
Causes Of Ovarian Pathology And Diseases That May Be Diagnosed

Common facts about the organ and symptoms

Ovaries are an integral organ in the female reproductive system in which ultrasound plays an outstanding role in diagnosing and differentiating many ovarian pathologies. The main function of the ovary is to release a mature oocyte every 28 days and to secrete oestrogen and progesterone for maintaining the reproductive cycle and to support pregnancy. The importance of differentiation between functional to non-functional pathologies can provide significant implications in terms of management to relieving symptoms in women across the age groups.

Possible causes of ovarian pathology can be presented as asymptotically and symptomatically. Often symptomatic reasons are pain, pressure symptoms, palpable masses, irregular menstrual bleeding, amenorrhea (no bleeding for more than 3 months), infertility or subfertility and postmenopausal bleeding. Some of the ovarian pathologies interpreted using ultrasound are simple cysts (functional cysts arising from the hormonal effect on the follicles or larger cysts from dominant Graafian follicle or corpus luteum cyst) Haemorrhagic cysts (formed when a Graafian or corpus luteum cyst bleeds and become larger), endometriomas (a cyst that grows when the endometrial tissue grows in the ovary) dermoid cysts (germ cell tumour arising from the ectodermal, endodermal and mesodermal tissues) and other malignant ovarian tumours arising from existing benign tumours such as cystadenoma (a larger tumour that is filled with fluid or mucin).

Patient history

Prior to scanning, it is also important to establish the patient history and clinical presentation. The information about the patient's age and last day of the menstrual cycle (pre-menopausal or post-menopausal status) can predict the benign and malignancies of some ovarian pathologies. Reproductive women have a low likelihood of malignant ovarian tumours and a high chance of ovarian torsion due to dermoid cysts or endometriomas whilst post-menopausal women have a higher risk of developing ovarian cancer. Any other medications (tamoxifen, HRT) and contraception can further affect the presentation and occurrence rate of these pathologies and the appearance of the normal presentation.

Advantages of U/S. Ultrasound has a high sensitivity in diagnosing ovarian pathology and the quick and painless examination makes it ideal for first-line imaging pathway in suspected cases. It is also an inexpensive, simple imaging modality in the hands of an experienced operator and has no bioeffects when used with recommended safety guidelines. Interpretation of the images are made during scanning and often a conclusive result can be given to the woman for further management.

U/S TAS vs TVs. Ultrasound is highly sensitive in detecting ovarian pathologies and it is a painless, inexpensive, non-invasive procedure without bioeffects of ionising radiation. Interpretations are made during the examination and often a conclusive result can be given. In

addition, the adnexal masses are detected through transabdominal (TAS) and transvaginal (TVS) approach in ultrasound. Both methods can be beneficial however TVS is more sensitive in differentiating gynaecological pathology in contrast to TAS. TVS transducer has a higher frequency that is able to provide the best resolution of the uterus and adnexal structures and able to come close proximity to adnexal organs to analyse subtle malignancies. TAS can be utilised prior to TVS to optimise the penetration and to visualise a wider field of view into the bladder, rectum and surrounding peritoneal organs with a full bladder as an acoustic window into the uterus. However, U/S imaging can be limited in some cases where the mass effect of bowel gas and high body mass index degrading the quality of greyscale images. TVS approach can be intrusive and painful for some women presenting with severe symptoms.

Normal appearances of ovaries. The ovaries are normally positioned laterally on either side of the uterus and attached to the broad ligament through its own mesentery called the round ligaments. The ovaries are attached to the uterus by the ovarian ligaments and the upper portions are in close proximity to the fallopian tube fimbriae. Ovaries are oval in shape and made up of a central portion (medulla) and outer cortex (stroma). Sonographically, the medulla has a reflective appearance and the stroma contains many follicles peripherally with appearances of anechoic, small cystic structures. One of the ovarian follicles then matures to form the dominant Graafian follicle that is a physiologically normal variant in the pre-menopausal women (seen in the late proliferative phase), unless the patient is pre-pubertal, postmenopausal, pregnant or the mean diameter exceeds above 3cm.

Normal corpus luteus. Often following menstruation, a corpus luteum cyst is formed from the remains of the dominant Graafian follicle that realised the egg, and this is also considered as a normal variant in pre-menopausal women. Corpus luteum is further seen as a thick-walled cyst with a characteristic ring of fire appearance of the peripheral vessel on colour doppler. During scanning, the position of the ovaries can vary due to the mobile nature of the mesentery and often the follicular appearance is helpful in reproductive women but atrophy of ovaries with the absence of follicles make it difficult to visualise in post-menopausal women. Due to the follicular content, a pre-menopausal ovary can measure 4 x 3 x 2 cm (6-12mls) whereas a post-menopausal ovary can only have a volume of less than 4mls.

