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Radiodiagnosis

MAGNETIC RESONANCE IMAGING THE GOLD STANDARD IN NONINVASIVE DIAGNOSIS OF OVARIAN MATURE TERATOMA WHICH ARE COMMONLY MISINTERPRETED AS OVARIAN MALIGNANCIES ON ULTRASOUND.

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ABSTRACT Ovarian mature cystic teratoma or an ovarian dermoid cyst is a common pathology in females under 30 years of age. It has complex constitution hence has variable imaging features on various imaging modalities which make its accurate diagnosis difficult on ultrasound leading to further evaluation with CT or Magnetic resonance imaging. We would be describing the imaging findings we encountered in our patients in this case series who were evaluated using Magnetic resonance imaging. Magnetic resonance imaging is non invasive and has no risk of radiation hence it's a modality of choice of imaging in the younger age group who present most commonly with ovarian mature cystic teratomas and have considerably higher risks involving exposure of radiation to the gonads.

KEYWORDS : Mature cystic teratoma, Magnetic resonance imaging, Dermoid cyst, Fat suppression.

INTRODUCTION:

In our case series we would like to highlight the variable patterns of presentation of ovarian mature cystic teratoma or ovarian dermoid cyst on magnetic resonance imaging. Magnetic resonance imaging findings possess high percentage of sensitivity and specificity for this condition arriving at this diagnosis accurately, hence, appropriate clinical decisions could be made aptly.

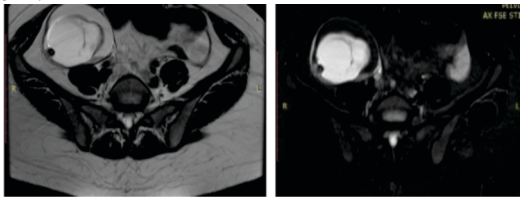
TECHNIQUES AND METHODS:

We have included 20 cases who were previously evaluated on ultrasound and reported as complex ovarian mass and were referred for magnetic resonance imaging for further evaluation. Non contrast magnetic resonance imaging was performed in these patients using GE optima 1.5 Tesla machine. Standard body and pelvis coils were used for imaging. Standard sequences of Magnetic resonance imaging of the female pelvic examination were included namely T1W imaging sagittal and coronal sections, T2W sagittal, axial, coronal sections, STIR axial sections , T1W Fat saturated axial and sagittal, DWI, Dual-echo gradient-echo Dixon sequence. In this series of 20 patients we would like emphasize about the accuracy of the Magnetic resonance imaging signs most commonly encountered in ovarian dermoid cysts.

OBSERVATION:

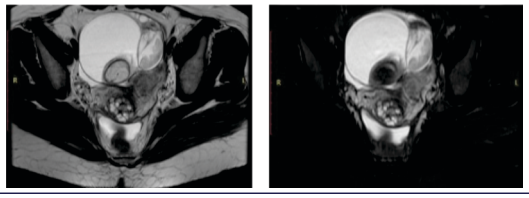
We would be presenting our observations necessarily as a pictorial essay since our specialty of radio-diagnosis is a visual based stream of medical imaging science. We aim to elicit our findings that will lead to easy understanding and accurate image interpretation of the pathology. We would be also explaining the Magnetic resonance imaging signs and describe them in brief.

CASE I:



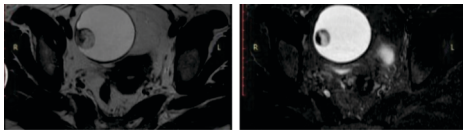
CASE I : These are T2W and STIR axial images of a right ovarian mature cystic teratoma demonstrating a hypointense focus within the cystic component of the lesion representing a “tooth”. There is fat suppression of the peripheral fat component observed.

CASE II:



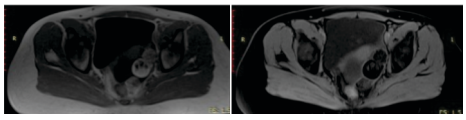
CASE II: These are T2W and STIR axial images of a right ovarian mature cystic teratoma demonstrating a “Rokitansky nodule” within the cystic component of the lesion with suppression of the fat component .

CASE III:



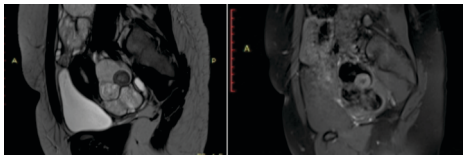
CASE III: These are T2W and STIR axial images of a right ovarian mature cystic teratoma demonstrating a “Rokitansky nodule” within the cystic component of the lesion with fat suppression of the interspersed fat component. This lesion was diagnosed as ovarian malignancy on ultrasound due to its predominantly cystic component with a peripheral mural nodule.

CASE IV:



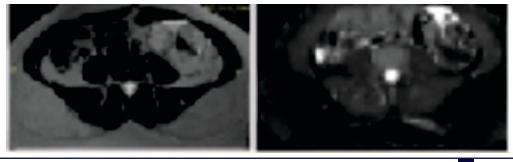
CASE IV: These are T1W and T1fat saturation axial images of a left ovarian mature cystic teratoma demonstrating majority of the lesion made of fat component with signal loss on fat suppression. This lesion was reported as a solid ovarian mass on ultrasound due to its predominantly fatty component.

