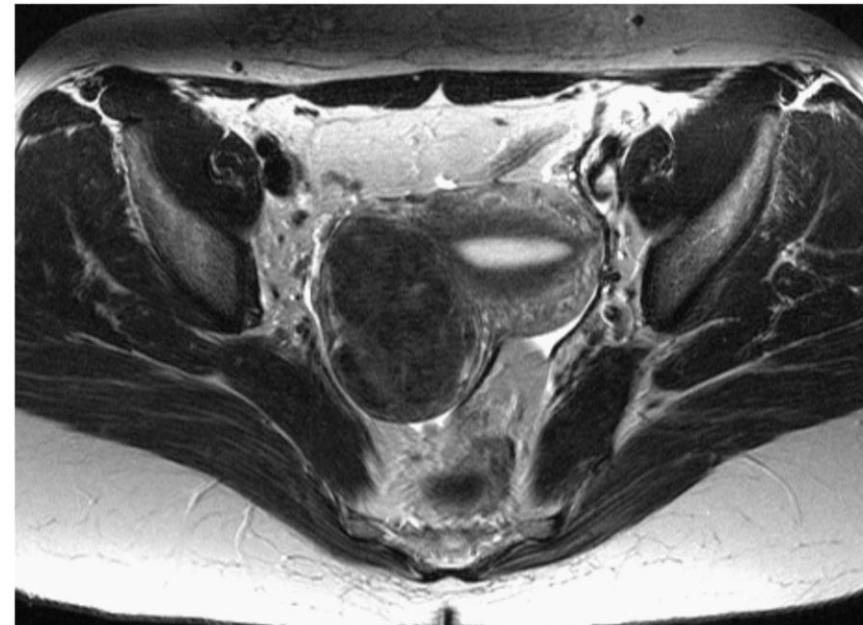
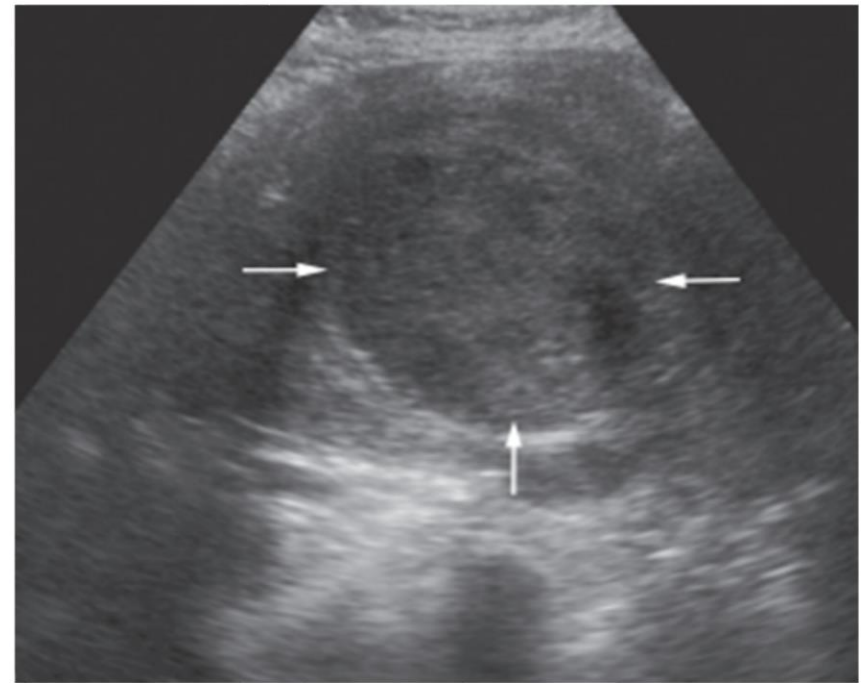
- *Suggestion of malignancy:*
- Thick wall, nodular septation with vascularity by Doppler flow.
- coexisting solid nodule within or near the cyst.
- Ascites (indicates dissemination).
- Omental or peritoneal metastasis, better by FDG-PET/CT.
- Hydronephrosis due to ureteric invasion.
- Enlarged L.N.
- Liver metastasis.
- Pleural effusion

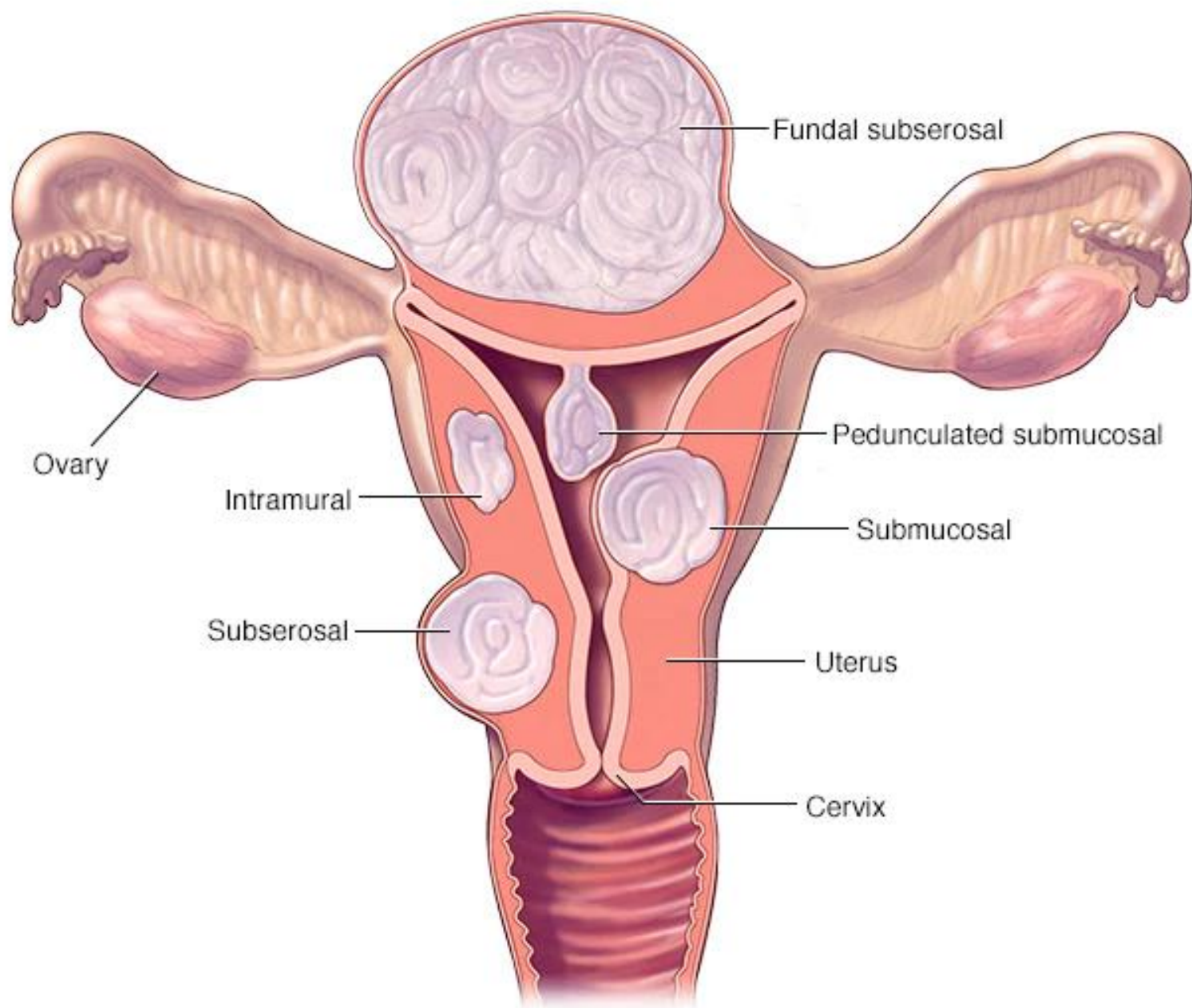


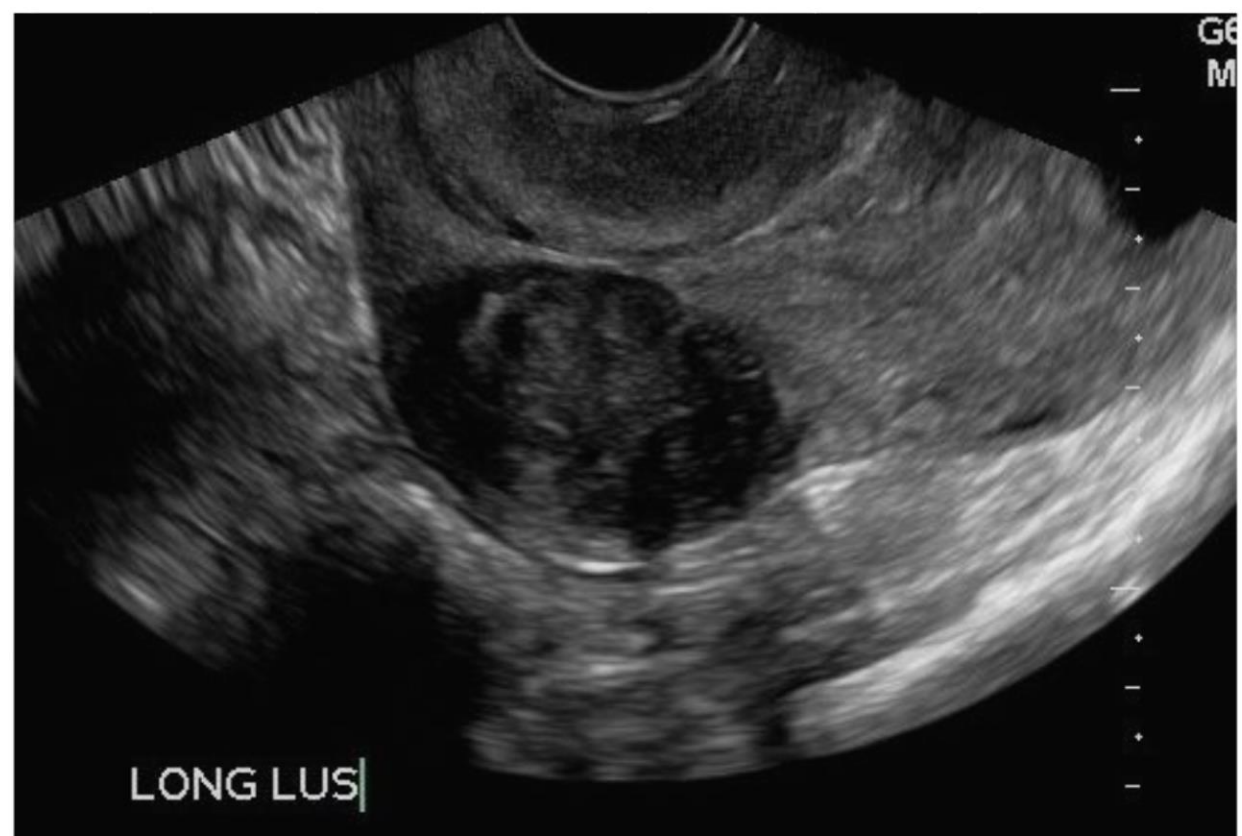
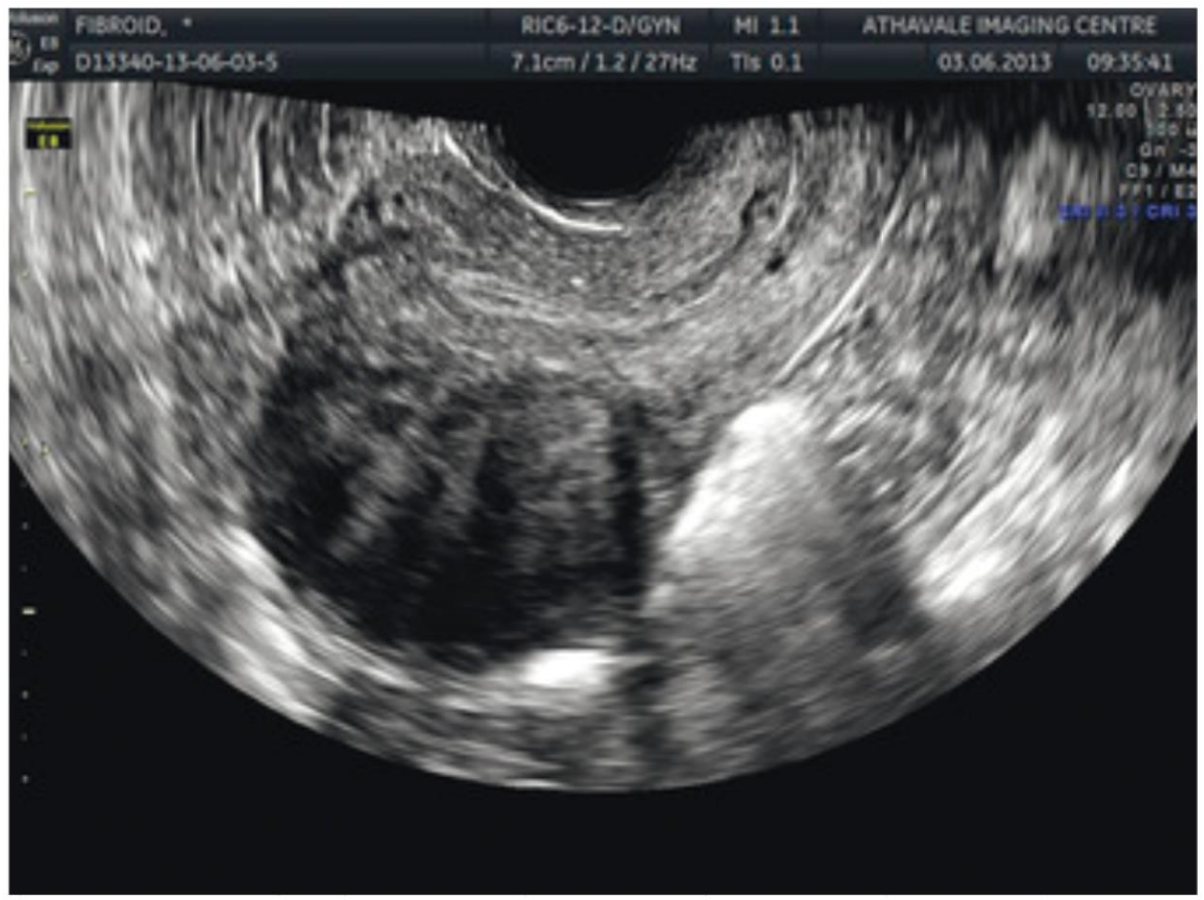


