Original Research Article

Radiological Evaluation of Ovarian Dermoids -A Reterospective Study of 28 cases in a Tertiary Care Centre of North India

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Abstract

Background: Ovarian Dermoids are the most common ovarian neoplasm. It comprise for approx 15-20% of all ovarian neoplasms. They usually occur during reproductive age group, typically in 2nd -3rd decade. These are slow-growing tumors containing elements from multiple germ cell layers and are easily diagnosed with Ultrasonography (USG) and better characterized by CT and MRI.**Aim and objective:**To do Radiological Evaluation of Ovarian Dermoids using imaging data of different Radiological Modalities.**Materials and methods:** Data of Radiologically diagnosed cases of Ovarian Dermoids was collected from USG, CT and MRI wings of Department of Radiodiagnosis BPS GMC W Khanpur Sonipat Haryana over a period of two yrs (2017-2019). Imaging data were evaluated by at least two Radiologists. Histocytopathological findings were taken into consideration wherever available. Data was collected, complied and analyzed statistically**Results:** Total 28 female cases were evaluated in age range of 21-70 with mean, median & modes age as 32, 26.5 and 23 yrs respectively showing predominance of reproductive age group. The lesions are seen predominantly on right side and 3/28 (10.71%) showed bilateral lesions. Most of the patients presented with lower abdominal pain (seen in 12/28, 42.8%); 8cm being the average size of lesions. Complication as torsion seen in 3/28 (10.71%) cases. 3/28 patients were found to be pregnant along with having Dermoid lesions. The lesions were characterized further on USG, CT and MRI. The lesions were readily diagnosed on each modalities based on typical imaging features with most of the lesions diagnosed incidentally on sonography (24/28) done as routine abdomino-pelvic scanning.**Conclusion:** Ovarian Dermoids can be diagnosed readily on USG with typical imaging features and complicated cases can further be better characterized on CT & MRI.

Keywords: Radiological evaluation, Ovarian Dermoid,USG,CT,MRI.

Introduction

Ovarian Dermoids are composed of well - differentiated tissues of at least two of the three types of germinal cells (ectoderm, mesoderm and endoderm). They almost always contain mature ectodermal tissues (skin, brain) with approx 90% of cases show mesodermal tissues (muscles, fat, bone, cartilage and mostly also contain endodermal tissues (ciliated, gastrointestinal mucinous or bronchial epithelium, thyoridian tissue) [1].

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Ovarian dermoids are classified in three types: (a) Mature cystic teratoma (b) Immature teratoma (c) Monodermalteratoma. Mature cystic teratomas (Dermoid Cyst) comprise 60% of ovarian neoplasms and occur mostly in reproductive age group. It is mostly unilateral with bilateral Dermoids seen in few percentages. Patient of mature cystic teratoma are mostly asymptomatic; when symptomatic presents with lower abdominal pain or irregular menses. These are slow growing tumors and operated only when they are more than 6 cm or present with complications [2]. Immature teratomas are rare (less than 1% of all ovarian neoplasms) and involve younger age group. They are usually large and 50% of cases are associated with increased serum alfa protein. They are of malignant behavior with more than 30 % of cases become malignant on follow-up [1]. Monodermoidteratomas are rare and comprises of strumaovarii,

neural tumors or carcinoid tumors [1]. Complicated ovarian dermoids can present as Rupture, Torsion, Ovarian vein thrombophlebitis, Malignant Degeneration .In Radiological Evaluation of Ovarian Dermoid, USG is used as screening modality which is more specific, whereas CT is used for further characterization which is more sensitive. MRI can be used as and when required as in pregnancy and findings can be correlated with USG & CT. In USG calcified materials, echogenic sebaceous material or rokitanksy protuberances in the lesions are classical findings where as in CT scan fat detection (density less than -20 HU) is diagnostic. Gravity dependent layering with fat-fluid line, palm tree like protrusions are other findings seen on CT imaging. In MRI T1W images shows sebaceous material as hyperintense and suppressed on FAT SAT imaging whereas hemorrhagic contents of cyst are not suppressed [2, 3, 4, 5].

Aim and objective

The primary objective of this study is to do Radiological Evaluation of Ovarian Dermoids using different Radiological Modalities data.

