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Ovarian Dysgerminoma - Case Report with Comprehensive Review of Literature

Dr . SAAVI REDDY PELLAKURU[1], Dr . DILEEP REDDY AYAPANENI[2], Dr . SUNIDHI SIRIKONDA[3], Dr . NLN MOORHY[4]

[1](Junior Resident , Department of Radio-diagnosis, Apollo Institute of Medical Sciences And Research)
[2](Senior Resident , Department of Radio-diagnosis, Apollo Institute of Medical Sciences And Research)
[3](Junior Resident , Department of Radio-diagnosis, Apollo Institute of Medical Sciences And Research)
[4](Head Of Department , Department of Radio-diagnosis, Apollo Institute of Medical Sciences And Research)

INSTITUTION: Apollo Institute Of Medical Sciences And Research ,Apollo health City Campus, Road No.92, Jubilee Hills, Film Nagar, Hyderabad, Telangana 500090, India. Phone no.- 040-23285555, Mail Id- aimsresearch1@gmail.com

ABSTRACT:
Ovarian dysgerminoma, a rare malignant germ cell tumor with a generally favorable prognosis, predominantly impacts women in their reproductive age. While histopathology remains the gold standard for definitive diagnosis, early detection is facilitated through radiological imaging. Distinguishing clinical as well as imaging features, such as the presentation of a solid lobulated mass with fibrovascular septa, aid in differentiation from other ovarian neoplasms. This report highlights the imaging findings of ovarian dysgerminoma in a 26-year-old nulliparous woman who presented with severe abdominal pain and a decade-long history of secondary amenorrhea.

KEYWORDS: *Magnetic Resonance Imaging, Ovarian tumors, Ovarian dysgerminoma, Radiology*

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I. INTRODUCTION:

The ovary is the site of a heterogeneous group of neoplasms owing to the multitude of cell types present in situ and its intimate relationship with the distal fallopian tube. Ovarian tumors are categorized into epithelial tumors, mesenchymal tumors, sex cord-stromal tumors, and germ cell tumors[1]. While the majority of ovarian neoplasms are benign or borderline, malignant varieties represent a significant public health threat, being the 8th most common cause of death due to cancer in women[2]. We present a case of ovarian dysgerminoma, which represents 1-2% of all ovarian neoplasms. With an evolving understanding of the histological subtypes and subtype-specific treatment of carcinomas, it is imperative that radiologists understand the distinguishing radiological imaging features of these subtypes and work closely with pathologists and gynecologists to correlate imaging features of each subtype to reduce patient morbidity.

II. CASE REPORT:

A 26-year-old nulliparous woman presented with severe lower abdominal pain. She gave a history of secondary amenorrhea of 10 years, following menarche at the age of 16 years. On per-abdomen examination, a non-tender solid mass, showing restricted mobility and measuring approximately 15x15 cm was noted. Her per-vaginal examination was also suggestive of a non-tender, firm, solid mass.

On ultrasound examination, a well-defined lobulated abdominopelvic mass showing irregular margins with vascularity within was noted, along with minimal free fluid in the pelvis and left hydroureteronephrosis. The uterus appeared normal in size and morphology, however, both ovaries could not be visualized.

On serological examination, the patient was noted to have raised serum LDH (1358 U/L) and TSH (12.25mIU/L) levels. Her serum CA 125, CA 19-9, and CEA were noted to be within normal range.

Suspecting malignancy, MRI Pelvis was done. It revealed the presence of a large fairly well-defined multilobulated mass, measuring approximately 18x14x11cm (CCxTRxAP) showing T1WI hypointensity [Figure 1], T2/SPAIR heterogeneous, predominantly hyperintensity [Figure 2,3], diffusion restriction on DWI [Figure 5] and exhibiting corresponding low ADC values of $1.054 \pm 0.154 \times 10^{-3}$ mm^2 /s [Figure 6].

The septa appear hypointense on T1WI and T2WI, showing blood vessels within on heavy T2WI. The lesion is noted arising from the left adnexa and crossing the midline.

Rectum and peri-rectum fat planes were maintained. The rest of the visualized soft tissues and solid organs were unremarkable.

