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قسم تقنيات
الاشعة والسونار

Gynaecology
(non-pregnant female pelvis)

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PhD of Medical Imaging



Outline of my presentation

- ✓ Indications.
- ✓ Preparation.
- ✓ Normal anatomy.
- ✓ Position of the uterus.
- ✓ Ovaries.
- ✓ Ovarian follicles.
- ✓ Arterial supply.

Indications



1. Pelvic pain. including dysmenorrhoea (painful menstruation).
2. Pelvic mass.
3. Abnormal vaginal bleeding.
4. Abnormal vaginal discharge.
5. Amenorrhoea (missed or absent menstrual cycle).
6. To confirm the presence and check the position of an intrauterine contraceptive device.
7. Infertility: hysterosalpingography may also be needed.
8. Genital tract developmental abnormality: hysterosalpingography may also be needed.
9. Urinary or bladder symptoms .
10. Diffuse abdominal pain.
11. Follicular monitoring in investigation of infertility.

Preparation of the patient



1. Preparation of the patient. The bladder must be full. Give 4 or 5 glasses of fluid and examine after one hour (do not allow the patient to micturate). Alternatively. fill the bladder through a urethral catheter with sterile normal saline: stop when the patient feels uncomfortable. Avoid catheterization if possible because of the risk of infection.

2. Position of the patient. The patient is usually scanned while lying comfortably on her back (supine). It may be necessary to rotate the patient after the preliminary scans. Erect scanning is occasionally needed. Apply coupling agent liberally to the lower abdomen: it is not usually necessary to cover the pubic hair. but. if required. Apply freely.

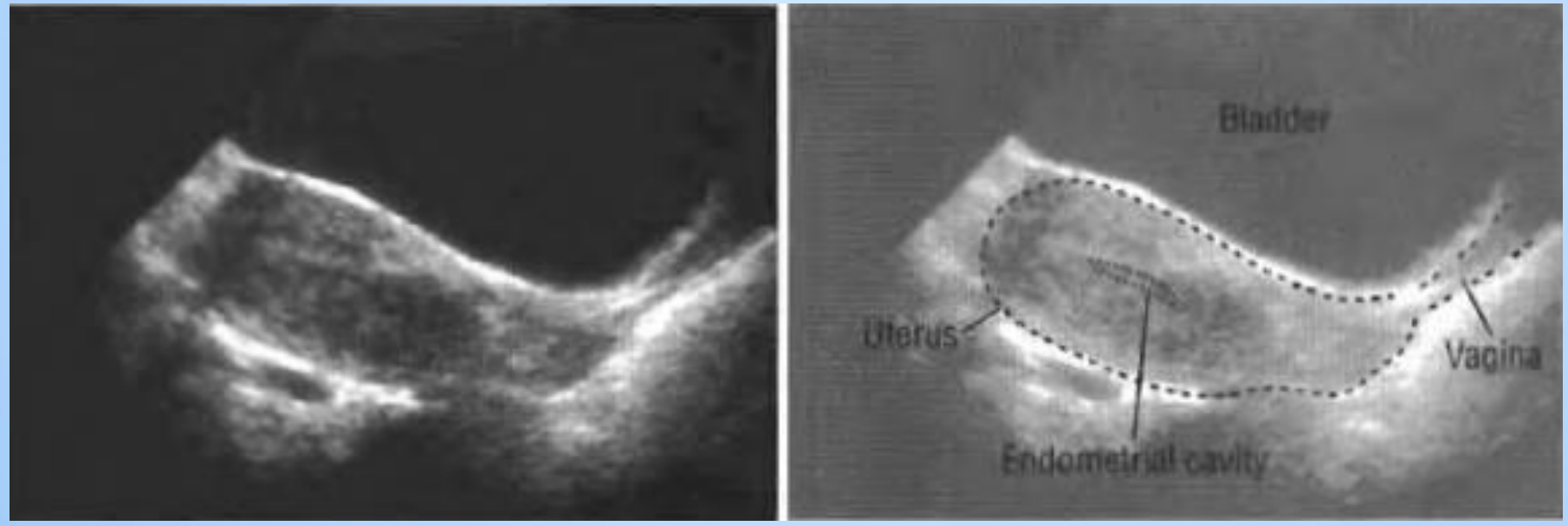
3. Choice of transducer. Use a 3.5 MHz transducer for adults. Use a 5 MHz transducer for children or thin adults.

4 . Setting the correct gain. Position the transducer longitudinally over the full bladder and adjust the gain to produce the best image.

Normal anatomy



The uterus has two different zones of echogenicity. The muscles in the uterine wall are hypoechogenic, but the pattern of the endometrium varies. In the first half of the menstrual cycle (post-menstruation) the endometrium is thin and hypoechogenic. In the second half, the premenstrual phase, the endometrium is hyperechogenic



Longitudinal scan of a normal uterus.