Uterine tumour:

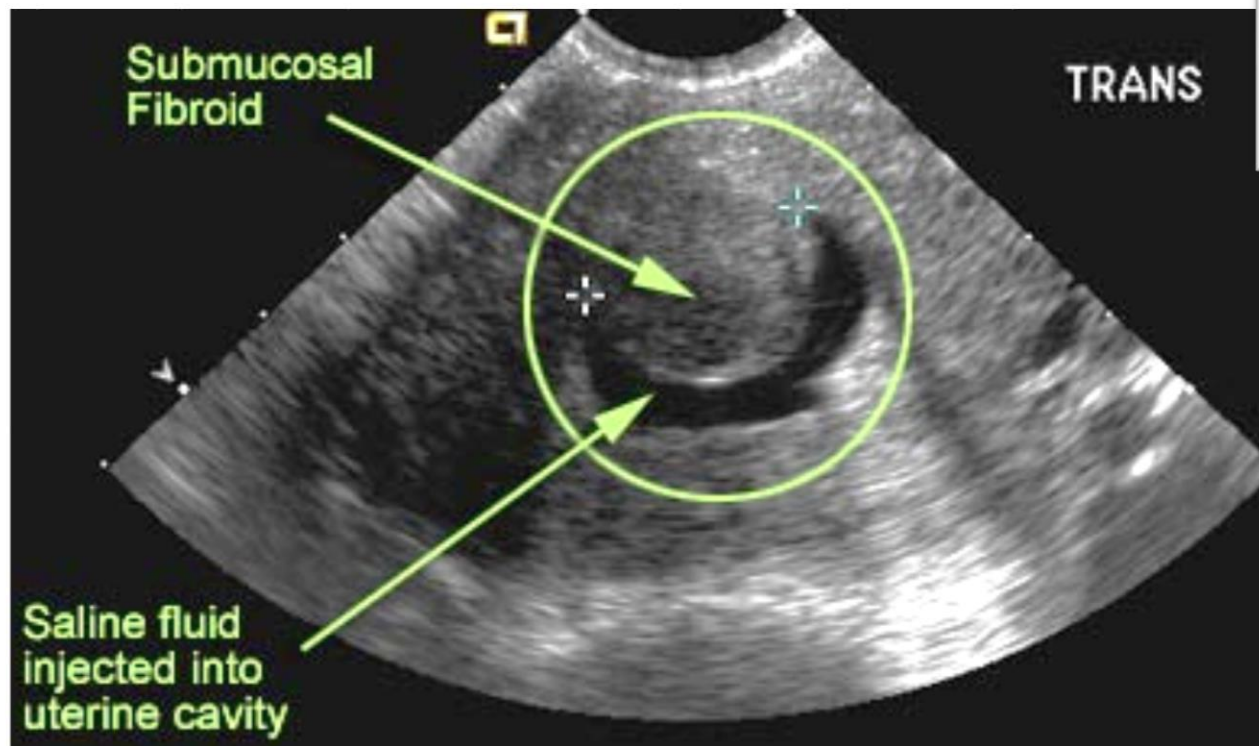
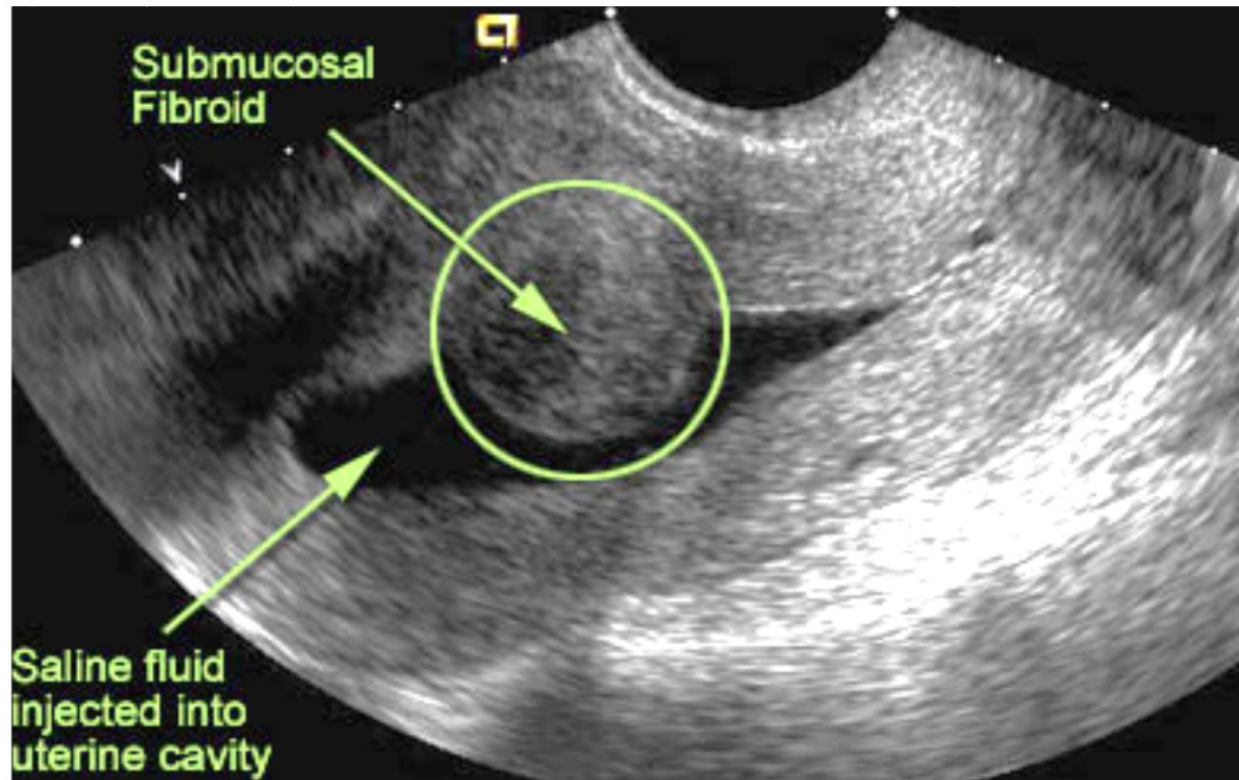
- **Fibroid(Lieomyoma):**
Commonest ut. tumor.
- Lobular or spherical S.T. mass, sometimes calcification seen.
- By **USG** appear either hypo echoic or echogenic.
- By **CT** show same density of myometrium.
- **MRI** readily identify fibroid b/s of different signal characteristic from the normal uterus.
- Also distinguish b/w degenerating & non degenerating fibroid.