Materials and methods

The study was carried out in the Department of Radiodiagnosis, BPS GMC W Khanpur Kalan with the Radiological data of two yrs (2017-2019). This is a Reterospective Observational; Descriptive Hospital Based Study which involves the study of imaging data of 28 patients diagnosed for Ovarian Dermoids in USG, CT & MRI wings. In few cases the data comprises findings of two or more modalities. USG, CT & MRI was done on Philips machines Logic HD11XE, 128 slices CT and 1.5 T MRI respectively. Scans were evaluated by at least two Radiologists for further authentication of radiological findings & diagnosis. Histocytopathological findings were available in few of the cases and were correlated with imaging findings. Data was collected, complied and analyzed statistically

Results

Age Group Distribution (Chart 1): Out of 28 patients, 25 (89.28%) were in age group of 21 -40 Yrs with Mean as 33 Yrs

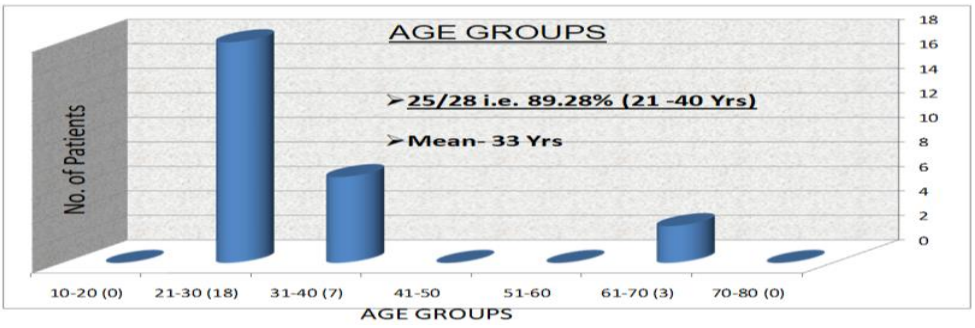


Fig 1:Age groups and number of patients

Clinical symptoms (Chart 2):Most of the cases 12/28 (42.8%) presented with ipsilateral abdominal fullness with pain in whom average size of the lesion was 8 cm followed by asymptomatic cases 7/28 (25%) in whom the average size of lesion was less than 6 cm. 14.28 % (4/28) cases presented with torsion in whom the lesion size ranges from 8 to 16 cm. Two patients were diagnosed to have pregnancy during routine scanning. Rest presented with menstrual irregularities and infertility.

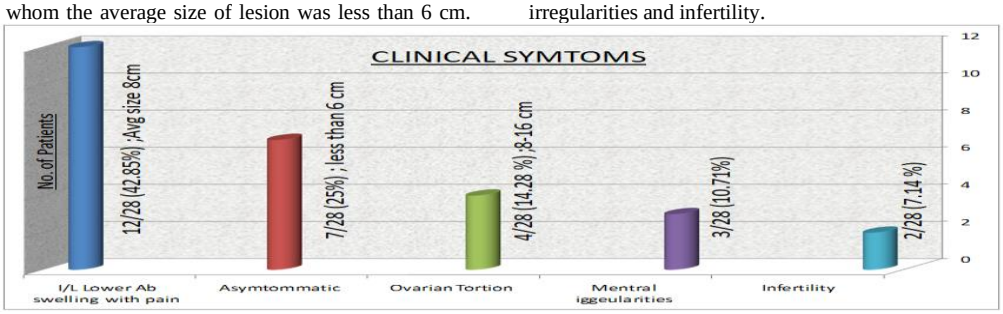


Fig 2:Number of patients and clinical symptoms

Radiological Evaluation (Chart 3): Patients were evaluated with different radiological modalities as per chart 3 data.