Normal anatomy

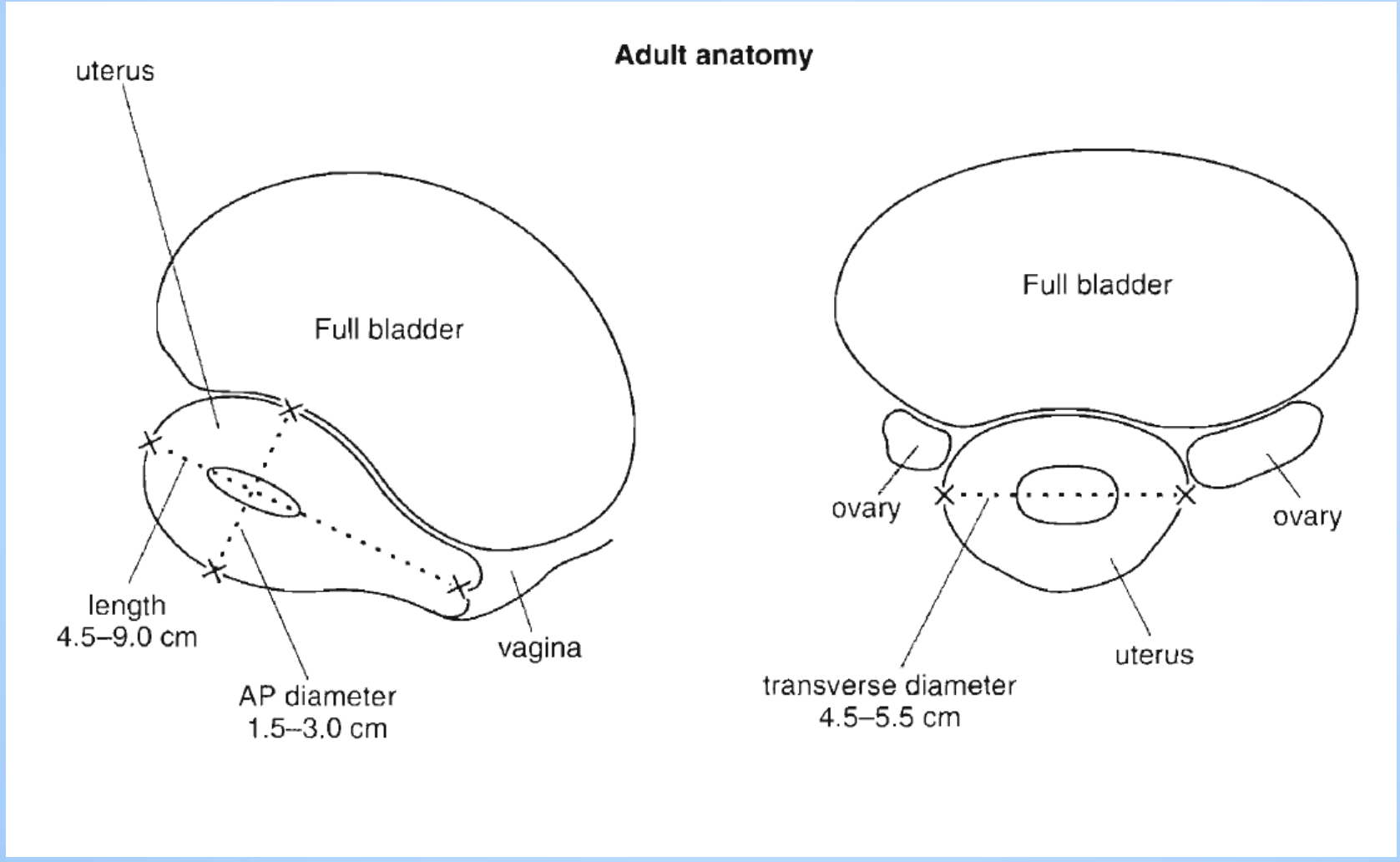


The uterus may not be exactly in the long axis of the pelvis and may be seen tangentially. The long axis of the uterus is measured from fundus to cervix.

The normal post-pubertal nulliparous uterus measures 4.5-9.0 cm in length, 1.5-3 cm antero-posteriorly, and 4.5-5.5 cm in the transverse diameter. Uterine dimensions increase by 1.0-1.2 cm with parity, and the body of the uterus becomes more rounded .The antero-posterior diameter of the uterine cervix should not exceed the antero-posterior diameter of the uterine body (for measurements in children).