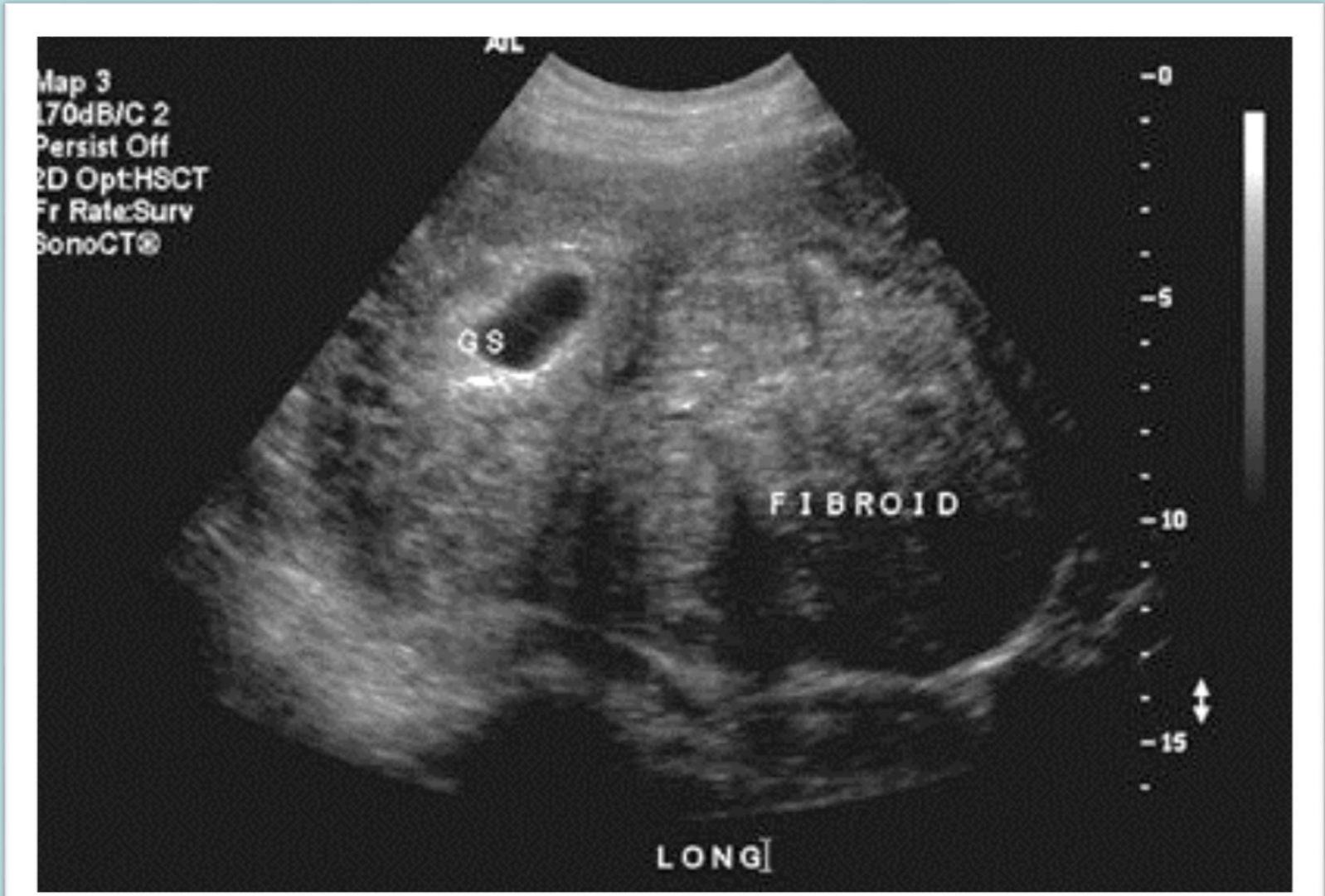


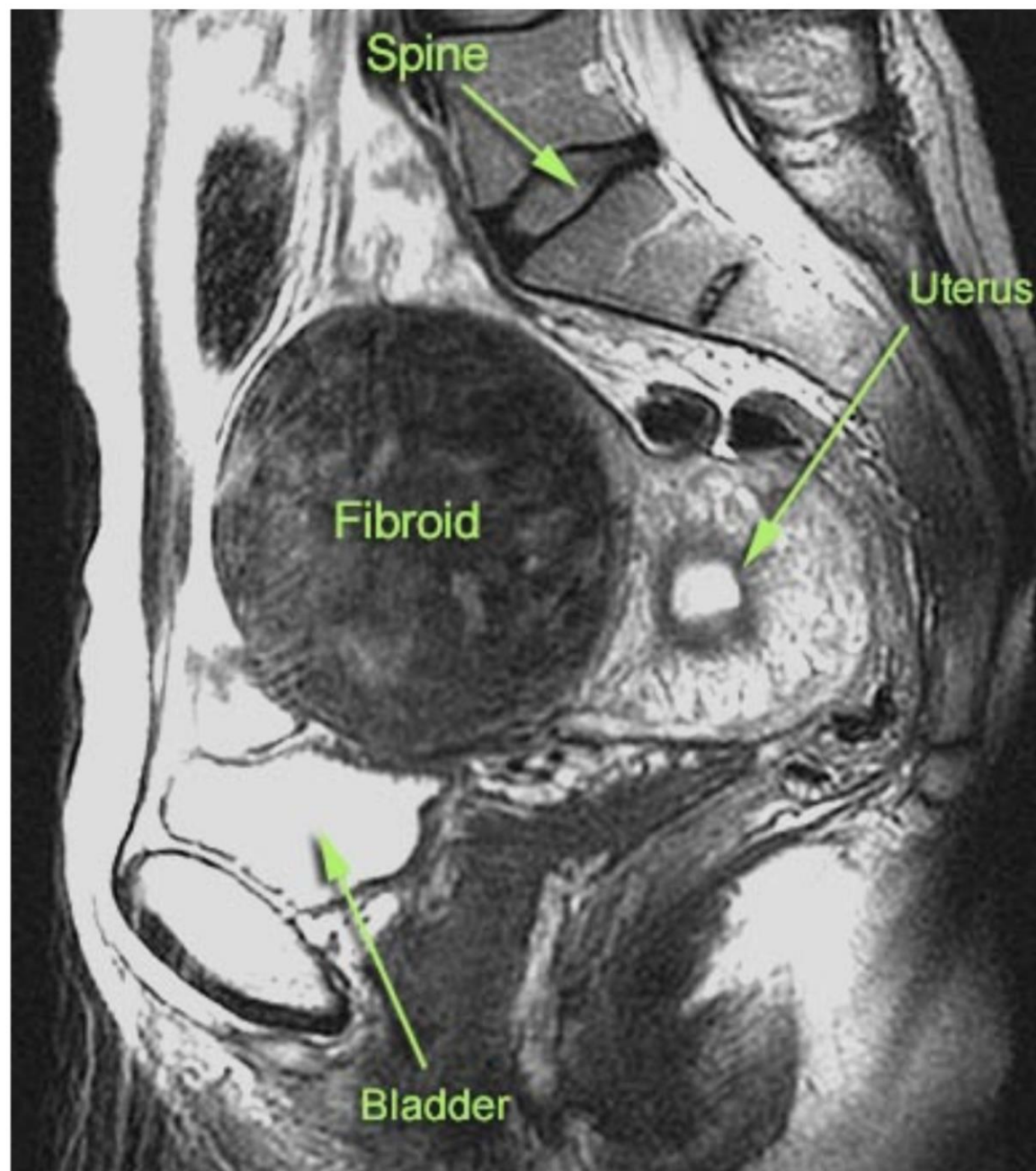


Sonohystogram



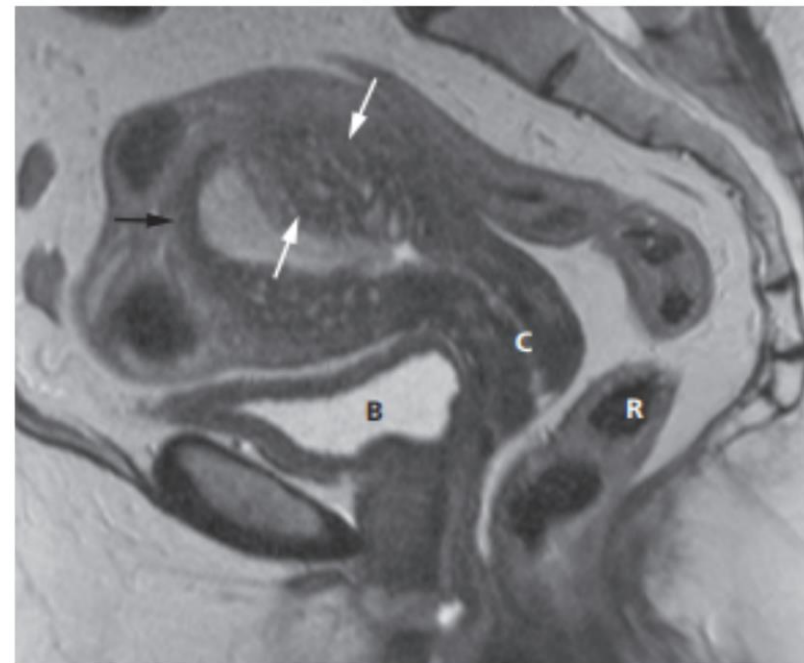
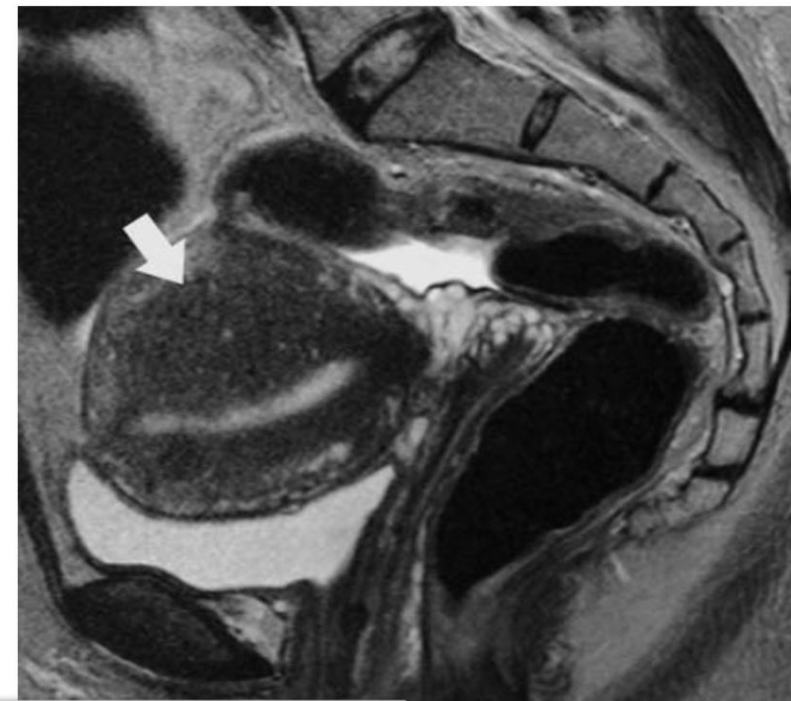
Transvaginal USS for fibroid with GS





Adenomyosis..

- Benign condition.. endometrial tissue within the myometrium
- Hypertrophy of smooth muscle enlarged uterus.
- Dysmenorrhea, and abnormal bleeding.
- USG ..heterogeneous myometrium.
- MRI; focal, or diffuse junctional zone thickening...
- Some cases, bright endometrial projections into the myometrium



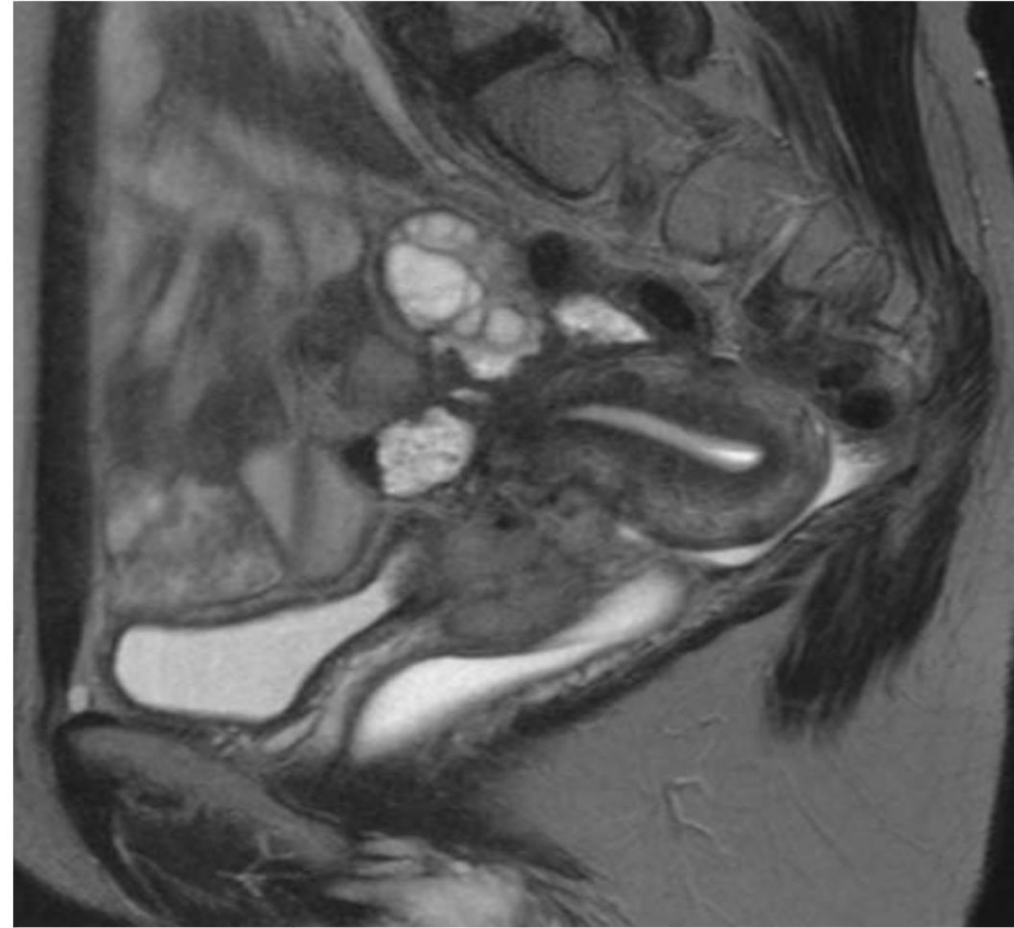
Uterine Tumour

Carcinoma of Cervix and body of uterus

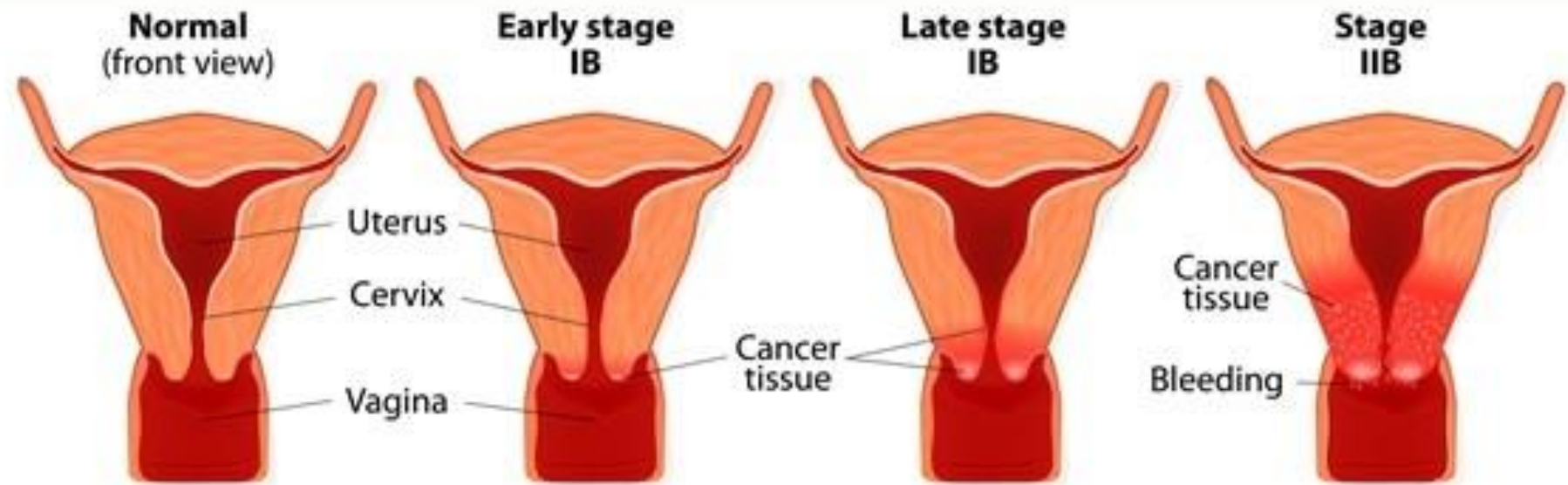
Neither MRI, CT, nor USG play much role in initial diagnosis of these condition .

Mainly diagnosis made by physical examination, **biopsy** ,or cytology.

MRI & CT used to help in assessment of the extension of disease to help decide weather treatment with surgery, or radiotherapy.