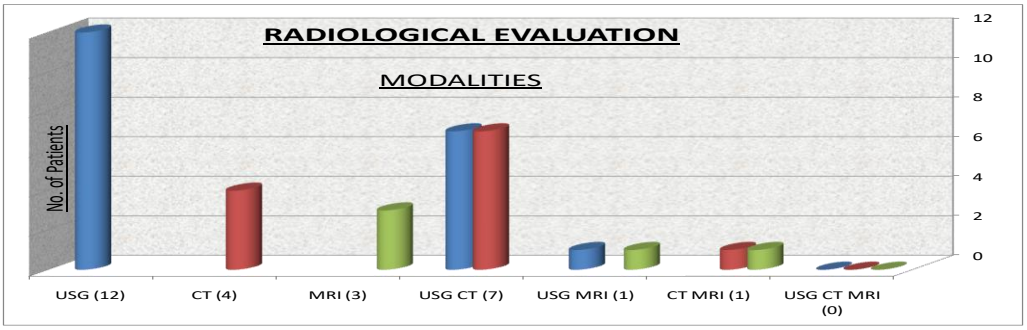
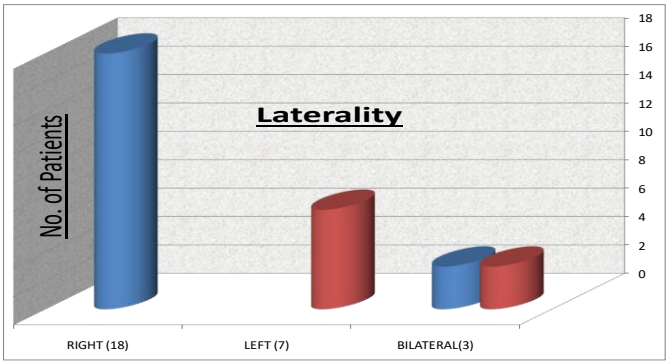


Fig 3:Radiological evaluation and number of patients

20 Patients were evaluated with ultrasound in which 17 patients were diagnosed easily with typical imaging features and in rest of the three patient CT correlation was needed further. Typical features like echogenic sebaceous material, calcified echogenic foci with posterior acoustic shadowing, rokitanksy protuberance etc were easily appreciated in most of the patients. CT scan was done in 12 patients including primary investigation and as adjunct to USG in detection and characterization of the pathology. Fat detection (density less than -20 HU) is more evident and diagnostic as compared to USG. Calcified structures were easily recognized. MRI was done in only 5 cases which showed typical T1W hyperintense fatty elements which showed suppression of signal on FAT SAT sequences.

Laterality (Chart 4): In most of the patients 18/28, the lesions were seen on right side only with bilateral lesions seen in 3/28 cases



Right - 18/28 (64.28 %)
(2.3 – 21 cm , mean - 8.20 cm)

Left - 7/28 (25.00 %)
(4.2 – 15 cm , mean - 8.19 cm)

B/L - 3/28 (10.71 %)

Fig 4:Laterality and number of patients

Size (Chart 5): Most of the lesions 20/31 (64.5%) were in size group of 6-10cm

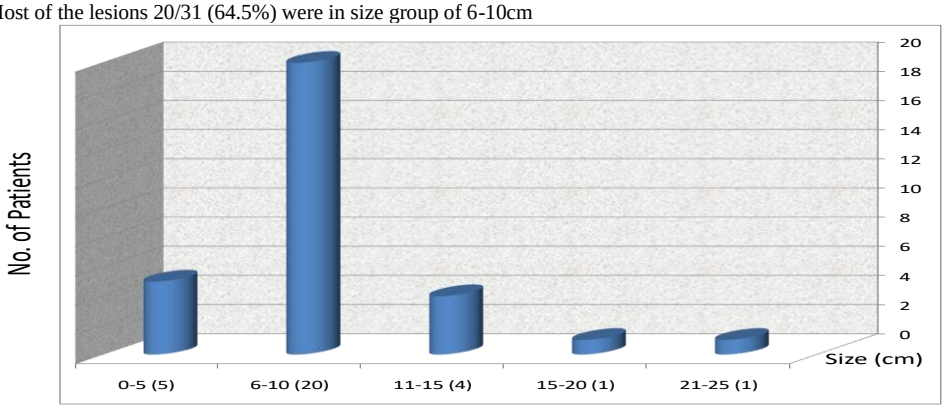


Fig 5:Lesions size and number of patients

Discussion

Ovarian teratomas are the most common germ cell neoplasm and as reported in many studies, the most common excised ovarian neoplasm. Teratomas comprise mature or immature tissues of germ cell (pluripotential) origin. The most common of these tumors, the mature cystic teratoma (also known as dermoid cyst), typically contains mature tissues of ectodermal (skin, brain), mesodermal (muscle, fat), and endodermal (mucinous or ciliated epithelium) origin.