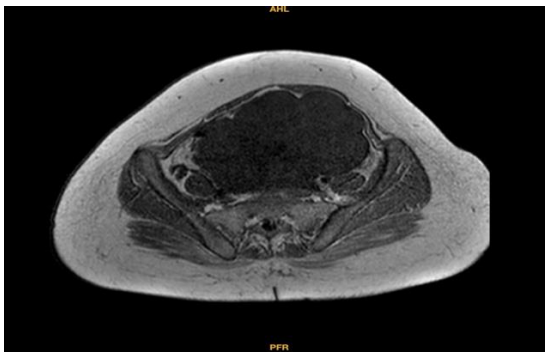

Figure 1: T1W axial section showing homogenously hypointense lobulated mass lesion of size measuring approximately in 14x11cm (TR x AP) in pelvis

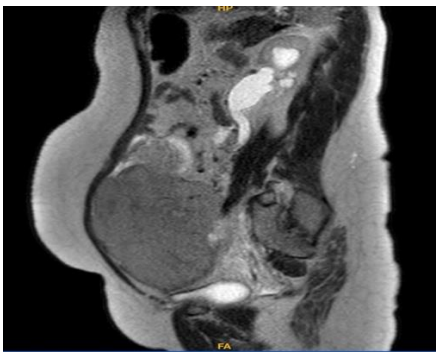

Figure 2: T2W sagittal section showing heterogeneous, predominantly hyperintense mass with characteristic fibrovascular septa appearing hypointense and also showing left hydroureteronephrosis.

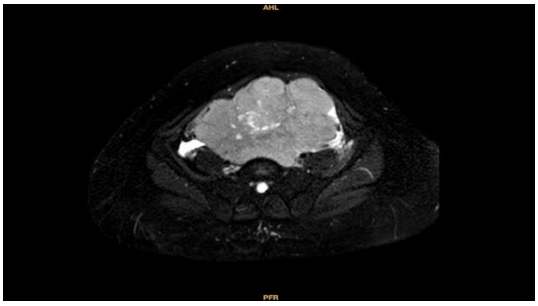

Figure 3: Axial section of SPAIR sequence showing heterogenous, predominantly hyperintense mass with the characteristic fibrovascular septa appearing hypointense.

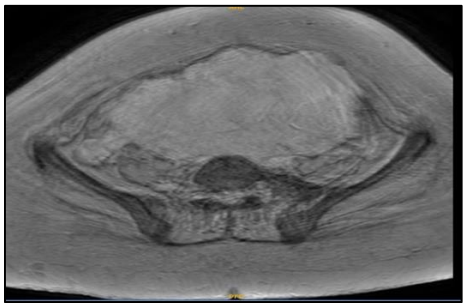

Figure 4: Axial section of GRE sequence, showing mass with no evidence of blooming.

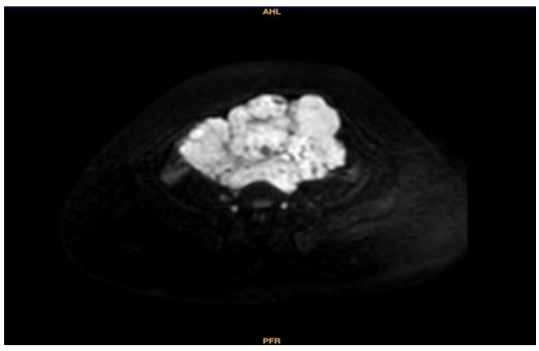

Figure 5: Axial section of DWI sequence, read at B-1000mm^2/sec, showing high signal intensity mass in pelvis with low signal intensity septa.

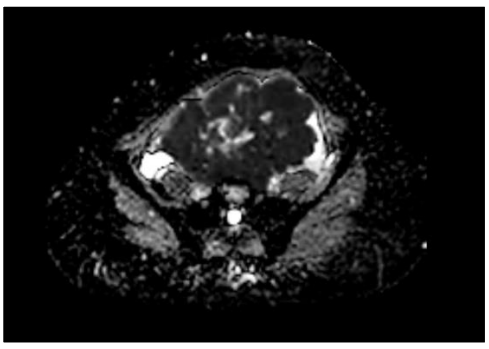

Figure 6: Axial section of the pelvic mass showing corresponding low ADC values.

The chief differential diagnosis reached was ovarian dysgerminoma. The patient was taken for diagnostic laparoscopy, frozen section of the tumor confirmed the presence of ovarian dysgerminoma (FIGO Stage I).

