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Case Report

Imaging appearance of ovarian dysgerminoma: A report of two cases ☆

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ABSTRACT

Ovarian dysgerminoma is a rare germ cell tumor accounting for 1%-2% of all malignant ovarian tumors and is generally associated with a good prognosis. The condition is more frequent in young women and can arise in dysgenetic gonads that contain gonadoblastomas. Imaging findings, particularly MRI, have a prominent role in the early and correct identification of ovarian dysgerminoma, the most common ovarian malignant germ cell tumor. On CT and MR images, ovarian dysgerminoma often appears as a large, solid mass. The edematous condition of characteristic fibrovascular septa can be well displayed by imaging, which can guide the radiologists to make an accurate diagnosis. This article describes 2 cases of patients with ovarian dysgerminoma who presented with pelvic pain. Imaging showed a right ovarian mass that was surgically and histologically confirmed.

Introduction

Ovarian dysgerminoma, the female counterpart of testicular seminoma, derives from primitive germ cells. It is the most common ovarian malignant ovarian germ cell tumor, accounting for 32.8%-37.5% of them, followed by immature teratomas, yolk sac tumors, and mixed germ cell tumors. Dysgerminoma usually occurs in the second and third decades of life, but 10% of cases occur in the first decade of life. Bilateral ovaries are involved in up to 10%∼15% of cases [1]. The most common presenting symptom is a palpable pelvic or abdominal mass. Abdominal pain, distention, and irregular menstruation are the next most prevalent symptoms [1].

In order to differentiate dysgerminoma from a wide range of adnexal masses, preoperative imaging is essential to surgical decision-making. Computed tomography (CT) is widely used in diagnosing female pelvic bulk masses for the advantages of the large field of vision (FOV), reconstruction techniques, and demonstration of the feeding vessels of

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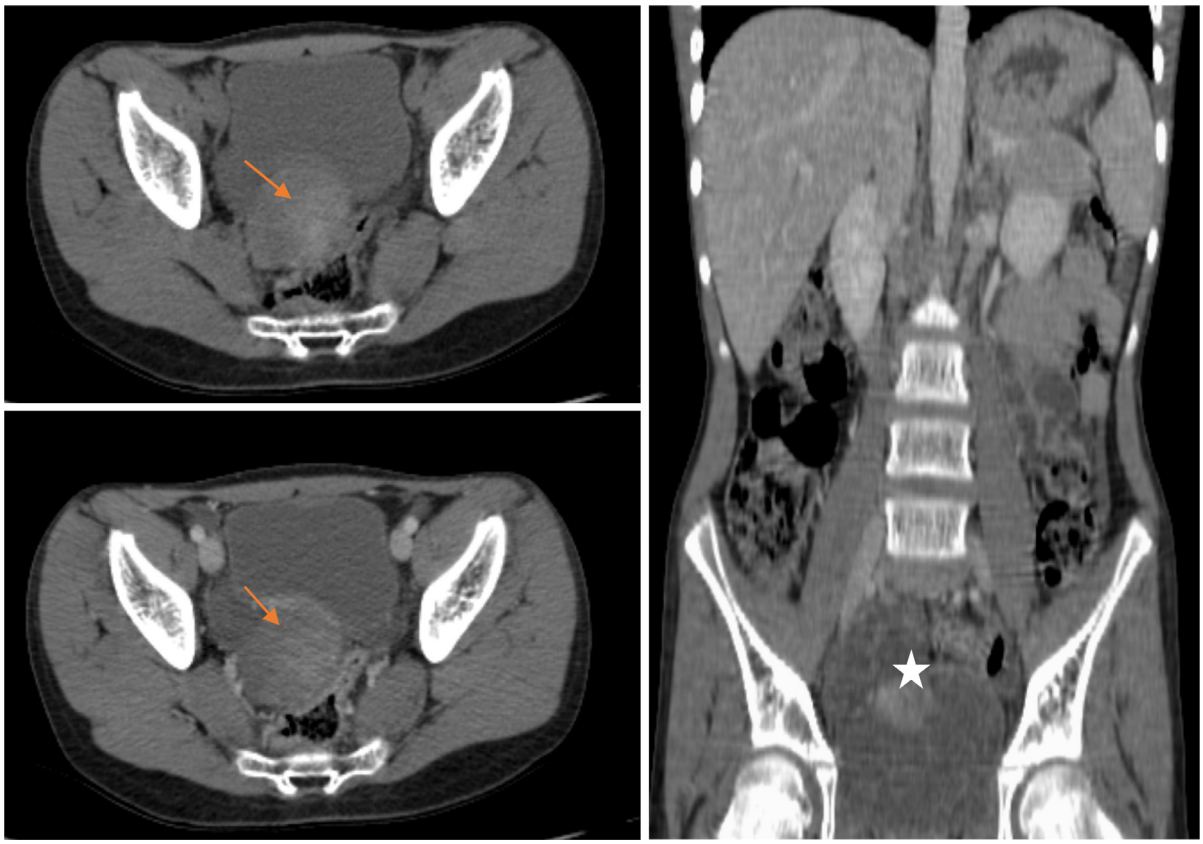