Mature Cystic Teratomas (Dermoid Cyst) affect a younger age group (mean patient age being 30 years) than epithelial ovarian neoplasms [1]. In our study it is predominantly seen in 3rd decade (21-30yr) with percentage being 64.28% (18/28). It is reported as most common ovarian mass in children [6]. Mostly these are asymptomatic and when symptomatic, as in minority of patients, abdominal pain or other nonspecific symptoms occur [1]. However, in our series; 42.85% (12/28) patients had lower abdominal pain with 8cm being the average size of lesions. 25% patients were asymptomatic with 6cm being the average lesion size. Torsion is seen in 10.71% (3/28) cases with average size of lesion larger being 8-16cm. These grow at slower rate of 1.8 mm /year and nonsurgical management is advised in smaller (6-cm) tumors [7]. In our series, most of the lesions 20/31 (64.5%) were in 6-10 cm range; and that is most likely reason being majority patients were symptomatic. The smallest and largest lesions were being 2.8 & 21 cm respectively. Bilateral lesions are seen in about 10% of cases [8] as also seen in our series, 10.71% (3/28) patients. 3/28 patients were found to be pregnant also. In Unilateral cases it is seen frequently on right side, in 64.28% (18/28) patients. Histopathologically, these tumors are unilocular in 88% of cases and are filled with sebaceous material, which is usually liquid at body temperature and solidify at room temperature [8]. Hyalinized ovarian stroma often covers the external surface and squamous epithelium lines the wall of the cyst. Hair follicles, skin glands, muscle, and other tissues also lie within the wall. Usually a raised protuberance known as the Rokitansky nodule, from where typically hair arises , is seen projecting into the cyst cavity. Also, when bone or teeth are present, they tend to be located within this nodule. Ectodermal tissue (skin derivatives and neural tissue) is invariably present with Mesodermal tissue (fat, bone, cartilage, muscle and Endodermal tissue (eg, gastrointestinal and bronchial epithelium, thyroid tissue) are seen in 90% and majority of cases respectively. Adipose tissue and teeth are seen in 67%–75% and 31 % cases respectively [8-11]. Most mature cystic teratoma can be easily diagnosed at US with variety of appearances. As per prospective US study by Mais et al [12], sensitivity of 58% and specificity of 99% was seen in the diagnosis of mature cystic teratoma. The most common US pattern shows a cystic lesion with a densely echogenic tubercle (Rokitanksy nodule) projecting into the cyst lumen (13). The second pattern is a

diffusely or partially echogenic mass showing sound attenuation owing to sebaceous material and hair within the cyst cavity (14, 15). The third pattern consists of multiple thin, echogenic bands caused by hair in the cyst cavity (Fig 3). Pure sebum within the cyst may be hypoechoic or anechoic with fluid-fluid levels result from sebum floating above aqueous fluid, which appears more echogenic (15, 16). The Dermoid plug appears echogenic with posterior acoustic shadowing. CT and MR imaging are more sensitive for fat in diagnosing mature cystic teratoma [17]. At CT, fat attenuation in cyst cavity, with or without calcification in the wall, is diagnostic for mature cystic teratoma. A floating mass of hair can sometimes be seen at the fat–aqueous fluid interface. Fat and teeth or other calcifications are seen 93% and 56% cases respectively [18, 19]. At MR, the fatty sebaceous component of dermoid cysts show very high signal intensity on T1-weighted images and variable signal intensity on T2-weighted images. Fat is to be distinguished from intracystic hemorrhage, which also shortened MR T1 and T2 as in Endometriomas These can be differentiated by different MR imaging techniques like Chemical-shift artifact evaluation , Gradient-echo imaging and Sequences with frequency-selective fat saturation. Short-inversion-time inversion recovery sequences are not chemical shift–specific and therefore should not be used to distinguish hemorrhagic from fatty masses. [21-26] .Nondependent spheres of lipid material can occasionally be seen in cyst cavity, producing a striking appearance [26]. Few complications can be seen in association of mature cystic teratoma like torsion (most common), rupture or malignant degeneration. Torsion is seen in large lesions (mean diameter 11 cm); however this enlargement could also be the result of the torsion [1]. Imaging findings suggestive of torsion include deviation of the uterus to the twisted side, engorged blood vessels on the twisted side, a mass with a high-signal-intensity rim on T1-weighted MR images, a low-signal-intensity torsion knot, and thick, straight blood vessels that drape around the mass and cause complete absence of enhancement [28 ,29]. The rupture of tumor, though rare seen in less than 1% cases, causes leakage of the liquefied sebaceous contents into the peritoneum and resulting in granulomatous peritonitis. Malignant transformation of mature cystic teratoma is a rare complication seen in 6^{th} -7^{th} decade, reported in 1%–2% cases in older literature [11]. Recently, Comerci et al [1] found malignant transformation in only one of 517 cases. Malignant transformation applies only to malignancy arising de novo in a preexisting benign mature cystic teratoma like carcinomatous or sarcomatous change, squamous cell carcinoma arising from the squamous lining of the cyst being the most common type accounting for over 80% of cases. In contrast, immature teratomas are not known to arise from mature cystic teratomas. It has an imaging appearance that indicates the presence of the underlying mature cystic teratoma: a sebaceous lipid component as well as a heterogeneous solid component protruding into the cavity or extending transmurally into adjacent organs [19]. Imaging appearance of malignant transformation includes sebaceous lipid component as well as a heterogeneous solid component protruding into the cavity or extending transmurally into adjacent organs [19].