Normal anatomy



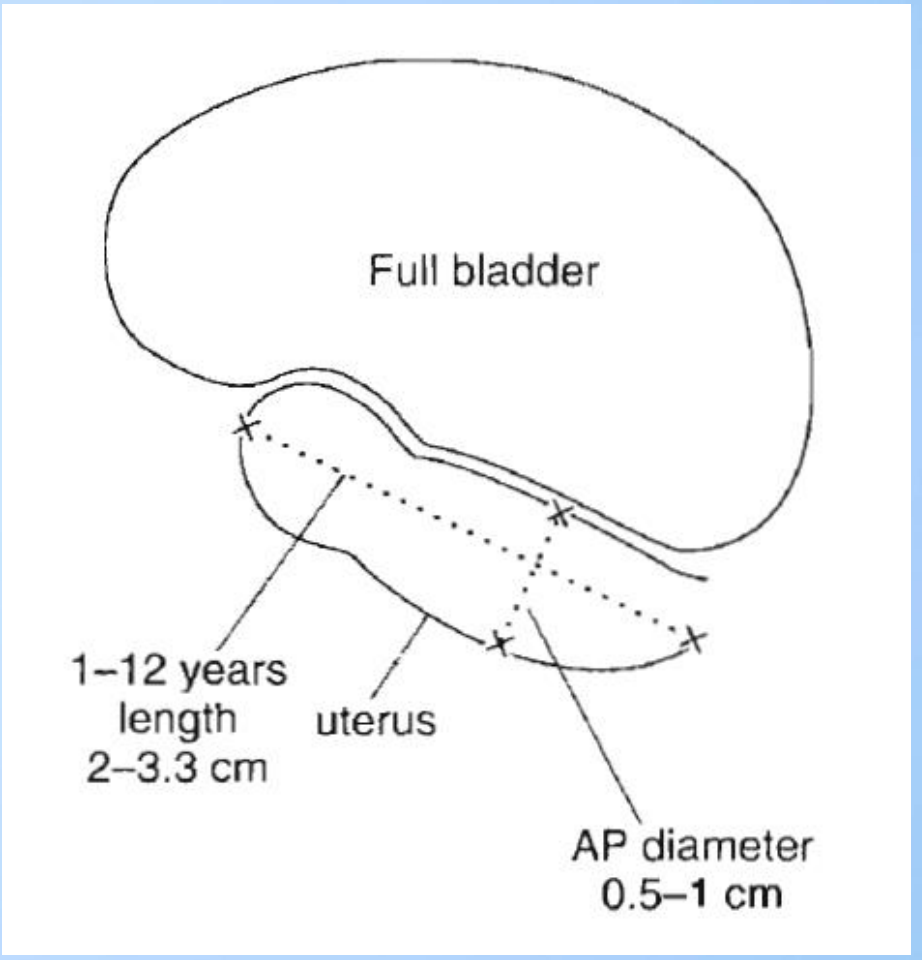


Normal anatomy



The pre-pubertal uterus

As the child grows, the ratio ofthe uterine cervix to the uterine body changes. In childhood the body of the uterus is smaller than the cervix, but with increasing age, the uterine body grows larger and the endometrium is not demonstrated.

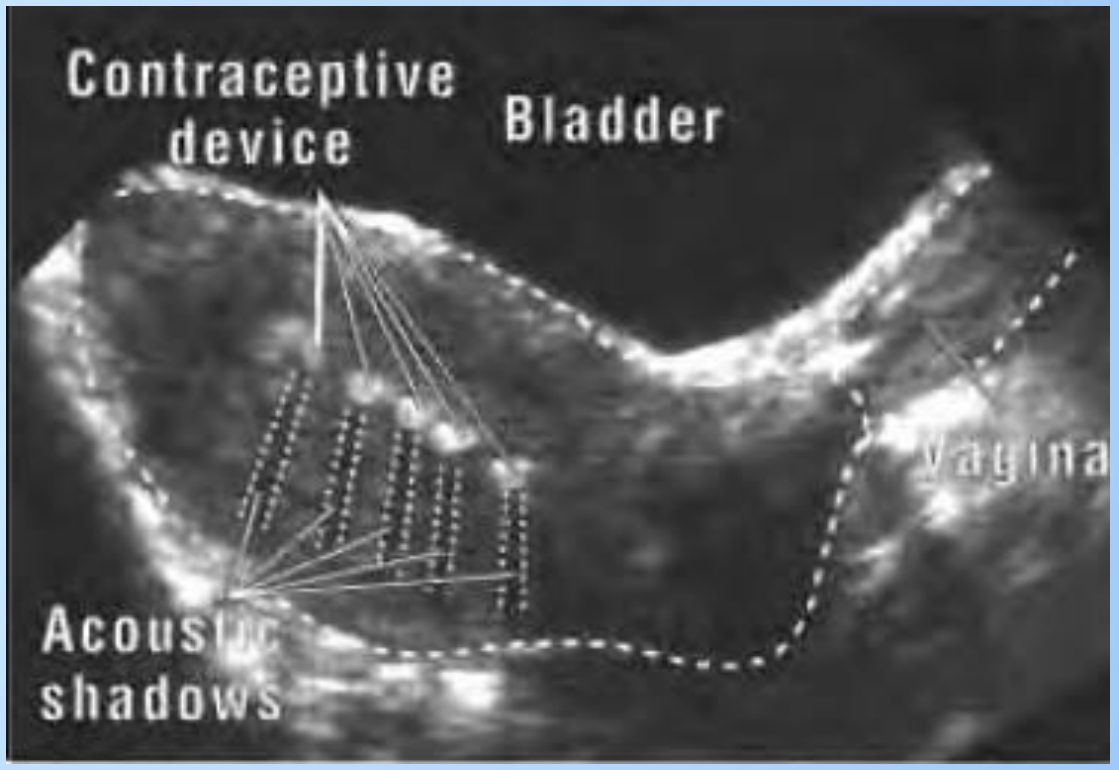


Normal anatomy



Intrauterine contraceptive device

An intrauterine contraceptive device (IUD) will appear as a linear or interrupted hyperechogenic line within the endometrial cavity or cervical canal and may produce distal acoustic shadowing