III. DISCUSSION:

Dysgerminomas are the most common ovarian tumors in adolescents and young women, in the 2nd-3rd decade of life, however, they can occur in any age group. Due to its age incidence, dysgerminoma is one of the most common ovarian neoplasms occurring during pregnancy and puerperium[3].5-10% of them occur in subjects with gonadal maldevelopment and chromosomal abnormalities[4].

Abdominal pain, abdominal distension, and palpable mass are common symptoms at presentation. In women with primary amenorrhea, they are usually associated with gonadoblastomas. In women presenting with acute abdominal pain, the tumor may show extensive necrosis and hemorrhage[5].

Dysgerminomas are the ovarian counterpart to testicular seminoma. They do not secrete hormones. The primary serum tumor marker of dysgerminomas is lactate dehydrogenase, which is produced by syncytiotrophoblasts contained within. There is a good correlation between the amount of tumor present and the serum enzyme levels, thus limiting its use[6].

Dysgerminoma is mainly unilateral, but bilateral involvement is observed in approximately 10% of cases.

On ultrasound imaging, dysgerminomas frequently appear as a solid mass without specific features. In most cases, it consists of a multilobulated tumor with smooth contours, well-defined borders, and heterogeneous echogenicity, characterized by prominent fibrovascular septa. Necrosis, hemorrhagic areas, and speckled calcifications may also be depicted. Under color or power Doppler ultrasound imaging, it is highly vascularized, revealing a prominent flow in the septa[7].

CT scan has a limited value in the primary detection and characterization of an ovarian tumor.

Increasingly, MRI is being used to characterize ovarian lesions that are indeterminate in ultrasound. The most characteristic appearance at MRI is that of a solid mass divided into lobules by fibrovascular septa. Dysgerminomas have low signal intensity relative to muscle on T1WI, isointense or slightly hyperintense on T2WI and high signal intensity on DWI with corresponding low ADC values. They show intense to moderate post-contrast enhancement with few exceptions in cases of tumors with extensive necrosis[8].

The characteristic fibrovascular septa appear hypo or isointense on T2-weighted images and are difficult to appreciate on T1-weighted images and show intense enhancement of fibrovascular component after administration of contrast material. Septa may be hyperintense on T2-weighted images when major edematous changes are present[8].

Multilocular cystic masses with papillary projections and irregular septations that mimic epithelial ovarian neoplasms have also been described[9].

DIFFERENTIAL DIAGNOSIS:

Dysgerminomas have to be differentiated from other common primary ovarian tumors which typically present predominantly as solid tumors. They include granulosa cell tumors, Sertoli Leydig cell tumors, embryonal carcinomas, endometriomas, Brenner tumors, fibromas, ovarian teratomas, and choriocarcinomas. Characteristic clinical and MR imaging features are an essential problem-solving tool here. Granulosa cell tumors and Sertoli Leydig cell tumors are hormonally active, producing estrogen and androgen respectively, with non-specific imaging findings. Clinical evidence of hormonal effects may help guide differential diagnosis. Endometriomas are predominantly solid ovarian tumors, typically associated with endometriosis. Fibrous tumors, the most common of which is fibroma, show faint to none post-contrast enhancement on MRI. The presence of dense calcification and scattered high signal areas indicating edema or cystic degeneration also favor the presence of fibromas. Mature cystic teratomas, the most common germ cell tumor, present as complex masses that may contain bone, teeth, or calcification, occasionally filled with fatty tissue. Brenner tumors are typically benign solid ovarian tumors, do not show diffusion restriction, and show amorphous calcifications with mild post-contrast enhancement. Embryonal carcinomas are most commonly associated with components of yolk sac tumors, immature teratomas, and dysgerminomas and present on MRI as predominantly solid tumors with large cystic (mucoid- filled) spaces. Choriocarcinomas, one of the rare germ cell tumors, are highly vascular complex solid-cystic masses with large signal voids and are isointense to slightly hypointense on T1WI with scattered areas of hemorrhage, which when present are bright on T1- and T2-weighted sequences[9 10].

IV. CONCLUSION:

The characteristic imaging findings along with typical clinical manifestations help in the early diagnosis of ovarian dysgerminomas which can further guide the fertility-sparing management in young women.

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