Fig 6: USG Images of two different cases (A) Homogenous hyperechoic lesion with eccentric Rokitanksy nodule showing posterior acoustic shadow consistent with calcific content (B) Large round to oval cystic lesion with internal echoes of variable echogenecity showing layering with fluid-fluid level of intracystic sebum and aqueous fluid.

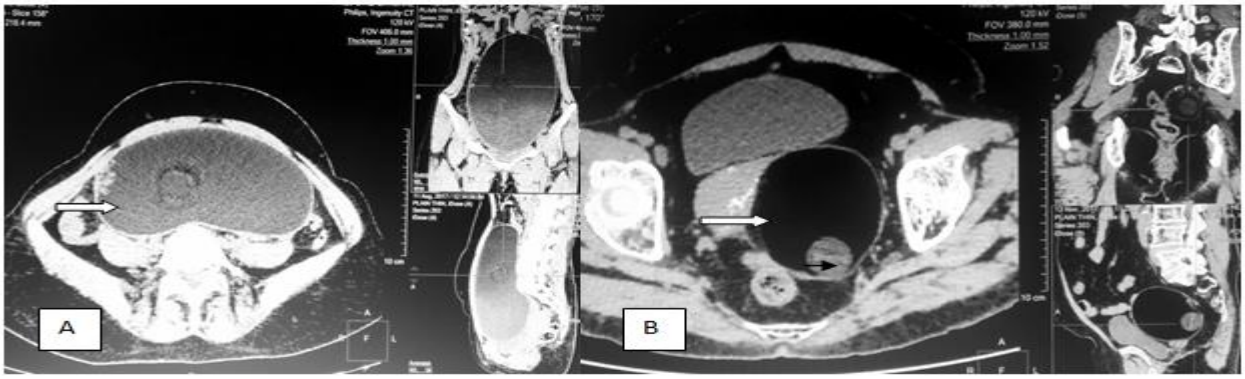


Fig 7: CT Images of two different cases (A) Large Oval Hypo-dense lesion (white arrow) of fatty attenuation and hypodense free floating densities (B) Large homogenous fatty attenuation lesion with internal dependent hypodense nodule likely Rokitanksy node (Black arrow)