Fig. 1 – Right ovary enlarged, associated with a cystic lesion (orange arrow), spontaneously hyperdense, well limited, with regular contours, unchanged after contrast injection, and whirlpool sign in the right adnexal (white star).

the tumors [1]. MRI, particularly DWI and DCE, are the key sequences for characterizing ovarian masses and narrowing the differential diagnosis.

Materials and methods

We report 2 cases of patients hospitalized in our pediatric department from January 2019 to January 2022.

Case presentation

Case 1

A 10-year-old girl presented with complaints of suprapubic pain in the right quadrant of the abdomen.

On presentation, the patient's vital signs were stable.

The abdominal examination revealed tenderness in the right iliac fossa.

An ultrasound examination demonstrated the right ovarian torsion. A CT scan demonstrated a lobulated mass measuring approximately 4 x 3 cm, originating from the right ovary, and a whirlpool sign suggesting ovarian torsion (Fig. 1).

Per-operative evaluation of the surgical incision confirmed the diagnosis and revealed an enlarged necrotic right ovary with 2 turns of spires; this aspect is extended over almost the entire tube and the lumbo-ovarian ligament (Fig. 2).

Left adnexa was normal.

An adnexectomy was performed.

No postoperative complications were noted.

The histologic specimen was diagnosed as pure dysgerminoma.

The patient did not receive chemotherapy and underwent, after 2 months, a follow-up CT scan, which came back without recurrence, and the serum tumor markers (AFP and HCG) were normal.

Case 2

A 3-year-old child girl with an unremarkable medical history was admitted for the early development of sexual characteristics. Her general condition was good.

The examination revealed pubic and axillary hair, gynecomastia and "café au lait" spots, pubertal stage P3S3, and a hypogastric mass.

The blood test showed: LDH: 386 (normal: 120–230 IU/l), AFP: 1.12 (normal: <10 ng/mL), estradiol: 81,99 (normal: <35 ng/mL), BHCG: <2.

A pelvic ultrasound scan shows a suprauterine and supravesical mass, more developed on the left side, probably ovarian.