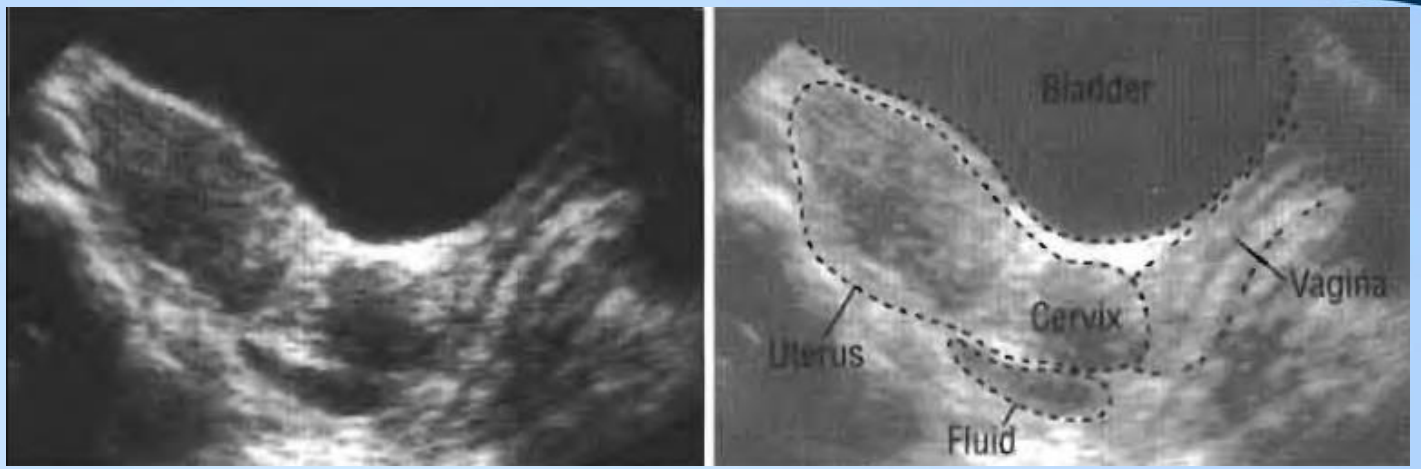


Normal anatomy

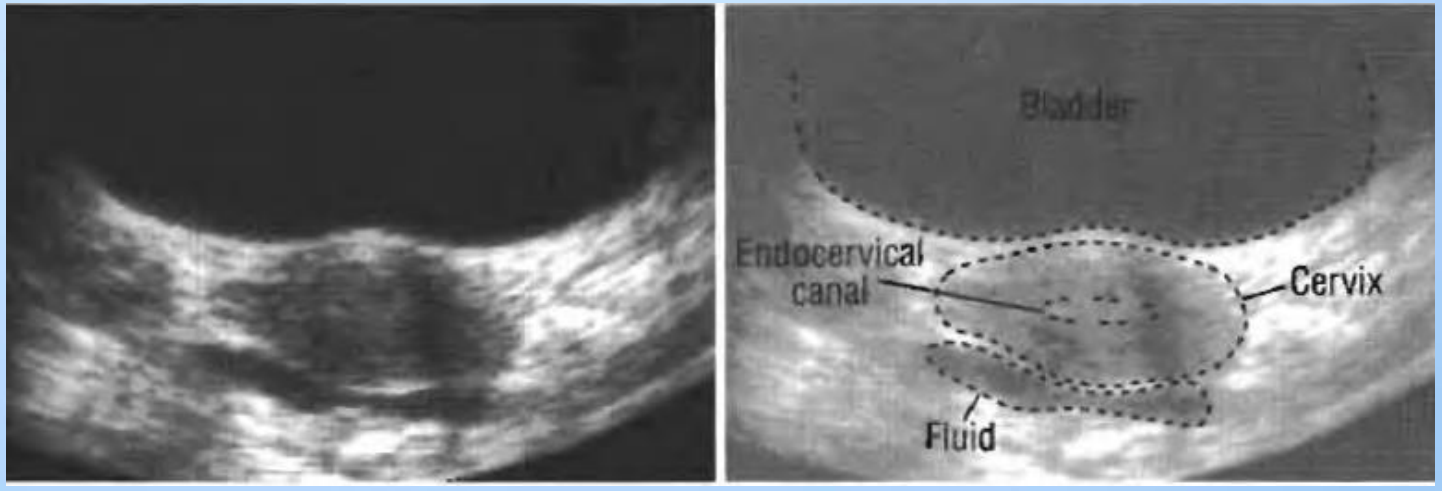


Fluid in the posterior cul-de-sac

It is not unusual to find a small amount of fluid in the posterior cul-de-sac following ovulation or menstruation . An echo-free cross-sectional diameter of less than 1 cm is normal.



Longitudinal section showing a small amount of fluid in the cul-de-sac; this is normal after ovulation or menstruation.



Transverse scan of the same patient.

Position of the uterus



The uterus may rotate so that the fundus of the uterus may be behind the cervix (retroversion).

It may also rotate forward (anteversion).

If the body of the uterus bends forward at the cervix. it is anteflexed. When the uterus bends backwards at the cervix. it is retro-flexed

If the uterus is not identified. check the patient's surgical history to exclude a hysterectomy.

When there has been pelvic surgery, look carefully for the remnants of the cervix, suggesting a partial hysterectomy

Ovaries



The ovaries are paired female gonads of the reproductive and endocrine systems.

They lie within the ovarian fossa on the posterior wall of the true pelvis and form part of the adnexa.