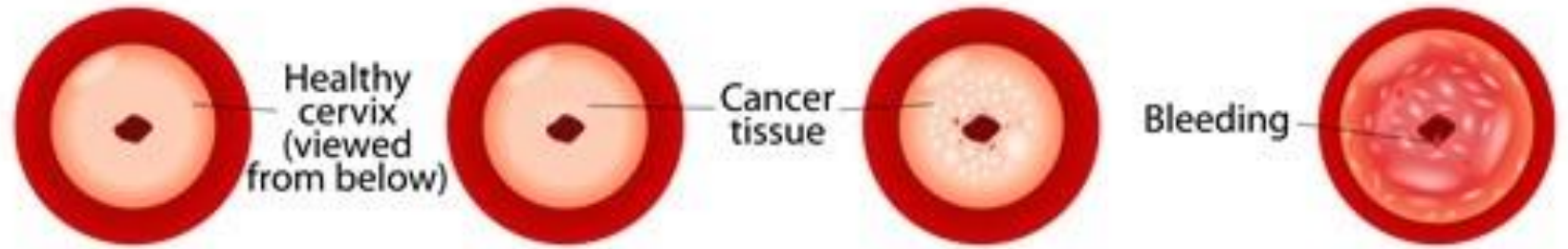


CERVICAL CANCER



Carcinoma only in cervix

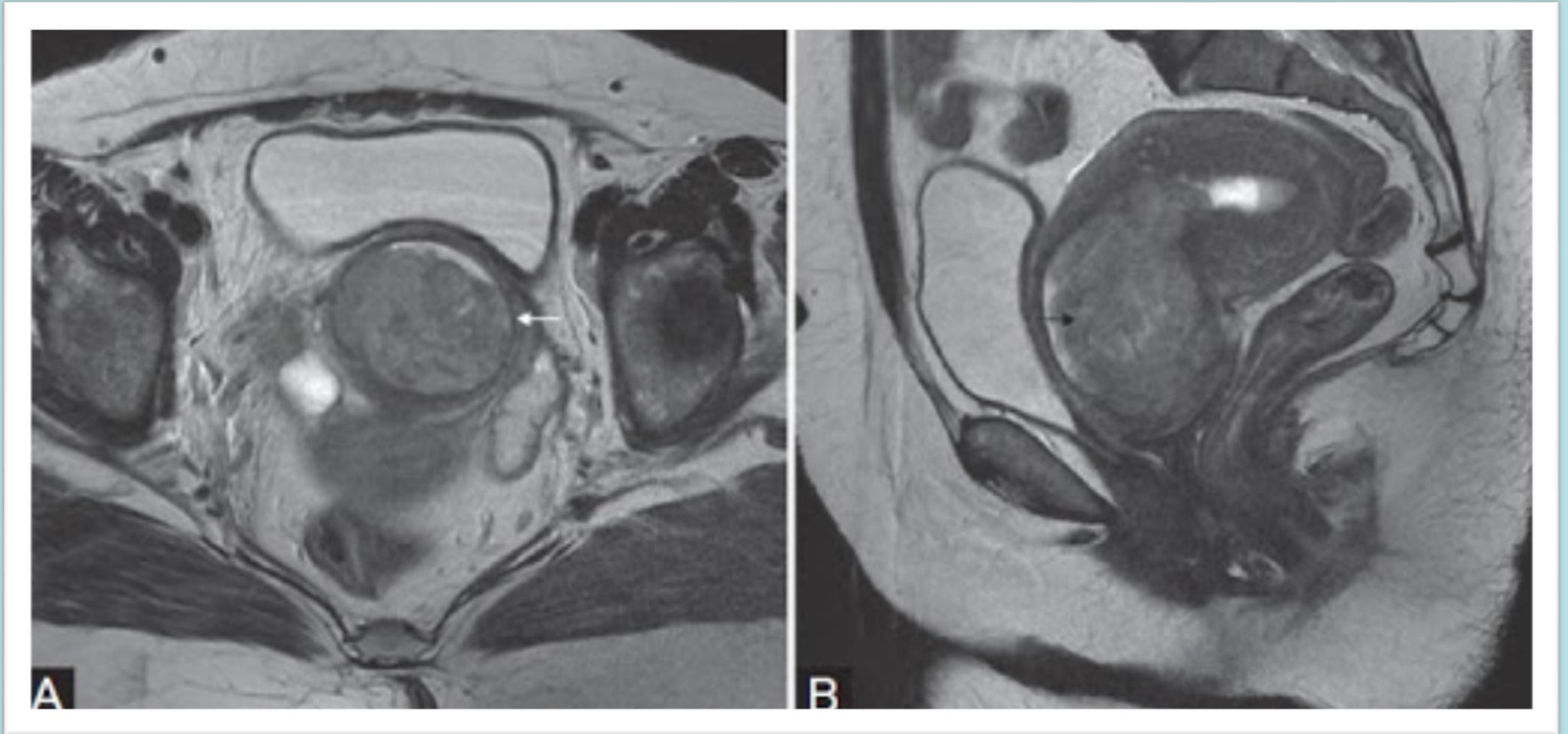
The cancer spreads outside cervix



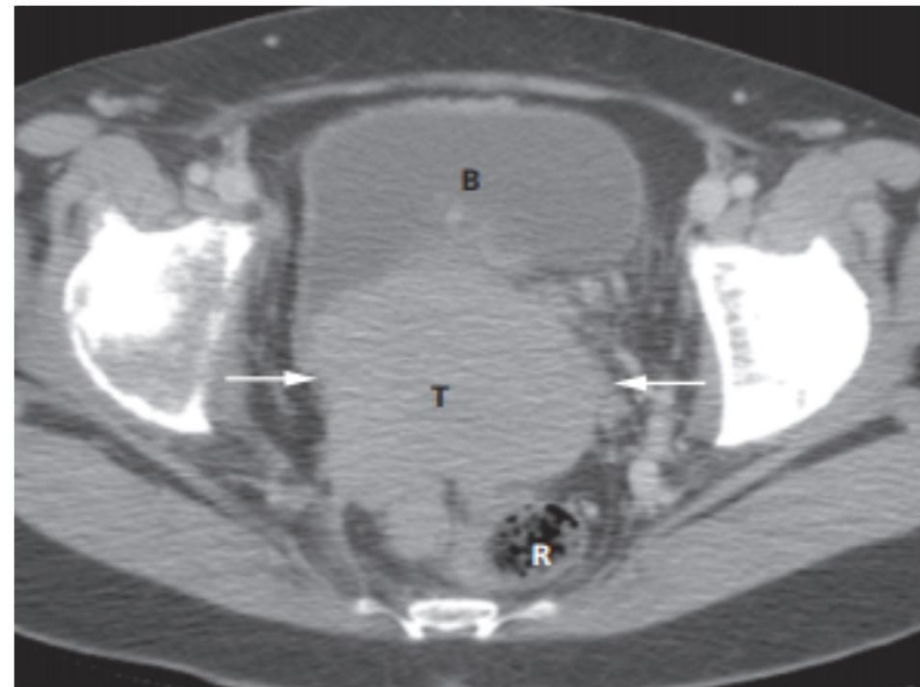
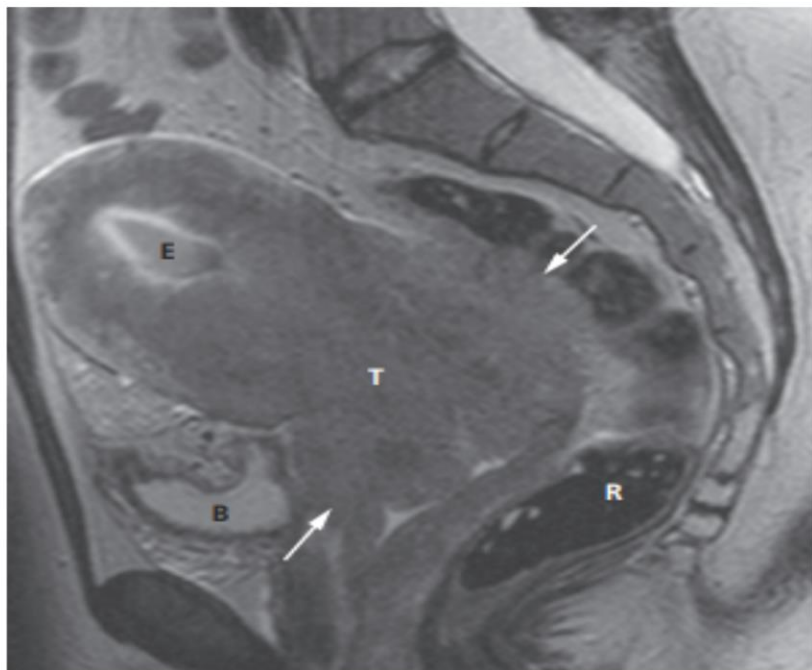
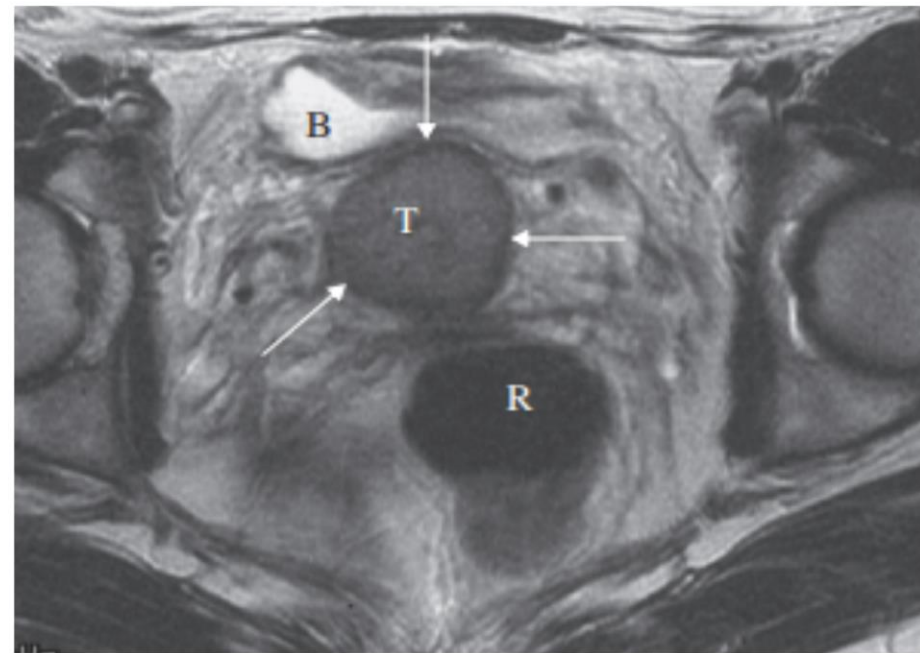
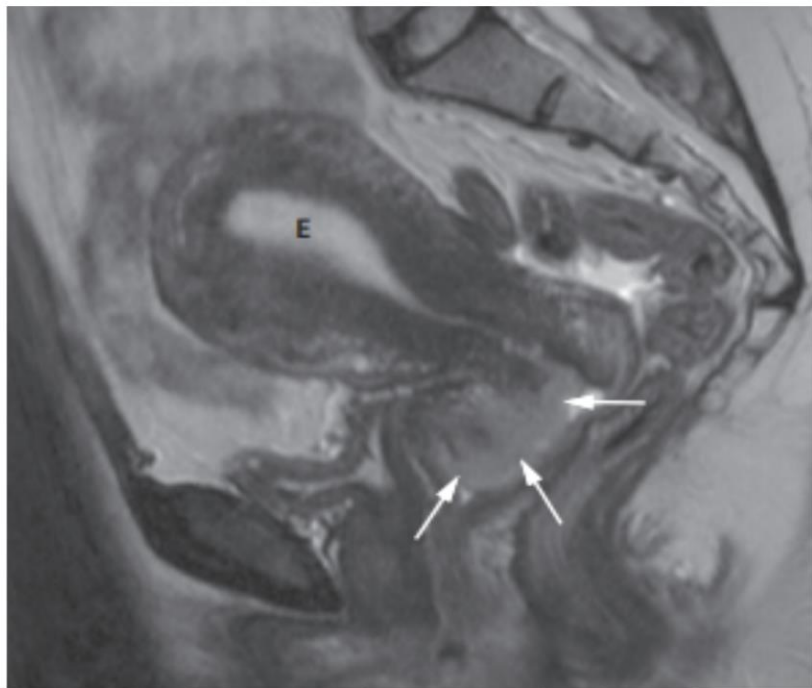
Cervical cancer