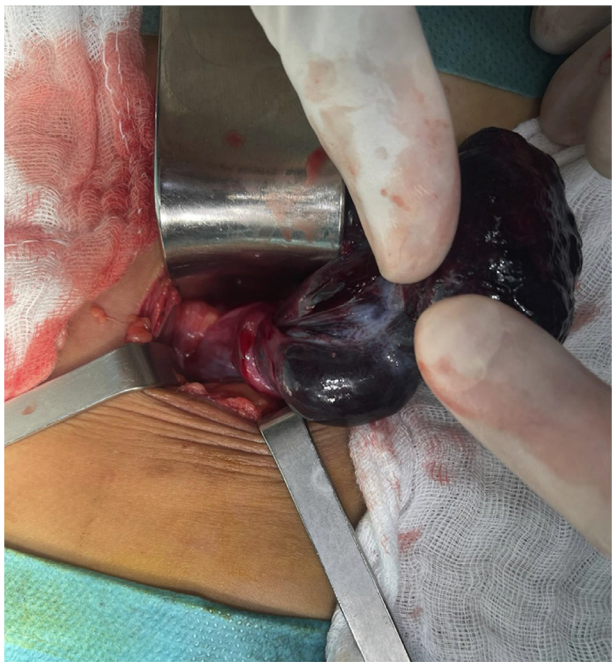

Fig. 2 – Per operative image showing an enlarged necrotic right ovary with 2 turns of spires, this aspect is extended over almost the entire tube and the lumbo-ovarian ligament.

A CT scan was performed, showing lobulated mass at the left ovary measuring 12 x 6 x 6 cm and heterogeneous enhancement on postcontrast (Fig. 3).

We completed a pelvic MRI, which objectified the presence of a large supravesical mass, well-defined, with septa and heterogeneous enhancement (Fig. 4).

Abdominal exploration revealed a huge mass dependent on the right ovary, which could not be extracted via infraumbilical surgery. A supraumbilical enlargement was performed. The mass was resected with preservation of the right ovarian stump.

The histologic specimen was diagnosed as pure dysgerminoma.

The tumor mass was undifferentiated on anatomopathological examination, so it was decided to administer adjuvant chemotherapy according to the TGM 95 protocol.

Discussion

Ovarian dysgerminoma is the most prevalent malignant germ cell tumor of the ovary, affecting mainly women in the second to third decade. It is more likely to appear in the right ovary. It is reported that the tumors were 51% located in the right ovary, 32% in the left ovary, and 17% bilateral [1,2].

In the current study, both cases had a right-sided lesion. The histological reason for this predilection is that the differentiation of ovarian tissue on the right side proceeds more slowly and to a lesser degree than it does on the left side [1,2].

Furthermore, of all malignant germ cell tumors, ovarian dysgerminoma may be the only tumor that can develop bilaterally [3]. Dysgerminoma may be associated with dysgenetic gonads and sexual maldevelopment, including within the context of Turner syndrome, testicular feminization, and triple X syndrome, and is almost always associated with an elevated serum lactic dehydrogenase, usually isoenzymes. Elevation of serum b-HCG and AFP has also been reported [4].

The ipsilateral ovarian arteries may expand if there is an ovarian mass. Consequently, the “ovarian vascular pedicle sign” that Lee et al. describe is also a useful sign to determine the exact site of origin of the mass, especially in cases of ambiguous locations due to the large size of the mass or when complications like torsion arise [5].

Torsion of the ovarian vascular pedicle has previously been described as an important feature of ovarian torsion on CT and MRI [6].

The typical imaging appearance of ovarian dysgerminoma consists of a large, well-encapsulated, multilobulated, purely, or predominantly solid mass. It is generally in high signal on T2 and can be heterogeneous in cases of large mass. Consistent with its malignancy, ovarian dysgerminoma displayed a high signal intensity on DW imaging with a mean ADC value low to $0.830 \pm 0.154 \times 10\text{-}3\,mm^2/s$. Unlike yolk sac tumors, ovarian dysgerminomas usually have an enhancement lower than myometrium on contrast-enhanced CT and MR images [1,7].

Fibrovascular septa in the tumor are a typical imaging feature of dysgerminoma, as Tanaka first reported in 1994. Due to their fibrous content, the classic fibrovascular septa appear as hypointense lines on T2-weighted images and exhibit enhancement following contrast administration on both CT and MR images [1].