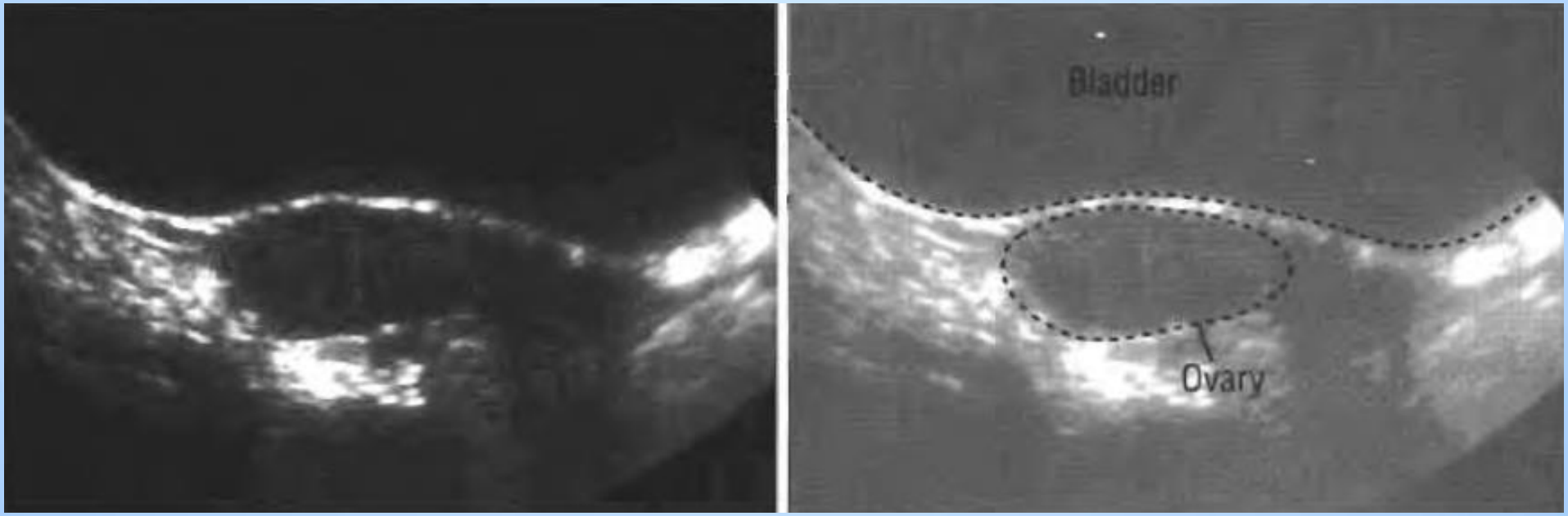
The ovaries are firm and ovoid in shape and measure approximately 1.5-3.0 cm × 1.5-3.0 cm × 1.0-2.0 cm (length x width x thickness) (corresponding to a volume of 1.2-9.4 cm3). For more on ovarian volume, see: Ovarian size and volume. An ovary typically weighs 2-8 g, however, they change during life and double in size in pregnancy.

Typically, they lie on the peritoneum of the pelvic wall in a shallow fossa in the angle between internal and external iliac vessels on the obturator nerve but have variable location secondary to their mobility. They are oriented with their long axis oblique, with lateral and medial surfaces, uterine and tubal ends, and mesovarian and free borders.

Ovaries



Scan the tissues on the left close to the uterus. Angle the transducer as required to locate the left ovary, which will appear as an ovoid (egg-shaped) structure, less homogeneous than the uterus but with the same or slightly less echogenicity: there will often be distal acoustic shadowing