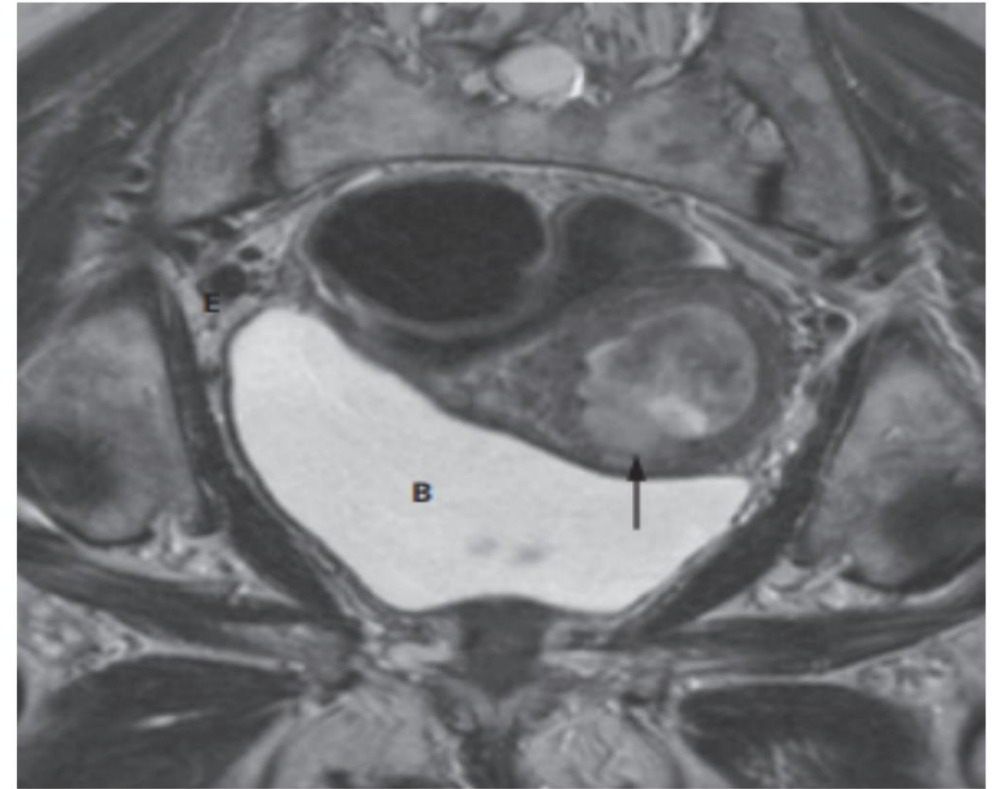
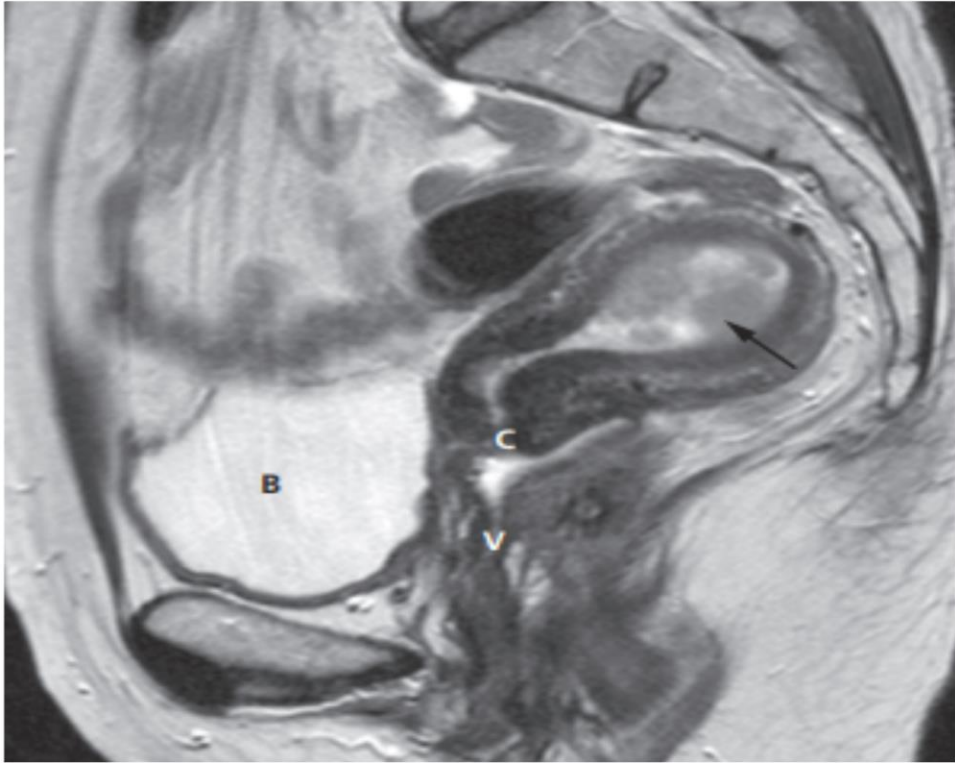
Cervical cancer



Carcinoma of Cervix



Endometrial cancer

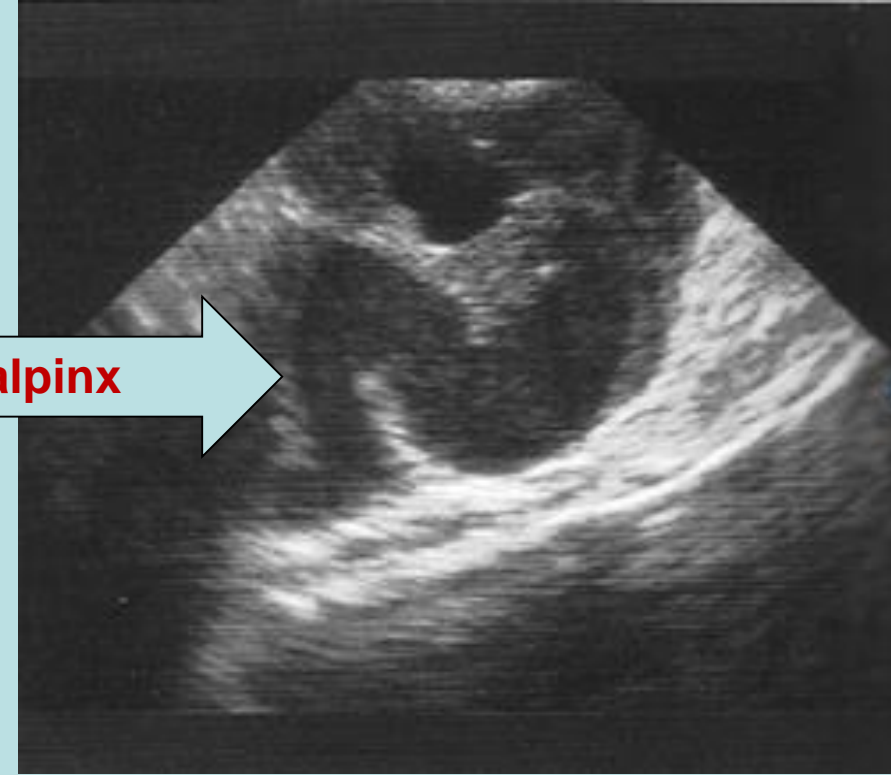


- Endometrial cancer. (a) Sagittal T2-weighted MRI demonstrating a polypoid tumor mass distending the endometrial cavity (arrow). (b) Oblique axial MRI in a different patient. The endometrial tumor mass is invading into the deep myometrium (arrow). B, bladder; C, cervix; V, vagina.

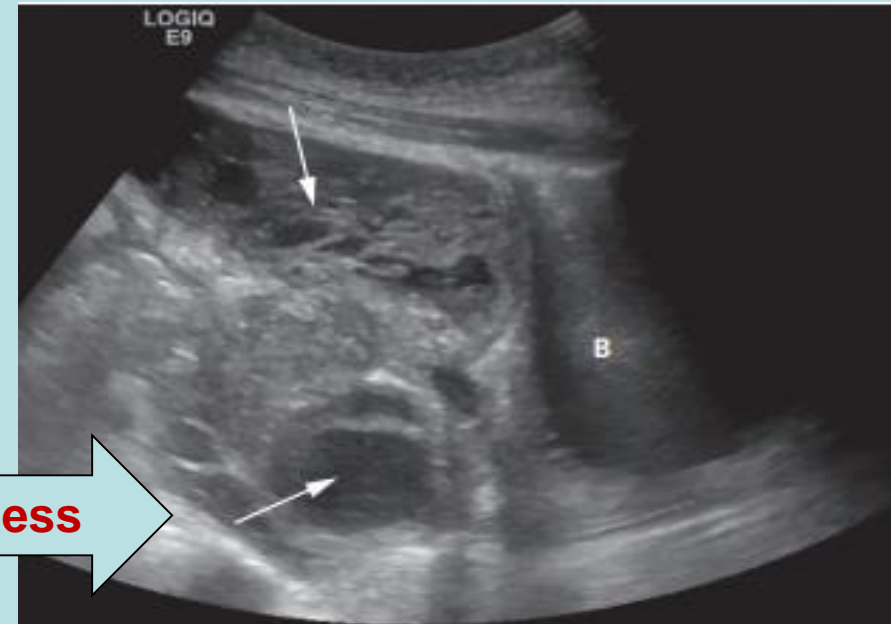
Pelvic Inflammatory Disease

- Venereal infection mostly Gonorrhoea.
- If acute may give rise to Tubo-Ovarian Abscess.
- Post surgical.
- Post partum.
- Abortion
- Associated with:
- IUCD.
- Appendicitis
- Diverticular disease.

