In the practice of obstetrics and gynecology, among the imaging investigations, ultrasonography is the most important diagnostic tool. Dr. Ian Donald of Glasgow pioneered the application of ultrasound in obstetrics in the mid-1960s. Since then, ultrasound has had a tremendous impact on obstetrical management of many pregnant patients to the point where obstetrics cannot really be practised without high quality sonography.

**Obstetrics application of ultrasonography**

**Common Indications for obstetrics sonography**

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**Early pregnancy (first trimester)**

The normal non pregnant uterus at transbdominal scanning is shown as an egg-shaped structure, larger at the fundus, and lying directly behind the distended bladder. All pelvic ultrasound examinations should be conducted with the bladder well distended, as this displaces gas-containing bowel and allows uninterrupted access of the ultrasound beam to the uterus lying behind the bladder.

In early pregnancy the uterus enlarges and a gestation sac can be identified as early as 5-6 weeks after the first day of the last menstrual period. Transvaginal scanning can identify the sac as early as 4 weeks. It appears as a cystic area with a rim of high intensity echoes. By 10th weeks the sac has enlarged to occupy most of the uterine cavity. The developing embryo or 'fetal node' can be identified from the 6th or 7th week and the fetal head at 14 weeks. Multiple pregnancy can also be identified at an early stage by the presence of two or more gestation sacs.

The fetal heart beat can be identified soon after the feral node is seen and must always be looked for as evidence of a live fetus.

The crown rump length of the fetal node can be measured accurately by electronic calipers between the 7th and 14th weeks of pregnancy and assessed against the normal standard. In a normal pregnancy the measurement can predict maturity with considerable accuracy. GS volume can also be measured by USG but is less accurate in assessing maturity.

**Abnormalities of early pregnancy**

Missed abortion accounts for nearly half the cases of early pregnancy failure. At ultrasound the fetal heart rate can be detected with real-time scanning. It is important to realize that even with a dead fetus it is still possible to have a positive pregnancy test as the trophoblast can continue to function.

An embryonic pregnancy is almost as common as missed abortion. The diagnosis is made in those pregnancies in which the gestation sac cannot be shown to contain a fetus either in ultrasound or in the aborted products of gestation. Apart from this absence of a fetal node and fetal heart beat the gestation sac is 'small for dates' at ultrasound.
Live abortion is defined as early (before 12th week) or late (after 12th week). The early group may show a low gestation sac volume at ultrasound but appearances may be normal even a few days before abortion.

Hydatidiform mole is rare in Europe (about 1 in 2000 pregnancies) but commoner in Bangladesh. In ultrasound the uterus is large for dates. No fetal parts or fetal heart beat can be detected, and the uterus is full of multiple fine echoes. The patients have high gonadotrophic levels in the urine.

Ectopic pregnancy
This may be unruptured in which case the gestation sac is identified in an extra-uterine location and a fetal node and fetal heart beat are identified with it, or it may be ruptured in which case the extra-uterine sac is associated with a complex hematoma mass. In both cases the uterus is enlarged and contains a mottled pattern but no gestation sac. Diagnosis of the adnexal mass can be difficult and in some cases may require laparoscopy.

Mid and late pregnancy (second and third trimesters)
18 to 20th weeks is a good time to perform routine examination of pregnancy by ultrasound. This should document:

Fetal age
Various parameters can be used for assessing fetal age
1. Biparietal diameter of the skull (BPD)
2. Femoral length (FL)
3. Head circumference (HC)
4. Abdominal circumference (AC).

The BPD is perhaps most widely used and is measured on a transverse axial image of the skull at its widest diameter. Femoral length is also randomly used after 20 week to term.

Amniocentesis, chorionic villous sampling and fetal blood sampling are invasive procedure which are being increasingly used for genetic screening. They all require ultrasound control for success, and carry a risk of fetal loss or damage.

Fetal Abnormalities
Many congenital abnormalities of the fetus can now be recognized in utero by ultrasound screening. In many cases these can be recognized sufficiently early for therapeutic termination to be a realistic possibility where this is considered desirable.