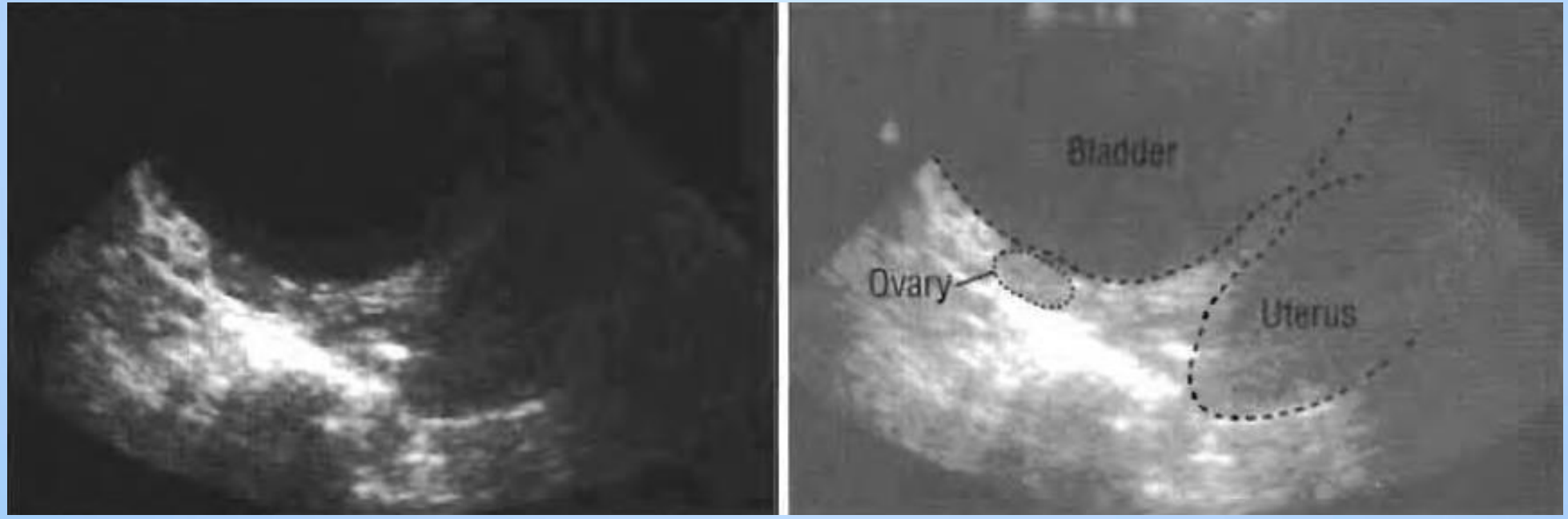


Longitudinal scan: normal left ovary.

Ovaries



The ovaries can vary in position but always lie behind the bladder and the uterus. They are most commonly found in the adnexal space laterally.
An ovary may be located in the cul-de-sac or cephalad to the fundus of the uterus . In postmenopausal women, the ovaries are small and may be difficult to identify.



Transverse scan: a small ovary lying unusually high in the pelvis.

Ovaries



When the ovaries cannot be identified, the following techniques may be helpful:

1. Tum the patient obliquely and scan the opposite ovary through the full bladder.
2. Reduce the gain settings. If the gain is set too high, the ovary may blend into the surrounding parametrium and be difficult to identify

If the ovaries are still difficult to identify, there may be too much or too little urine in the bladder. If the bladder does not extend to the level of the uterine fundus, it is probably not full enough and the patient should drink more water . Rescan 30 minutes later: if the bladder is then full enough, try to identify the ovaries.

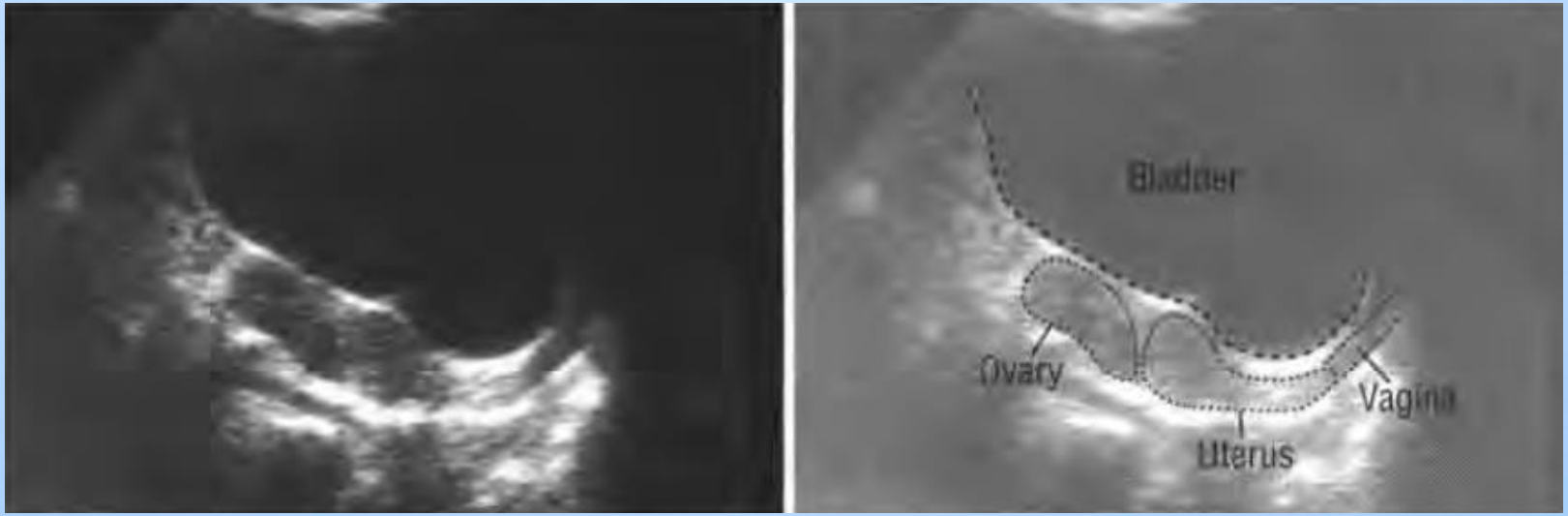
If the bladder is overfilled, it will push the ovaries against the uterus or laterally onto the psoas muscle. Ask the patient to partially empty the bladder (give her a specific measure, such as a small jug or bowl to fill). Then repeat the scan.

If necessary, scan the patient in the erect and oblique-erect positions. This may displace the gas-filled loops of bowel and allow the ovaries to be seen more clearly.

Normal ovaries



When the ovaries have been found, check for displacement of any surrounding structure. Check the normal echo pattern and look for any distal acoustic enhancement. If there are anechoic spaces within or on the surface of the ovary, these are probably ovarian follicles. Reduce the gain when scanning the ovary because normal ovarian tissue transmits the echoes and enhances the deep tissues. Measure the size of each ovary.



Normal ovaries



Examine the tissue around the ovary for cystic. solid or fluid-filled masses. Look particularly for fluid in the cul-de-sac. Examine both ovaries.