Hydrosalpinx



Pelvic abscess

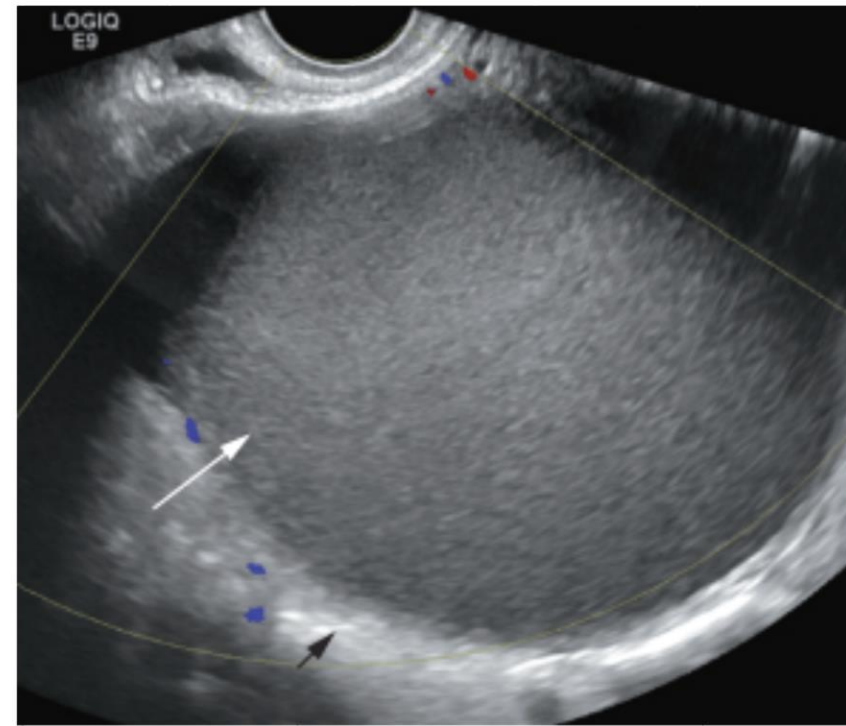


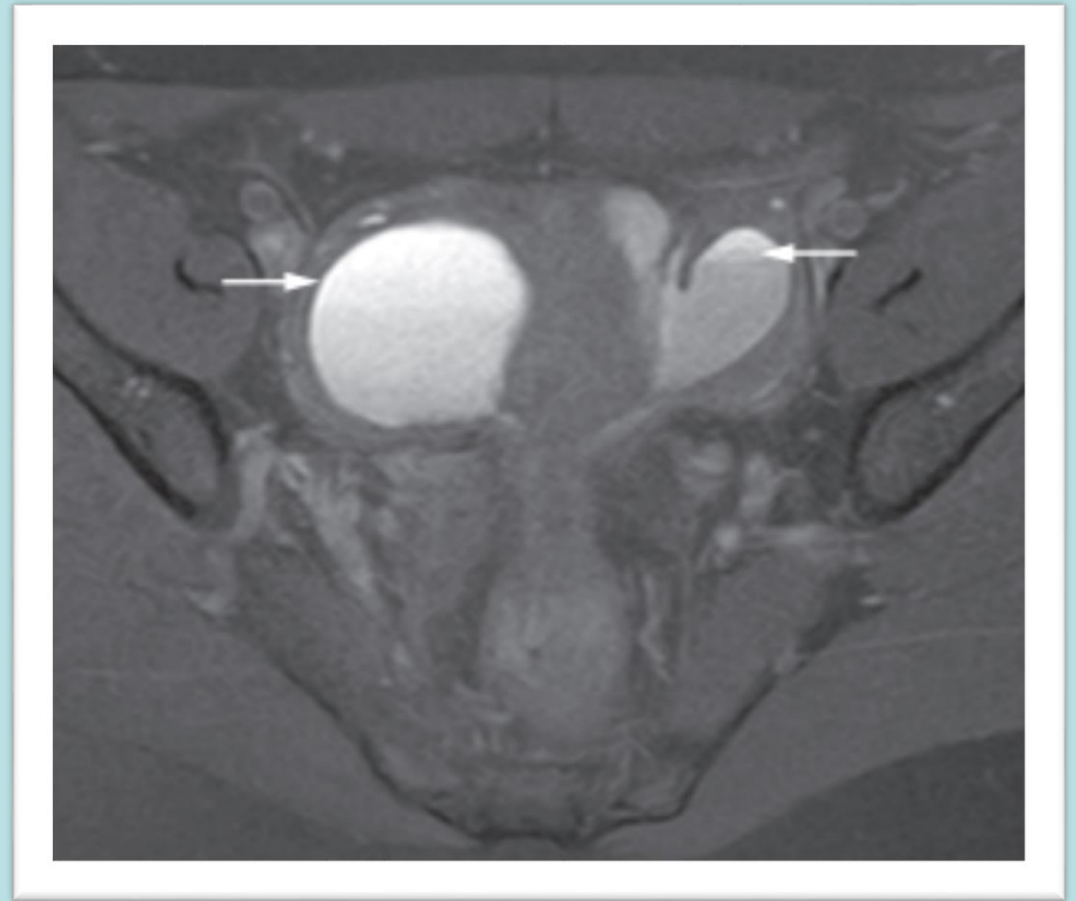
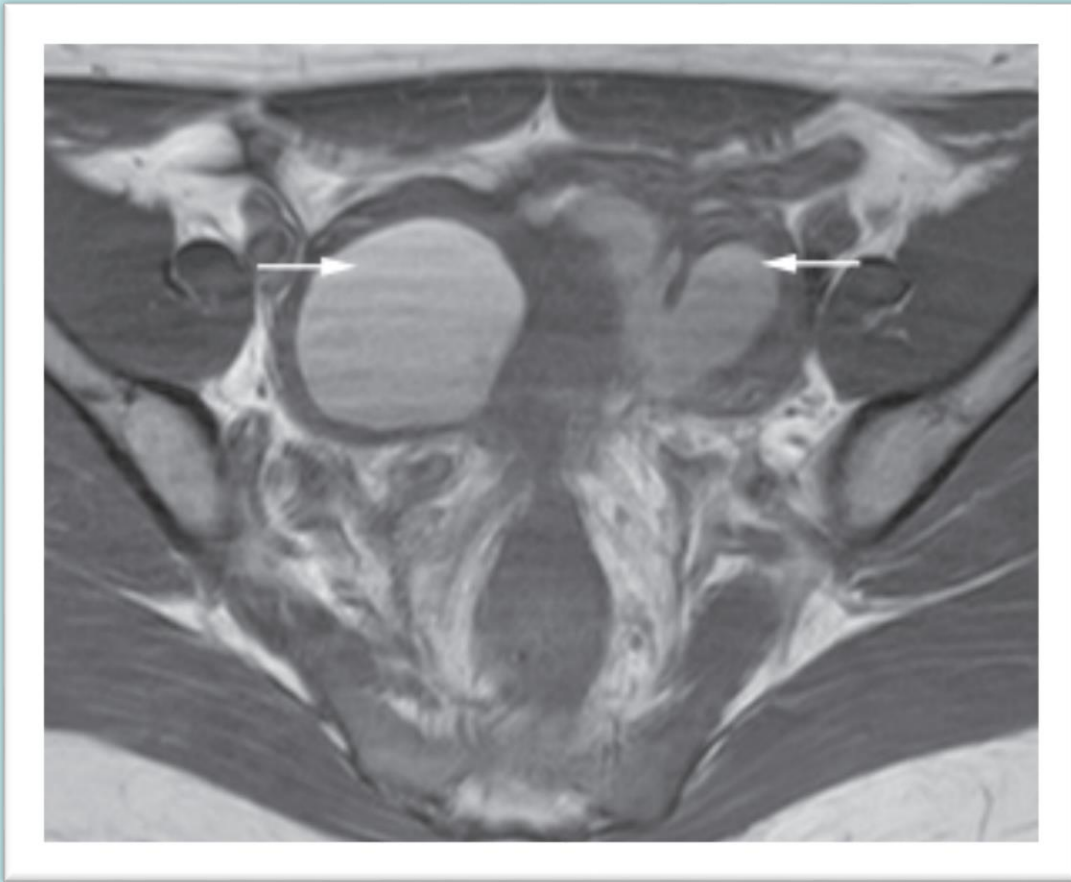
P.I.D

- The usual mode of imaging is USG .
- Show hypoechoic or complex mass in adnexal region or Douglas Pouch(Cul-De-Sac).
- Hydrosalpinx ,due to blockage of Falloian Tubes which appear as hypo echoic adnexal mass often tubular in shape.
- D/D:
- Endometriosis.
- Ectopic pregnancy, conditions which all occur in childbearing women

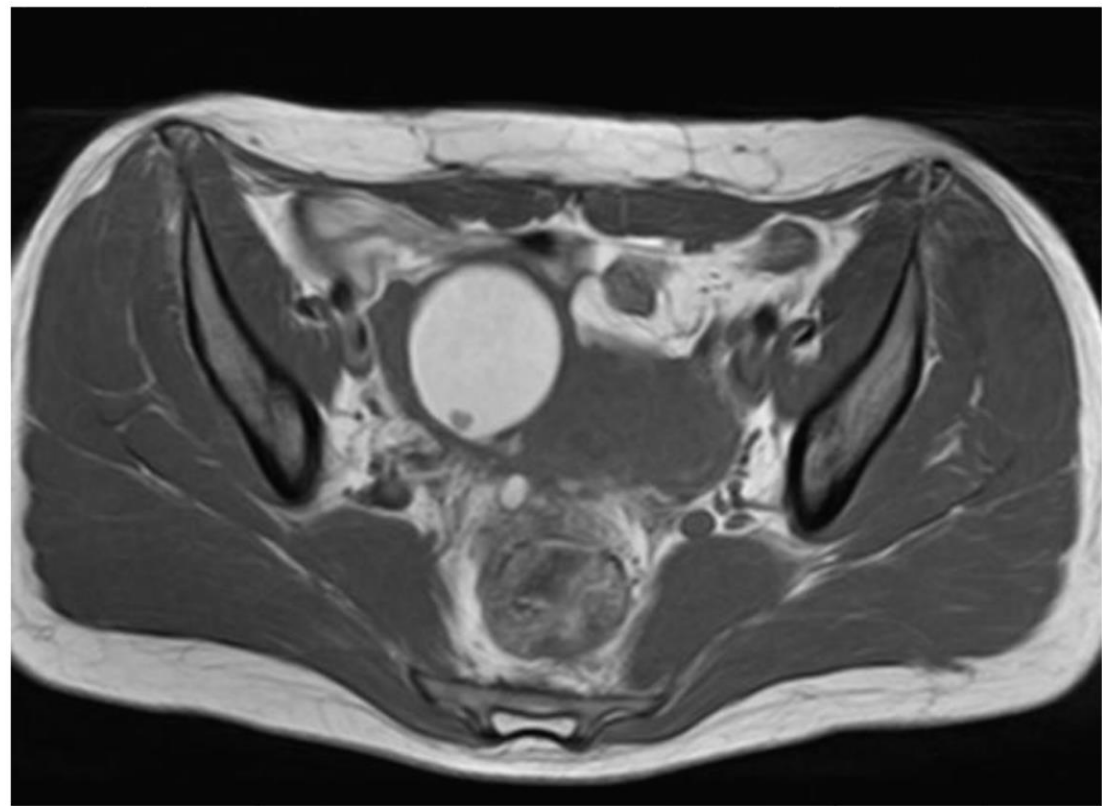
Endometriosis

- Endometrial tissue found outside the uterus, commonly confined to pelvis.
- By USG seen as cystic or hypoechoic mass in adnexal region /or pouch of Douglas.
- Fluid in peritoneal cavity if endometriomas in peritoneal cavity.
- B/S of recurrent hemorrhage in these endometriomas they give characteristic MRI appearance.





- Bilateral endometriotic cysts. (a) Axial T1-weighted MRI showing hemorrhagic cysts in the pelvis (arrows), which have a relatively high signal on this sequence. (b) The cysts retain the high signal intensity on this fat-saturated T1 sequence, confirming the presence of blood. There is some variation in the signal intensity, a characteristic of endometriotic cysts



Detection of IUCD:

- Common Gynecological Problem is lost IUCD
- **USG is 1ST mode of investigation.**
- Seen as highly reflective linear structure.
- If not found in pelvis by USG, then plain X-ray film of the Abdomen can detect the migrating Device.

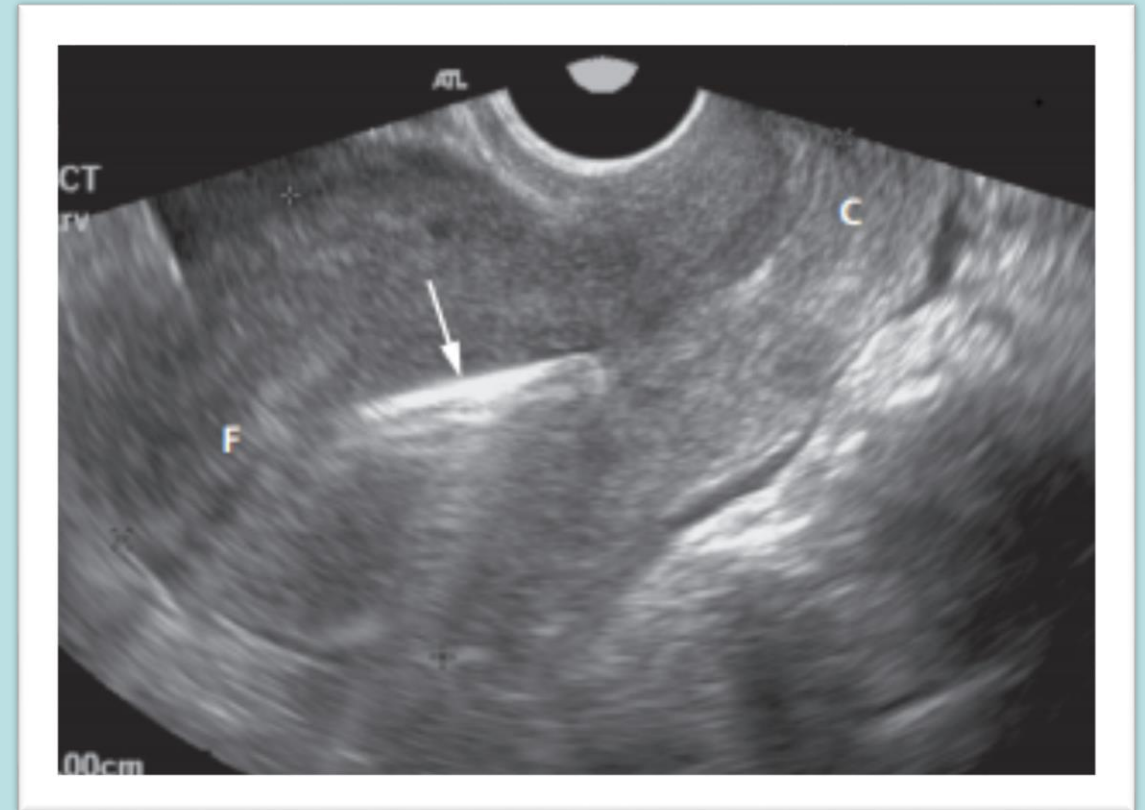
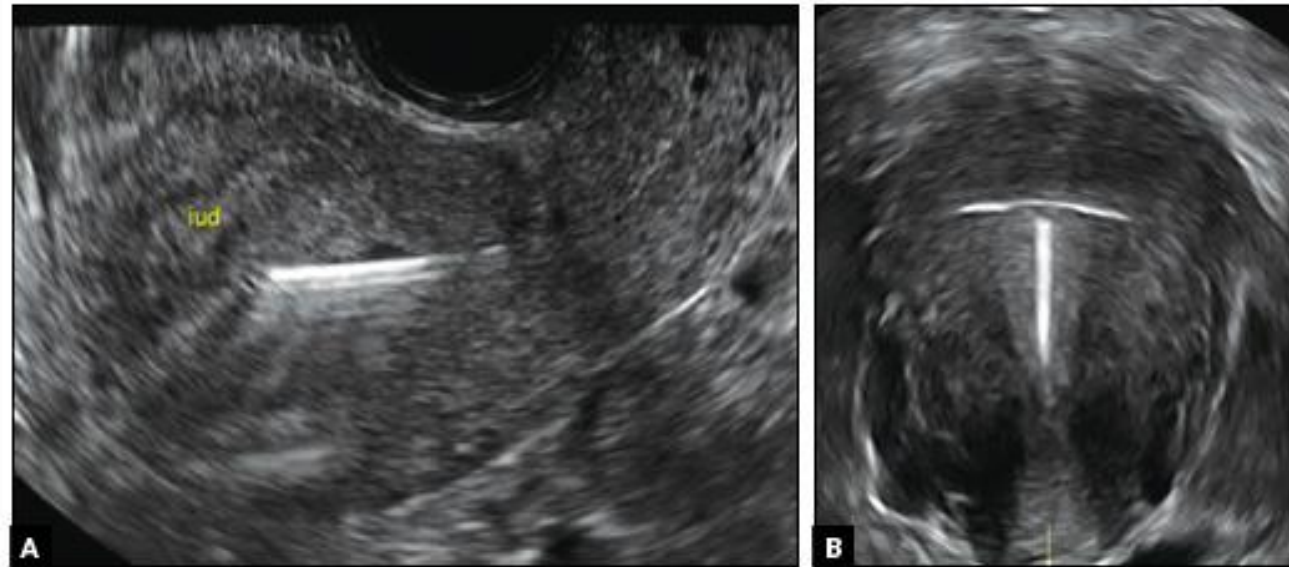