These includes
Neural tube defects: Such as anencephaly, spina bifida, Encephalocele, hydrocephalus.
In Thorax: congenital heart disease (CHD), congenital diaphragmatic hernia (CDH).

Abdomen
Abdominal wall defects leading to omphalocele or gastroschisis, duodenal atresia, ascites and other anomalies, renal agenesis (Potter's syndrome) infantile renal polycystic disease, dysplastic kidneys. Fetal hydronephrosis.

Hydrops fetalis due to isoimmunisation from feto-maternal blood group incompatibility.

The sonographic features include
1. Polyhydramnios.
2. Increased placental thickness
3. Skin thickening
4. Ascites, pleural and pericardial effusion.

The placenta
The placenta is easily identified by ultrasound and its site is always noted at routine examination. Localisation is particularly important in:
1. Anterpartum hemorrhage (placenta previa, abruptio
2. Amniocentesis.

MRI
There is as yet no experimental or other evidence that MRI is harmful to the fetus but both the National Radiation Protection Board in the UK and the Food and Drugs Administration in the USA recommend that it should not be used in the first trimester.
Review Article

Gynaecological imaging

Ultrasound

Ultrasound of the female pelvis is now the primary imaging investigation in many gynecological problems. Most cases are examined by transabdominal scanning, but transvaginal scanning can provide better detail in selected cases as can transrectal scanning in elderly patients.

IUCDs. These are readily identified by ultrasound as a strong linear echo or a row in punctate echoes within the uterine cavity, sometimes with acoustic shadowing.

Ovarian function: The normal ovaries can usually be identified as small ovoid structures lateral to the uterus and hypoechoic to the surrounding pelvic fat.

Enlarged ovaries with multiple cysts may be seen in the Stein-Leventhal syndrome (amenorrhea, infertility, hirsutism and obesity).

Pelvic masses

Uterine fibroids are the commonest female tumour, occurring in 20% of females above the age of 30. The sonography shows enlarged uterus with a focal uterine mass of hypo-or hyper-echoic features. Calcification is markedly hyper-echoic.

CT and MRI

CT is now widely used in the further assessment of pelvic and abdominal tumours and is particularly valuable in the staging of malignant tumours. MRI is probably more accurate than CT in the staging of uterine carcinomas, particularly cervical carcinoma, but ovarian carcinoma in better staged by CT.

Plain Radiography

Simple X-rays of the pelvis can be helpful in the diagnosis and differential diagnosis of some pelvic masses in the female. Such as calcified fibroid, ovarian dermoid etc. Apart from simple X-rays the only other X-ray technique still widely used for the investigation of gynecological problems is salpingography.

Hysterosalpingography

Hysterosalpingography is most widely used in the investigation of sterility. The investigation is obviously contraindicated in the presence of...
pregnancy, severe hemorrhage or active infection. Salpingography is performed in the X-ray department and is best done by the radiologist and gynecologist in cooperation. The normal hysterosalpingogram shows the uterus as an inverted triangular shadow and the tubes as fine sinuous lines extending out from the cornual angles. In cases of sterility normal appearances may be shown with a free spill into the peritoneum and a local mechanical cause may thus be excluded. In these normal cases the prognosis is fair and in one series about a third of the patients subsequently became pregnant. It has even been postulated that salpingography had a therapeutic effect in some of these patients by clearing adhesions. On the other hand the salphingogram may show a definite cause for sterility such as blockage of both tubes or the presence of bilateral hydrosalpinx. Congential anomalies of the uterus such as bicornuate or infantile uterus may be seen, or gross anomalies such as uterus didelphys may be diagnosed.

**Conclusion**

For Proper diagnosis and management of obstetrics and gynecological cases Imaging is the utmost important investigation just next to clinical examinations. So the latest Knowledge about different Imaging modalities such as Ultrasonography, CT scan, MRI etc. play a key role in the diagnosis and management of Obstetrics and Gynecological patients.

**References**