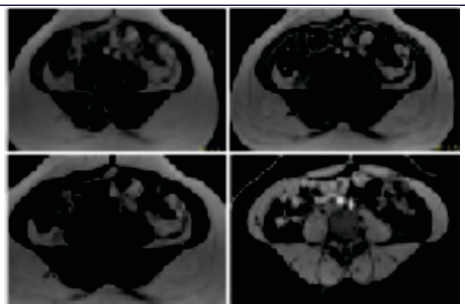
CASE V:



CASE V: These are T2W and T1 fat suppression sagittal images of a left ovarian dermoid cyst depicting a “Rokitansky nodule” within the predominant anterior fatty component of the lesion and small posterior cystic component with loss of signal of the fatty component on fat suppression. Note the significant degradation due to artefact from bowel motion.

CASE VI:





CASE VI: These are T2W and STIR, dual-echo gradient-echo Dixon sequence axial images (respectively in phase, out of phase, fat only and water only images) of a left ovarian mature cystic teratoma demonstrating central tooth, anterior cystic and large posterior fat components with suppression of fat. Note the chemical shift artifact seen in the out of phase images along the fat interfaces of the lesion which confirms the presence of fatty tissue. Water only images derived from dual-echo gradient-echo Dixon sequence serves as an excellent modality of fat suppression with clear image details and less susceptible to bowel motion artefacts.

DISCUSSION:

Ovarian teratomas include mature cystic teratomas (dermoid cysts), immature teratomas and monodermal teratomas. [1] The commonest of these lesions are mature cystic teratomas i.e. dermoid cysts. [2] An ovarian dermoid cyst (DC) or a benign cystic teratoma or mature cystic teratoma is a benign tumor arising from germ cells. These are also the commonest germ cells tumors. [3] These tumors are composed of elements from all three layers i.e. ectoderm (skin and neural tissue), mesoderm (muscle, fat, cartilage, bone) and endoderm (epithelium which may be mucinous or ciliated epithelium or thyroid tissue). Mesodermal element of fat is seen in 75% to 80% of tumors. [4]Bilateral ovarian dermoid cysts are fairly rare approximately observed in 10-15% of cases. [5]

MRI is the most sensitive tool to diagnose an ovarian dermoid and is of gold standard in non invasive imaging diagnosis of the same. In our discussion we will try to understand the characteristic findings on various sequences on Magnetic resonance imaging. On magnetic resonance imaging the T1 weighted sequences demonstrate very high signal intensity within the ovarian lesion similar to that of the surrounding intraperitoneal fat signal intensity. The T2 weighted sequences demonstrate variable high signal intensity close to that of intraperitoneal fat. [6] These high intensity signals are caused due to shortening of T1 and T2 signals within the ovarian lesion. This imaging characteristic is not sensitive as it is also demonstrated by chronic hemorrhage within the ovarian lesions commonest of these are ovarian endometriomas. [7] Initially short-inversion-time inversion recovery sequences i.e. STIR sequences were utilized to look for fat suppression. Although suppression of hyperintense signal or low signal on STIR is not specific for fat but is also observed in chronic blood products seen in hemorrhagic ovarian cysts and endometriomas. [8] Magnetic resonance has other three methods to distinguish the sebaceous contents of a mature cystic teratoma from chronic hemorrhagic component. This problem was overcome by the advent of three new sequences in magnetic resonance imaging namely Chemical shift artifact in the frequency-encoding direction (9). Gradient-echo imaging with an echo time in which fat and water are in opposite phase demonstrate fat-water interfaces and mixtures of fat and water (10). Frequency selective fat saturation sequences will suppress the high signal of adipose tissue in the ovarian dermoid and help distinguish them from ovarian hemorrhagic lesions. [11] Spin-echo frequency selective fat saturation sequences need more imaging time. Bowel peristalsis and respiration induced movements and magnetic field and phase inhomogeneities are known to cause artefact and image degradation. [12] Implementation of any of these sequences in MR imaging for evaluation of ovarian lesions aid accurate differentiation between cystic mature teratomas and ovarian hemorrhagic cysts or ovarian endometriomas. [13] Complications of ovarian dermoids include ovarian torsion (16-25%), rupture of dermoid cyst (1–5%), infection of the dermoid cyst (1%), malignant transformation usually squamous cell variety (1-2%), rarest of all autoimmune hemolytic anemia (<1%). [14] Rupture of an ovarian dermoid could either be spontaneous or following a torsion of the ovary which are seen in ovarian dermoids larger than 7 cm in size. A ruptured ovarian dermoid cyst may cause complications like significant intraperitoneal hemorrhage or hemoperitoneum leading to hypovolemic shock or acute chemical peritonitis. Rarely, persistent, small, chronic leaks from the ovarian dermoid cyst can cause granulomatous peritonitis. [15]

CONCLUSION:

From our study we confidently conclude that magnetic resonance imaging is of gold standard in diagnosis of mature cystic teratoma and excluding them from other ovarian neoplasms which are frequently misinterpreted as ovarian malignancies on ultrasound due to variable inconsistent ultrasound imaging findings varying from patient to patient.

CONFLICTS OF INTEREST:

Authors would like to confirm that there are no conflicts of interest.

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