FIGURE 1 Well-positioned copper IUD



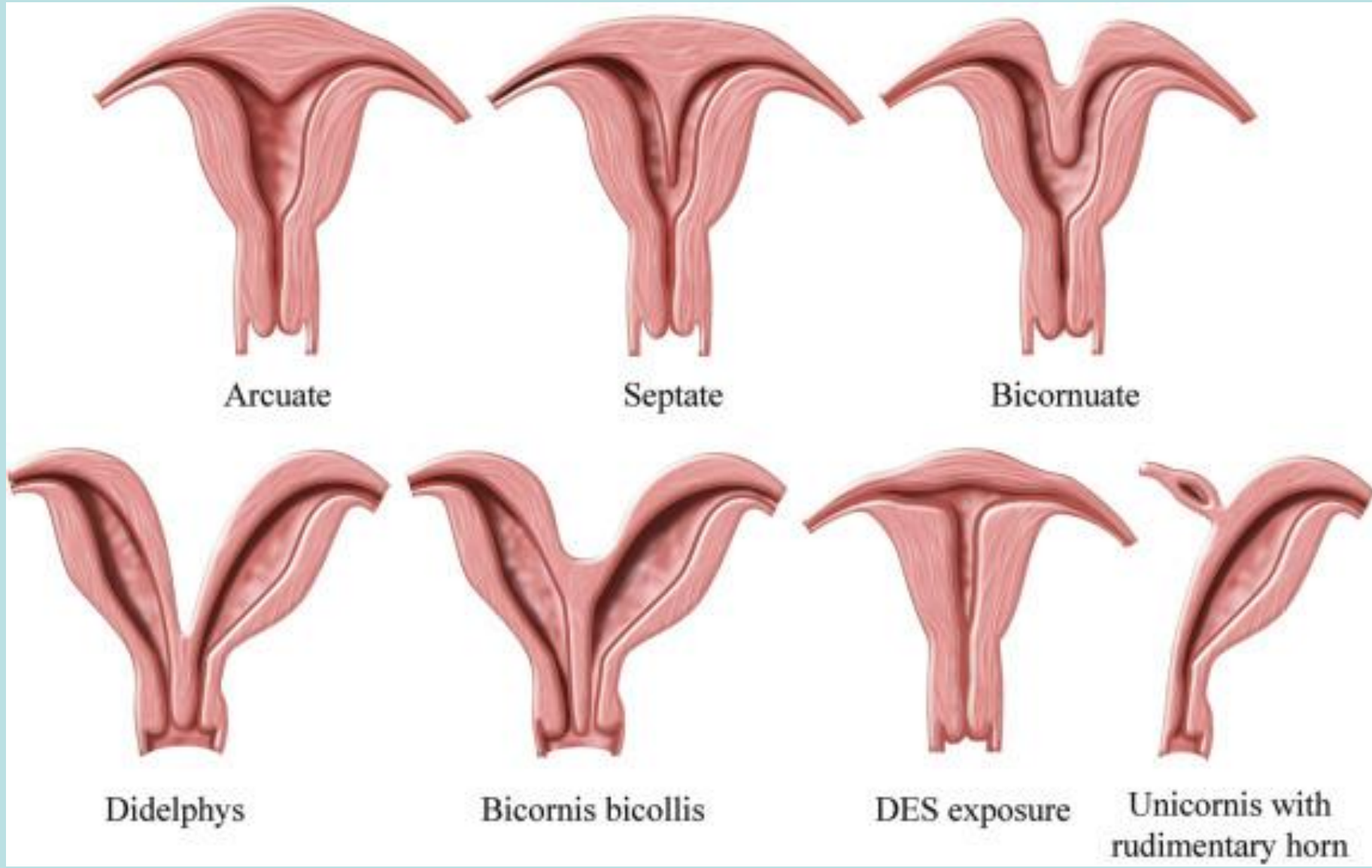
A. 2D (sagittal) and **(B.)** 3D images show the uniformly echogenic stem.

CASE 2 Extrauterine IUD

Upon imaging, a copper IUD is found to be entirely extrauterine, due to perforation, in the region of the right adnexa. The IUD is removed laparoscopically from the right fallopian tube, where it was extruding through the fimbriae.



Congenital anomaly of the uterus



Warning: Not for diagnostic use

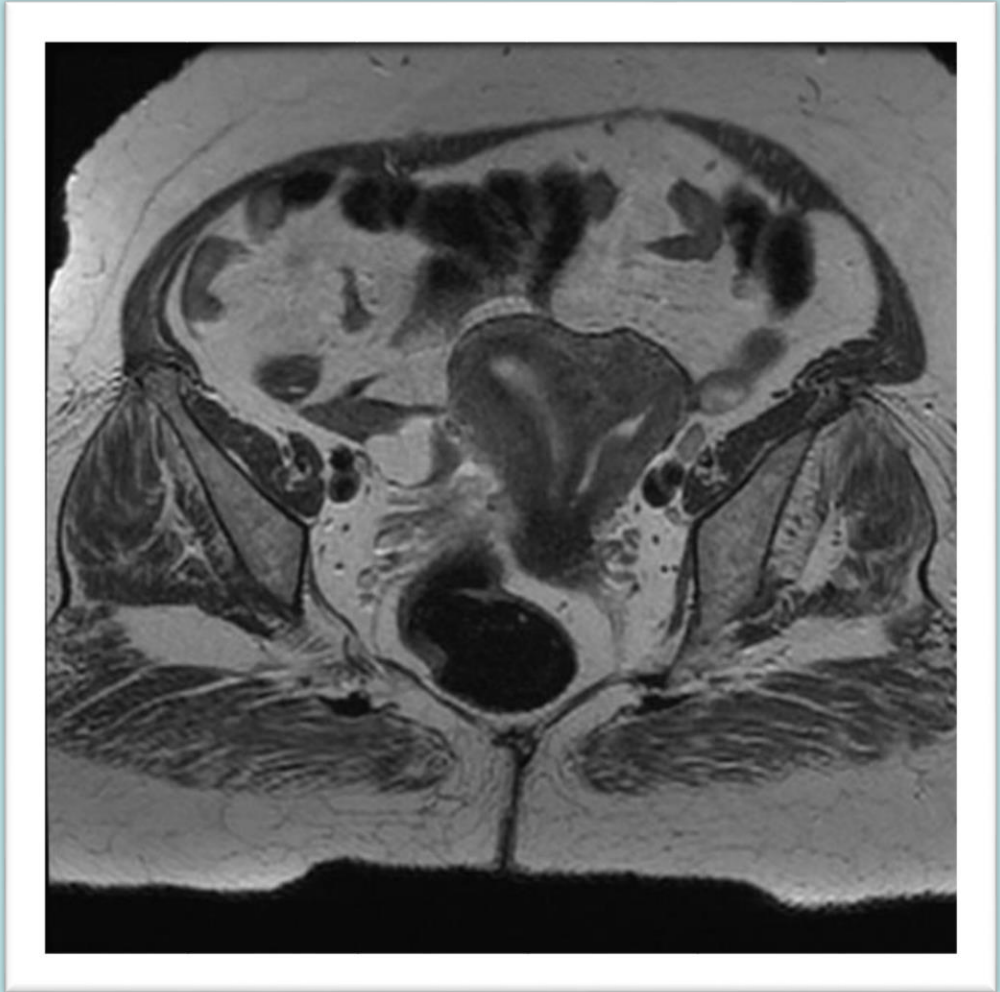
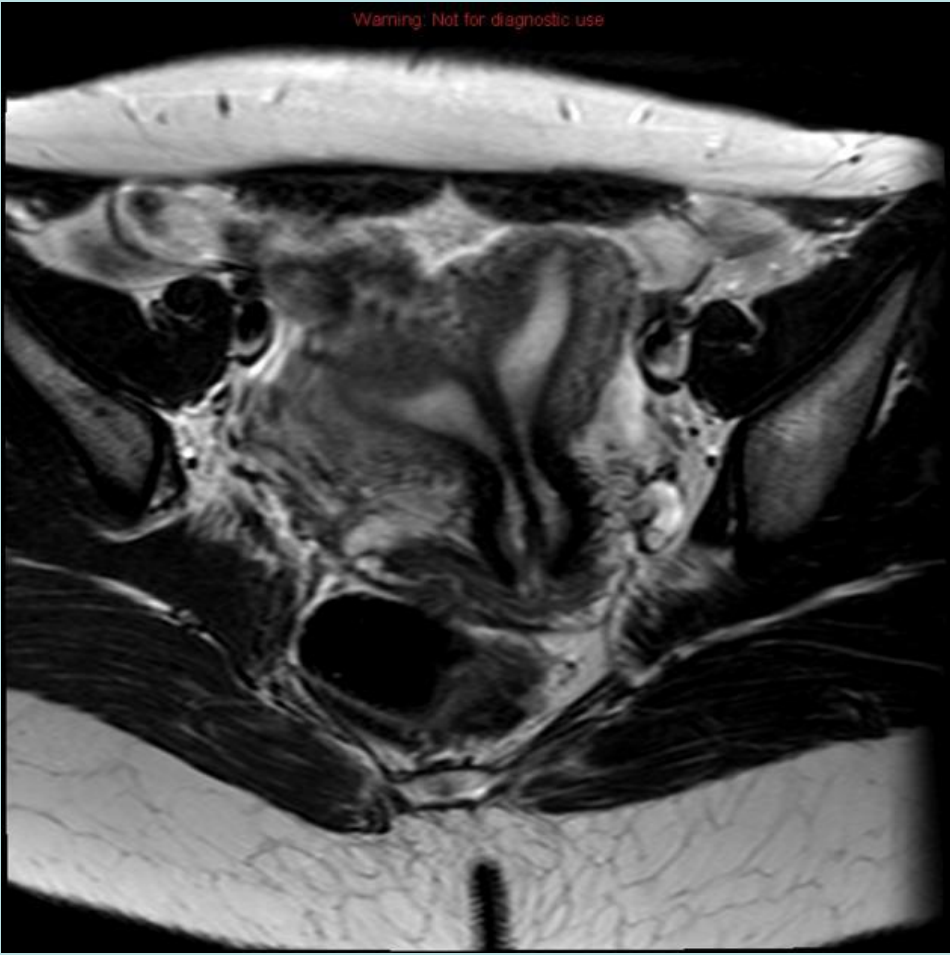
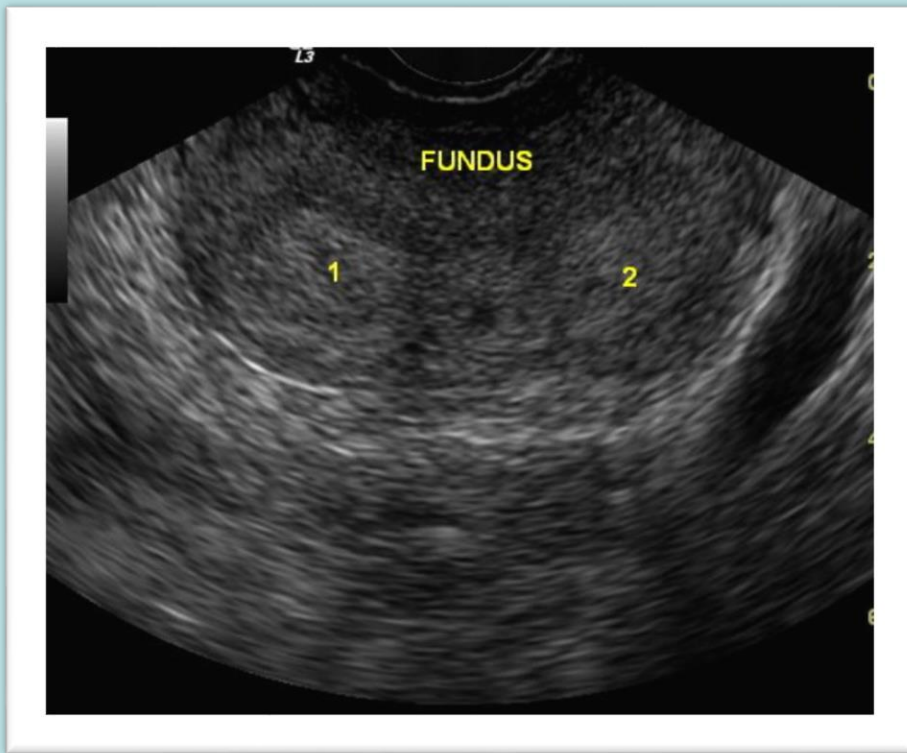




