ORIGINAL ARTICLE

Role of Radiology and Imaging of Ovarian Dermoids

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Abstract

Ovarian dermoid is a common ovarian tumour of reproductive age (usually 20-30 years), makes up 25% of all ovarian tumours. The tumour is mostly unilateral, but may be bilateral up to 20% of the cases. A few percentages (1-2%) of the tumour may undergo malignant changes, mostly squamous cell carcinoma. Two-third of the tumours are diagnosed incidentally. One-third presents usually with abdominal or pelvic pain with or without abdominal mass. Ovarian dermoid develops from two or more of the three germ cell layers and contains tooth, bone, hair, fatty tissue etc. The contents of the tumors are reflected in different imaging procedures. CT Scan is the imaging modality of choice.

Introduction

Dermoid cyst belongs to a group of germ cell tumors called Teratomas. Teratomas contain embryonic tissues from all three germ cell layers - ectoderm, endoderm and mesoderm and have been classified into Mature (benign) teratoma (Dermoid cyst), Immature (malignant) teratoma, Monodermal or specialized (Struma ovarii) teratoma[1,2].

Ovarian dermoid (Benign cystic teratoma, Mature cystic teratoma) is a common ovarian tumor derived from germinal cells, usually from two or more of the three germ layers - ectoderm, endoderm and mesoderm. Most frequently, the cysts are lined by skin with sweat and sebaceous glands, and contain greasy, yellow sebaceous material mixed with hairs. Less commonly, hair, soft tissue, teeth, cartilage, bone and other structures may be found[3,4].

Dermoids are benign slow growing tumors present since birth[5]. The karyotype of all benign teratomas is 46XX.

The tumor accounts for about 10-25% of all the ovarian neoplasms. It is usually unilateral but bilateral in approximately 10-20% cases[6,7]. 1-2% cases of Dermoid undergo malignant changes. The commonest malignancy developed is squamous cell carcinoma (80%), less frequently adenocarcinoma (7%) and rarely sarcoma and malignant melanoma[1]. The malignant transformation usually occurs above 40 years of age[8]. Occasionally the tumor may contain thyroid tissue, comprising more than 80% (strauma ovarii) and is associated with hyperthyroidism[1,3].

The complications, other than malignant degeneration, of dermoid are torsion (5-15%), haemorrhage, rupture (1-4%) etc[7,8,9].

This tumor is common in women of reproductive age, about 80% is presented with in 20-30 years of age[1,3,4,7,8]. Majority (about 60%) of the ovarian dermoids are asymptomatic and are diagnosed incidentally. The usual modes of presentation are abdominal/pelvic pain and abdominal mass is frequently associated with menstrual abnormalities and dysmenorrhea. Severe abdominal pain may indicate torsion, hemorrhage or rupture of the cyst.

Radiology and Imaging Techniques of Dermoid Tumours

Different imaging modalities play the key role in the diagnosis of ovarian dermoid. This tumour may be incidentally diagnosed during imaging of abdomino-pelvic organs, which is requested for investigating other illness. Roles of different imaging modalities are discussed below.

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Plain X-Ray of Abdomen

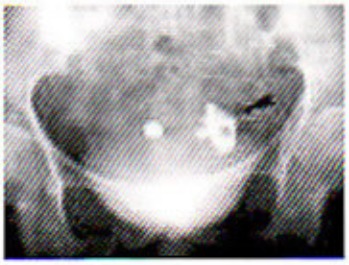


Fig-1: Plain X-Ray shows teeth and calcifications.

A plain X-Ray film of abdomen or of KUB regions is a routine investigation for a patient suffering from abdominal pain. Plain film may show calcification, bone or tooth. "Fat-floating" sign - a typical radiographic finding of dermoid cyst is due to adjacent soft tissues of different opacities[1,4,7].

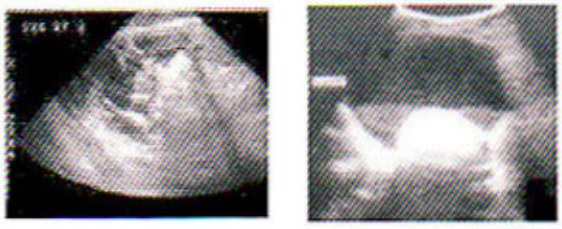


Fig-2: Ultrasonogram Findings- Complex Mass of polymorphic appearance and Dermoid Plug.