An ovary should not normally be found in front of the uterus. If it is in an abnormal position, rotate the patient to see if it is fixed by adhesions and note whether it is significantly enlarged.

As already noted, the gain setting must be varied while scanning the pelvis to obtain the best images. The relationship of the pelvic organs may be more easily seen by slow. continuous scans. taking about 10 seconds.

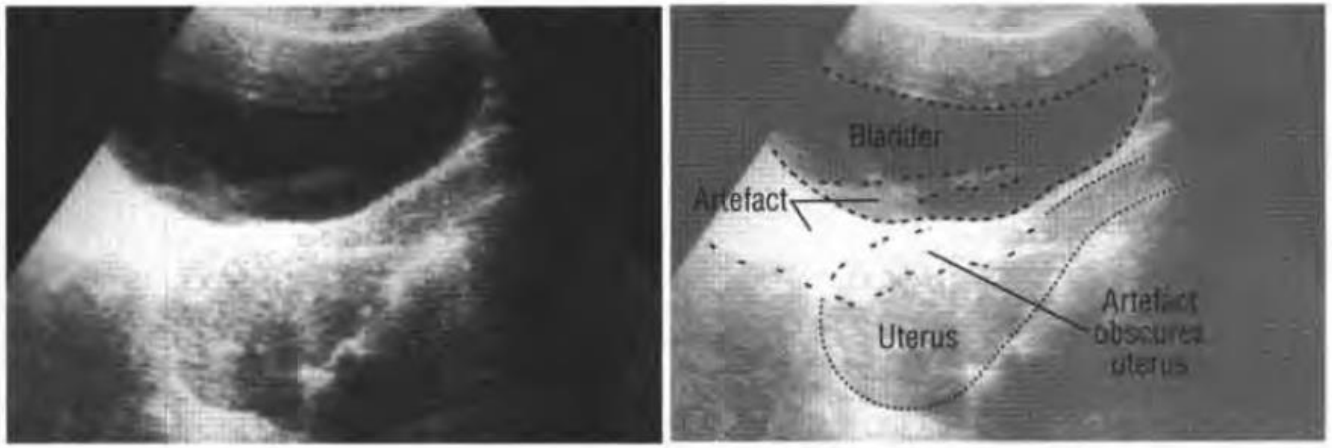


Fig. 142e. Gain settings too high, resulting in reverberation and artefacts in the bladder and poor definition of the uterus.

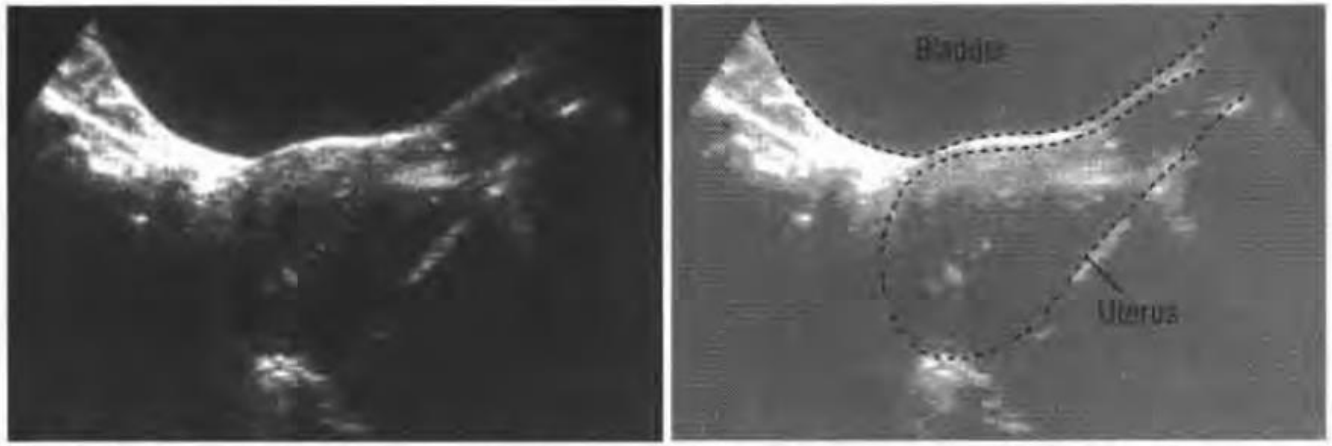
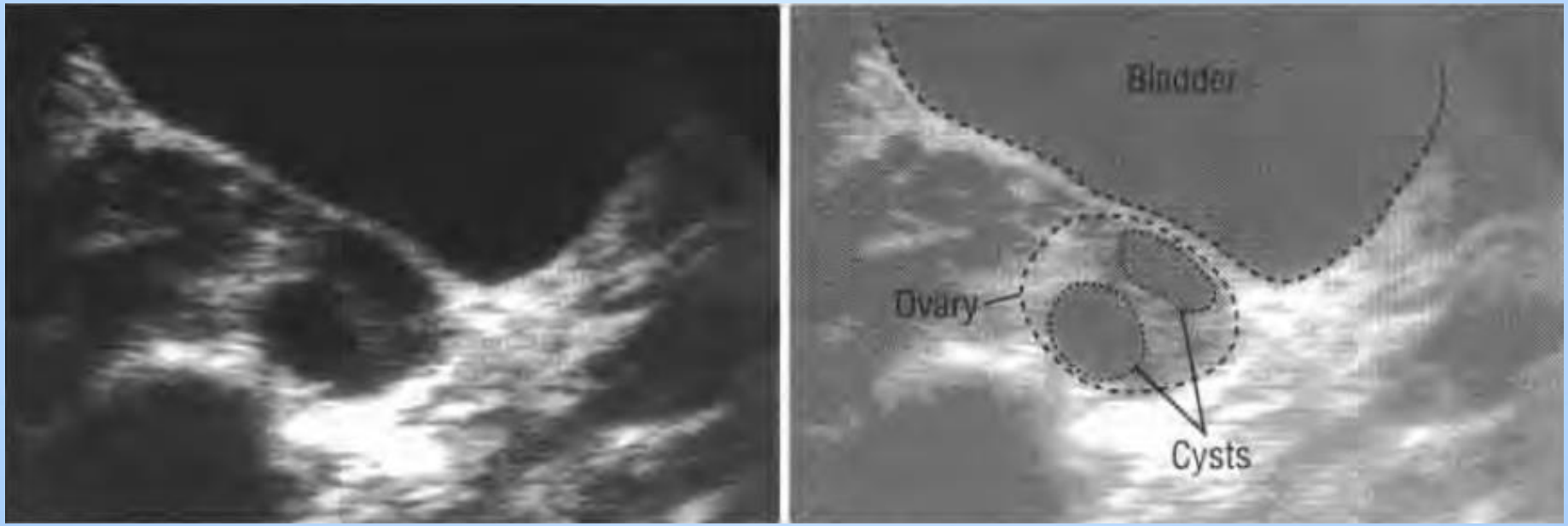