Simple cysts. Simple cyst is defined as a larger cyst arising from a smaller follicle (functional cysts) or from a dominant Graafian follicle or a corpus luteum cyst in the ovaries. Commonly identified in pre-menopausal women and usually expectant management or follow up U/S is offered to monitor the regression of the cyst. A large cyst in a post-menopausal woman may mimic the appearance of serous cystadenoma hence appropriate management may be directed more towards blood/hormonal tests such as CA-125 or other imaging. These are usually benign in nature and may give rise to larger (>3cm) functional cysts such as follicular or corpus luteum cysts. Follicular cysts are formed when a dominant Graafian follicle fails to ovulate and becomes larger (3-10cm) with similar appearances. Sonographically, simple cysts appear as anechoic, unilocular and thin-walled with posterior acoustic shadowing. No solid components or septations shouldn't be seen. No vascularity is also seen with the colour doppler.

Dermoid cysts. Dermoid cysts are benign germ cell tumours arising from the ectodermal, endodermal and mesodermal tissues in the ovary. Commonly seen in adolescents and reproductive women. Germ cell layers contain hair, bone, teeth, skin tissues, sweat glands and pockets of sebum encapsulated in a sebaceous cystic structure. These tend to be located in the ovaries with a less than 10cm diameter and can be bilateral in small cases. Further may be

subjected to rupture or torsion of the ovary. U/S appearance can be a unilocular cyst (can be cystic or cystic solid) with mixed echogenicity. If echogenic material is seen on the proximal borders the tip of the iceberg sign gives rise to acoustic shadowing. Dermoid mesh/dot sign is also observed as echogenic particles floating in the hypoechoic medium. Sometimes the appearance of fat/fluid levels is seen within the cysts.

Endometrioma

Endometrioma is a cyst that grows when the endometrial tissue grows in the ovary. In small cases, endometriomas are also associated with adenomyosis and deep infiltrating endometriosis. The causative factors are due to retrograde menstruation and/or abnormal change in the endometrial tissue. Location of endometriomas can be within the ovary or adjacent to it depicting the kissing ovary sign on u/s. These are mostly observed in the pre-menopausal stage and are benign in nature. The content of the endometrioma can rupture or cause torsion. Sonographically, endometriomas are unilocular lesions with ground glass echogenicity. No internal flow with colour doppler should be seen. However, it is important to assess for any further adhesions in the uterosacral ligament

Cystadenoma

Cystadenoma is another benign ovarian tumour that is filled with mucous or fluid and is more common in post-menopausal women in the 4th or 5th decades of life. Cystadenoma is often presented asymptotically but when symptoms are observed it is mostly due to the pressure from a palpable mass in the adnexa. It can be subdivided into serous or mucinous cystadenoma where the malignant form is known as cystadenocarcinoma. Serous cystadenoma has a classic appearance to a simple cyst sonographically but appears larger within the ovary. In addition, they can be seen as a thin-walled, unilocular anechoic cyst measuring more than 3cm in diameter. Internally the fluid may appear echo-free or maybe echogenic if a haemorrhage has occurred with thin papillary projections from the walls. If the cystic rupture is observed free fluid can be seen in the pouch of Douglas or in vesico-uterine pouch. Whilst, mucinous cystadenoma appears larger on u/s as a thin-walled, multilocular cyst. Due to the mucin, the internal fluid also appears more echogenic. Internal populations can be seen from the walls but no colour flow with doppler. Often the appearance of serous cystadenoma has a classic appearance to a simple cyst sonographically, hence often demographics and clinical risk factors for ovarian cancer (post-menopausal, history of breast cancer, BRCA-1/2 gene) need to be further examined. In suspected malignant ovarian pathologies, it is also necessary to scan peritoneal organs near to the uterus to rule out early to late-stage ovarian cancer.

Often the appearance of endometriomas within the ovary can mimic an early stage haemorrhagic cyst. To differentiate fully U/S follow up is needed after 8/10 weeks without the specific features of a haemorrhagic cyst. When differentiating a follicular and a corpus luteum cyst, it is crucial to apply colour doppler to observe the ring of a fire sign. Serous cystadenoma has a classic appearance to a simple cyst sonographically, hence often demographics and clinical risk factors for ovarian cancer (post-menopausal, history of breast cancer, BRCA-1/2 gene) need to be further examined. In suspected malignant ovarian pathologies, it is also necessary to scan peritoneal organs near to the uterus to rule out early to late stages of ovarian cancer.

The use of B-mode U/S and doppler imaging is extremely useful in diagnosing and differentiating functional, benign and malignant ovarian pathology in all age groups. The use of risk models can further allow the sonographer to reach a conclusive diagnosis and direct patients for medical and surgical management effectively and in a timely manner.

edubirdie.com