Ultrasonography

Sonographic findings may vary from case to case and frequently shows well defined pelvic complex mass of polymorphic appearance or of mixed echogenecity containing cystic and solid components. Echogenecity is usually due to presence of fat, calcification or tooth and may cast posterior shadowing. "Dermoid plug" (Rokitansky nodule) appears as hyperechoic nodular lesion or lessions within cystic portion of the mass. Classic sonographic appearance - "the tip of the iceberg sign" has also been described.

Fig-3: CT Scan of Pelvis - fat density areas, calcifications and cystic areas.

CT Scan

CT is considered the best imaging modality for the diagnosis of ovarian dermoid.
CT demonstrates the complex mass or masses clearly showing fat density areas, calcifications (globular, rim or tooth) and cystic areas. Often fat-fluid level, fluid-fluid level or dermoid plug is also well seen. Contrast enhancement of the dermoid plug indicates malignant transformation of the tumour[1,4,7,9].

MRI (Magnetic Resonance Imaging)

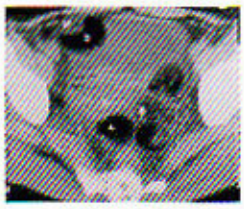
MRI study may be used as complementary procedure to confirm the diagnosis or in equivocal cases. MRI shows complex mass with variable signal intensities on different pulse sequences. On T1 weighted images, fat within the mass appears hyperintense and fluid is hypointense. Calcifications may appear as "signal void" like appearance. On T2 weighted images, both fat/lipid shows iso- to high signal intensities and fluid areas shows

Fig-4: MRI of Pelvis - Mixed signal intensity areas on T1 and T2 images.

high signal intensities. Fat Suppression or Chemical Shift Imaging Techniques confirm the presence of lipid materials within the mass by suppressing their signals[2,4,7,9,10].

A multipara female of 24 years of age complaining of lower abdominal pain radiating to back and dysmenorrhea for last two years. Different imaging techniques were done to diagnose the case.
(a) Plain x-ray (digital) of abdomen showed multiple small calcifications in the pelvis. Of those, larger opacities might represent small teeth. (b) Spiral CT Scan of pelvis shows lobulated midline mixed density mass in the lower abdomen containing fat density areas and small hyperdensity nodes. (c) Multiloculated cystic mass, also containing fat densities and tiny calcifications were seen in the left postero-lateral aspect of the uterus.

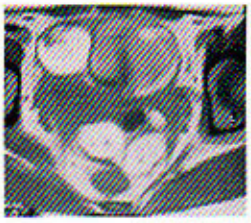
a) X-ray of Pelvis

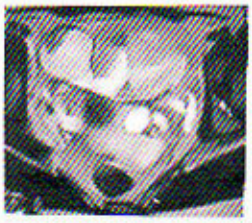


b) CT Scan of Pelvis

c) CT Scan of Pelvis

Fig-5: Bilateral Ovarian Dermoid Cysts





d) MRI of Pelvis: T1WI, T2WI, Fat Suppression Images.

(d) On MRI, the ovarian masses were hypo- to iso- to hyperintense on T1 weighted and T2 weighted images. T1 hyperintense areas became "dark" due to suppression of fat on STIR images.

Conclusion

Due to heterogenecity of dermoid tumour (rendered by presence of derivatives of different primitive germ cell layers), the diagnosis may be missed or may lead to confusion during ultrasound examination. Moreover, it may not be possible to diagnose the mass by differentiating from the bowel air and fecal matter that may give similar sonographic appearances. It may also be difficult to differentiate from complex bowel pathology, haematoma, or other complex ovarian mass etc[4,5,9]. In these occasions, CT scan and MRI positively helps to differentiate dermoid tumour from other pelvic masses or bowel. The imaging techniques also play an inevitable role to differentiate various complications of ovarian tumor such as rupture, haemorrhage or malignant degeneration.

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