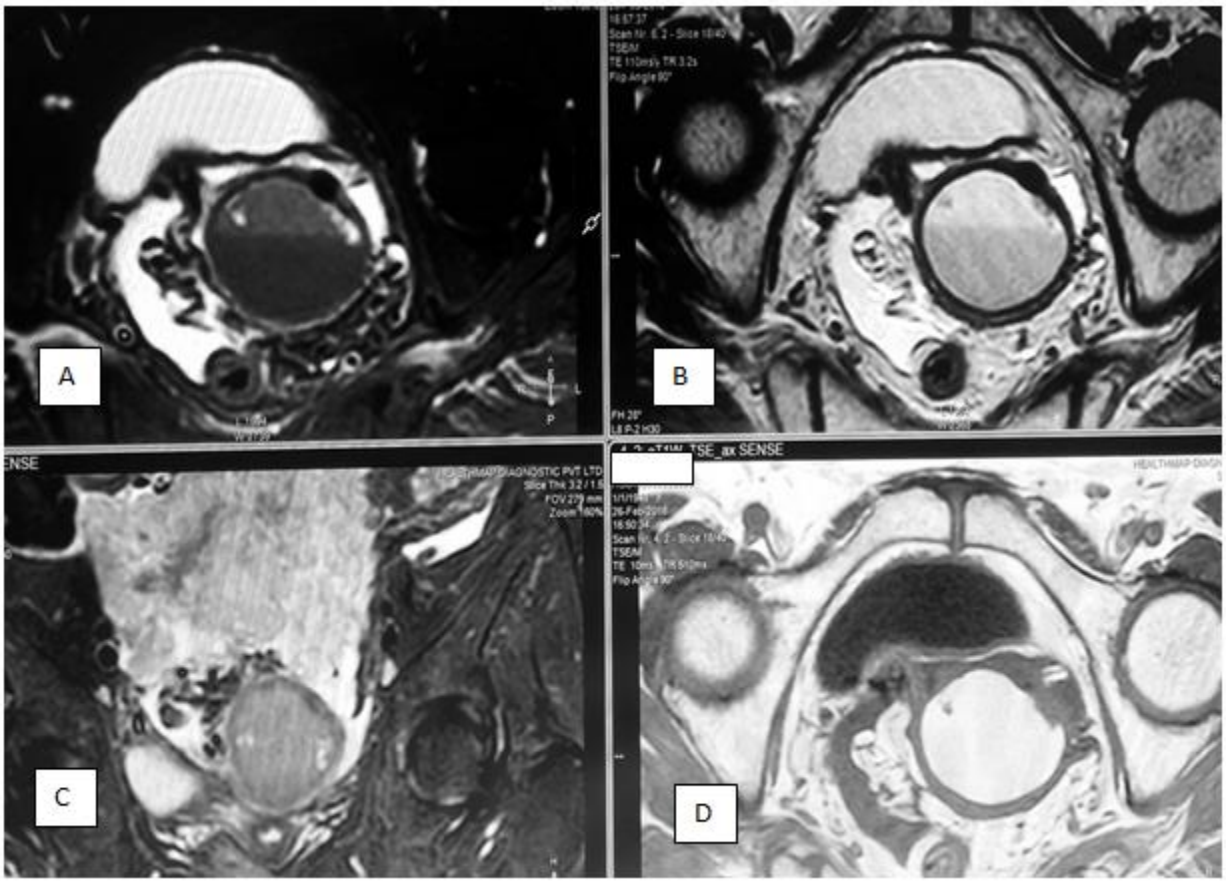


Fig 8: MR Images showing well defined lobulated left ovarian lesion as (D) TIW diffuse homogenous hyperintense and (B) T2W hyperintense with layering & fluid-fluid level of different intensities with suppression of fatty signal on FAT SAT sequences (A & C)

Conclusion

The mature cystic teratoma (Dermoid cyst) is the most common type of ovarian teratoma seen in women of reproductive age group. These are usually asymptomatic. Mature cystic teratomas (dermoid cysts) are predominantly cystic, whereas immature teratomas are predominantly solid with small foci of fat. Detection and morphological characterization of Ovarian Dermoids can be easily done on USG which can well demonstrate lipid material including sebaceous contents within the cyst cavity or adipose tissue within the cyst wall (dermoid plug). CT scan and MRI can adjunct USG in further characterization and detection of associated pathology in atypical cases. Fat (density less than -20 HU) and calcification detection is far easier on CT scan where as MRI can differentiate fatty element from hemorrhagic contents using different sequences.

Authors' contributions

The participation of each author corresponds to the criteria of authorship and contributorship as per guidelines. All the authors have actively participated in the formatting , editing & revision of the manuscript, and provided the final approval for publication

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