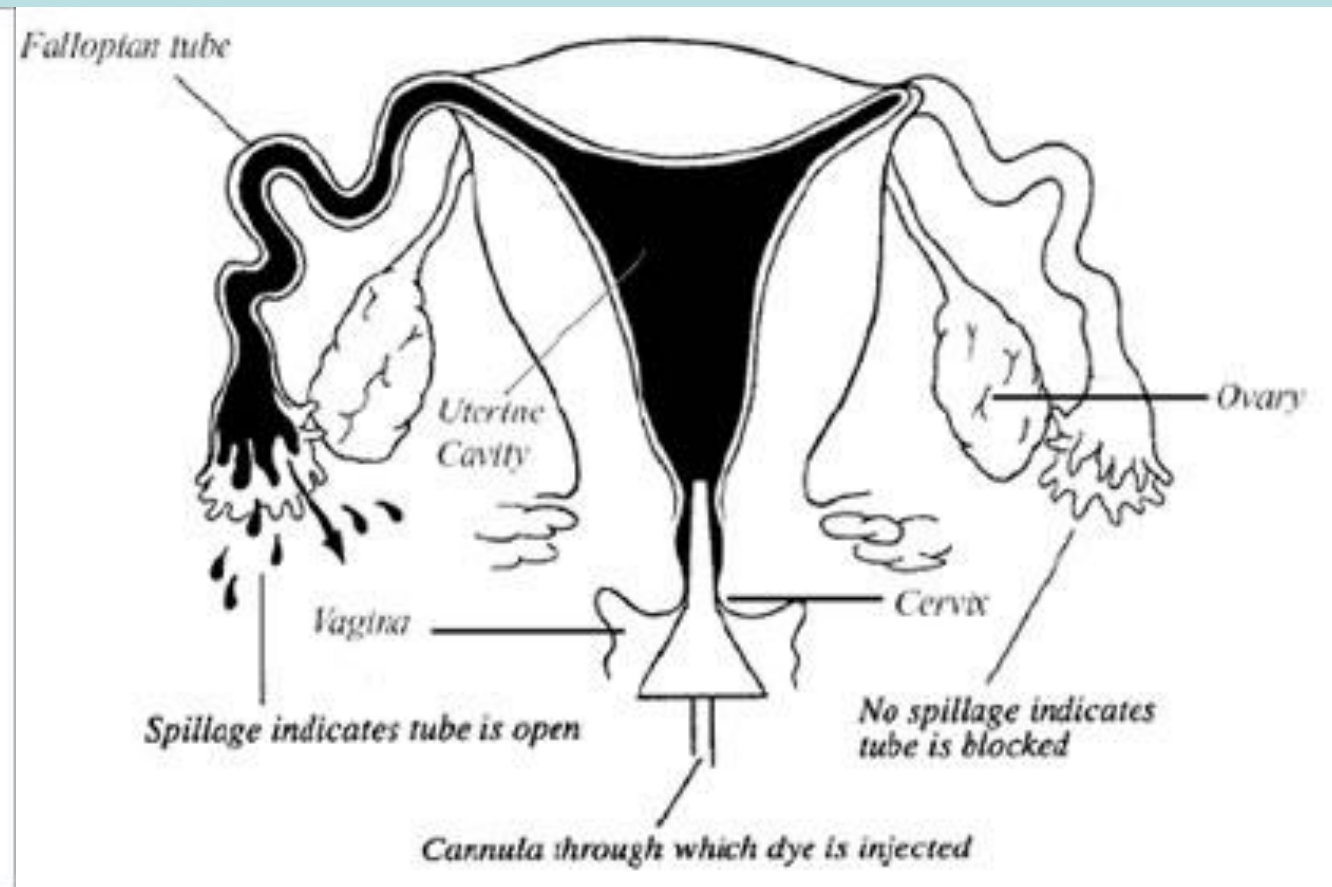
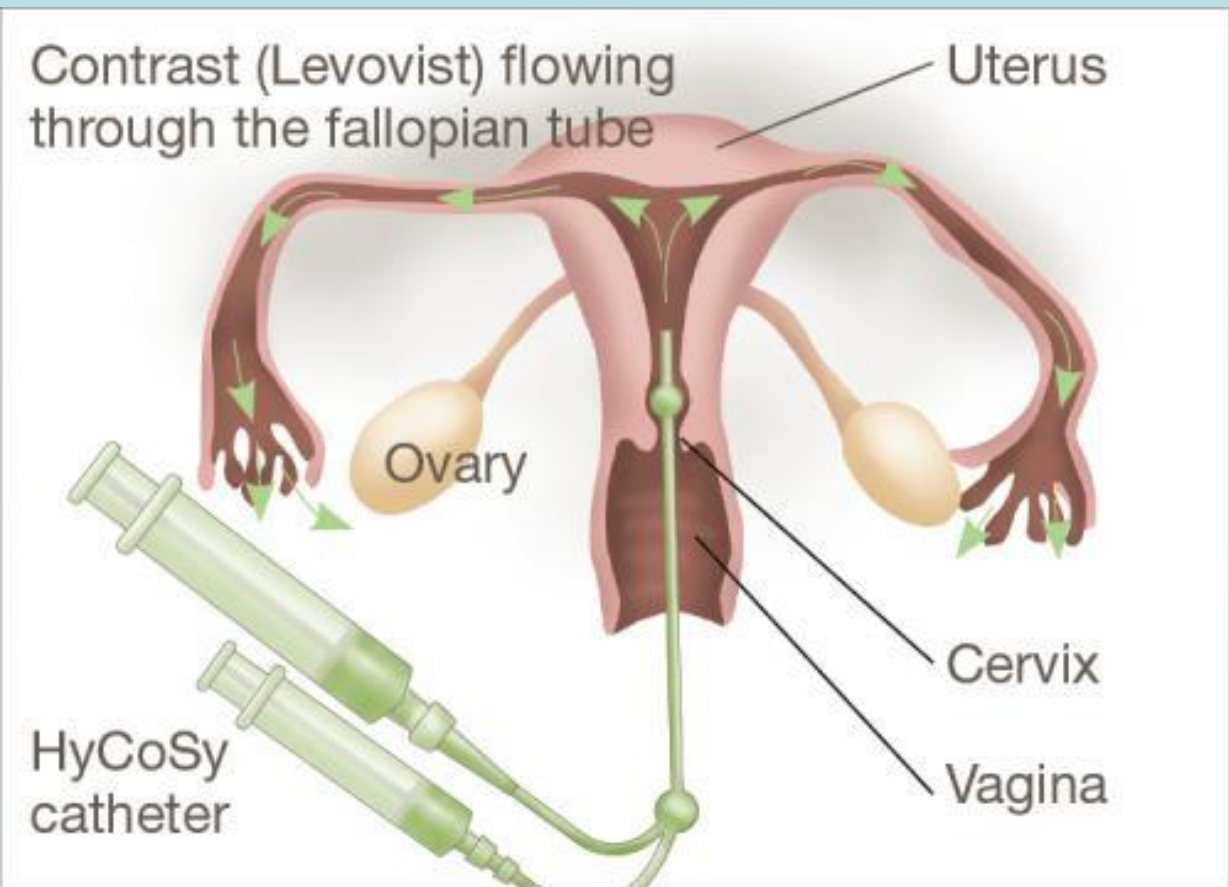
Fig. 3. MRI demonstrating a common single cervix.

Bicornate uterus



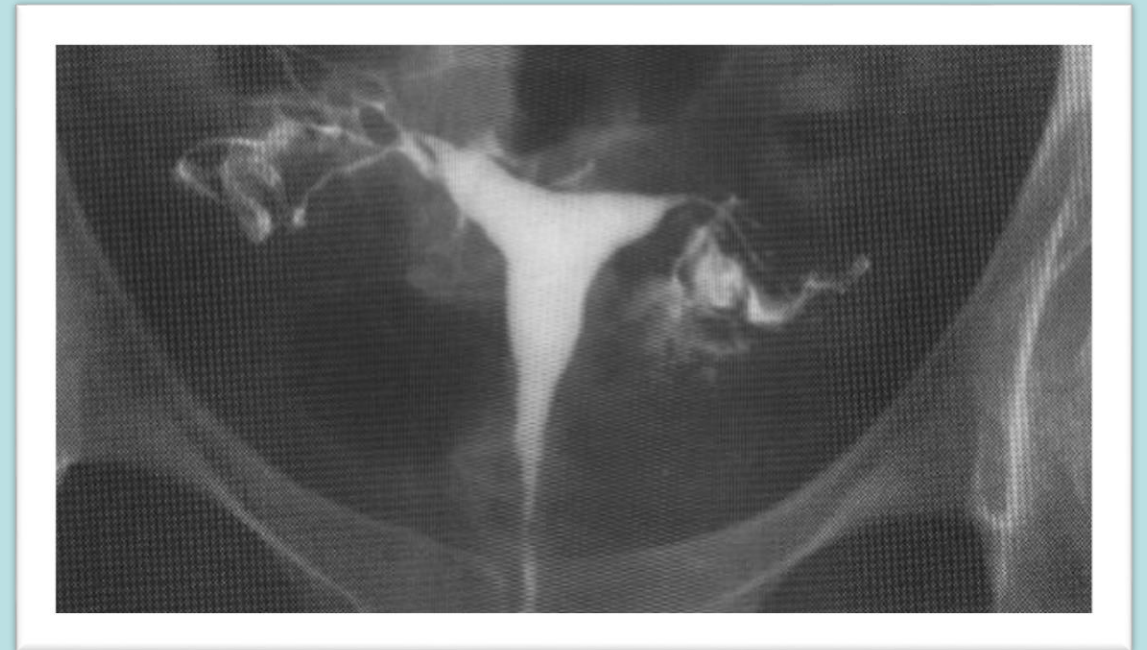
Hystrosalpengography

- Performed in selected cases in investigation of infertility in order to asses tubal patency.
- Technique:
- Through a catheter with a seal inserted into uterus contrast injected under the fluroscreen control to fill the uterus& fallopian tubes.
- If patent , spill seen into the peritoneal cavity & b/w bowel loops.

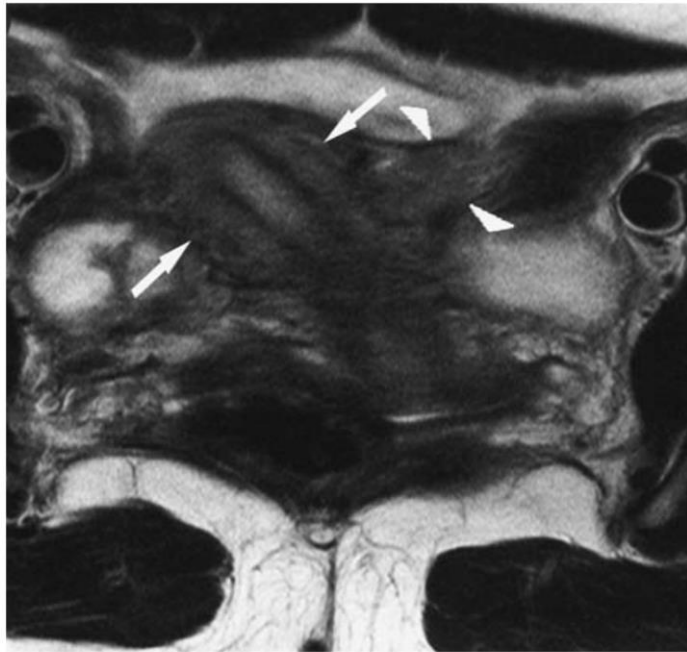
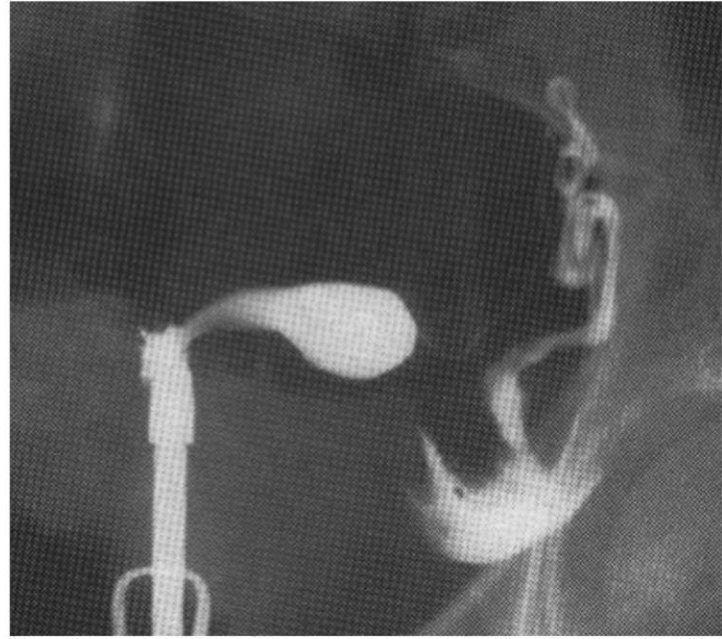




Hystrosalpingography







THANK YOU & GOOD LUCK