Fig. 142f. Gain setting too low, so that the posterior portion of the uterus is not clearly seen.

Ovarian follicles



Follicles normally show as cyst -like anechogenic spaces within or around the surface of the ovary and are best seen when the gain is low.
Depending upon the phase of the menstrual cycle. the cyst may be up to 2.5 cm in diameter.
Simple cysts measuring less than 5 cm may be physiological and will change. become smaller or disappear .

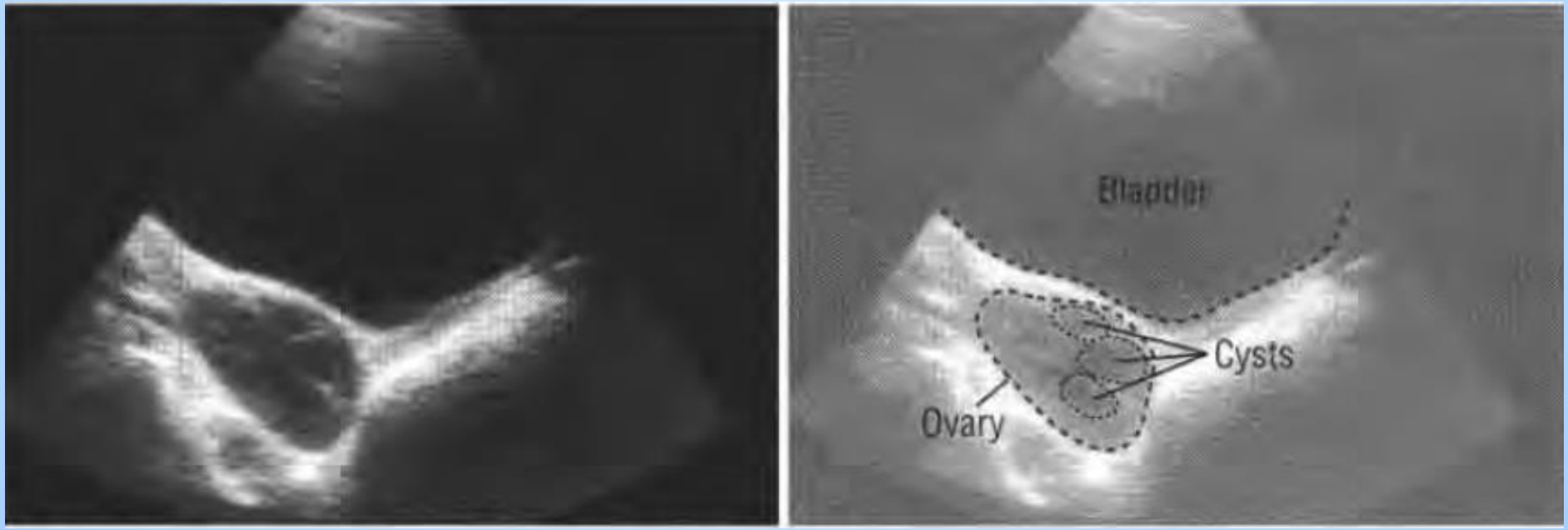


Longitudinal scan: two follicular cysts within the ovary.

Ovarian follicles



If there is concern that a cyst is neoplastic. the patient should be scanned both early and late in the menstrual cycle. Follicular cysts should regress, and nonfunctional cysts should not change in size. Scan after another month if still in doubt .



Longitudinal scan: an ovary with several surface follicular cysts.

Arterial supply



The primary blood supply to the ovary is the ovarian artery, although there is some anastomosis with branches of the uterine artery.


Thank you