The fibrovascular septa, due to the stromal edema, may become thickened, even amorphous in shape, hyperintense on T2-weighted images, and even low attenuation on CT images with a slight enhancement. Depending on the extent of edema, we divided the septa into 4 types: thin non-edematous septa, thin edematous septa, thick edematous septa, and map-shaped edematous septa. The map-shaped edematous septa are only found in voluminous masses. The presence of stromal edema may be crucial for precise diagnosis as it can significantly influence the morphology, signal intensity, and attenuation of the fibrovascular septa, or even the entire lesion.

Unlike yolk sac tumors, ovarian dysgerminoma may also contain necrosis, hemorrhages, tiny cystic alterations, or calcifications. [1].

MRI may contribute to distinguishing dysgerminoma from other OMGCTs, solid non-OMGCTs and epithelial ovarian tumors. Concurrently, MRI plays an important role in local and extra-ovarian staging of dysgerminoma, in preoperative planning, and in the detection of recurrencies [8]. For women with ovarian germ cell tumors, there are various therapy options available. Four types of standard treatment are used: surgery, observation, chemotherapy, and radiation therapy. The main treatment for OD is surgery, which often allows for fertility preservation [9].

New types of treatments are being tested in clinical trials. High-dose chemotherapy with a bone marrow transplant. The treatment for ovarian germ cell tumors may cause side effects. Follow-up tests may be needed [10].

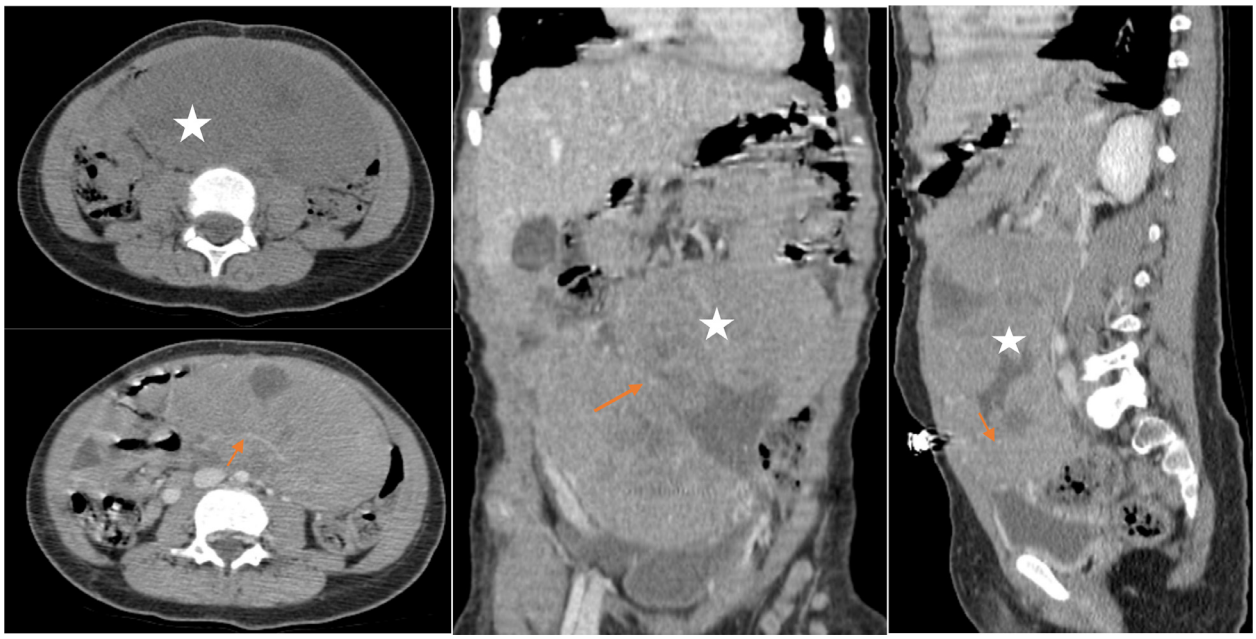

Fig. 3 – Pre-contrast and post-contrast CT scan images show a voluminous supravesical low density mass (white star) with enhancement after contrast (orange arrows), suggesting the presence of septa separating the mass into lobules, more visible on MRI.

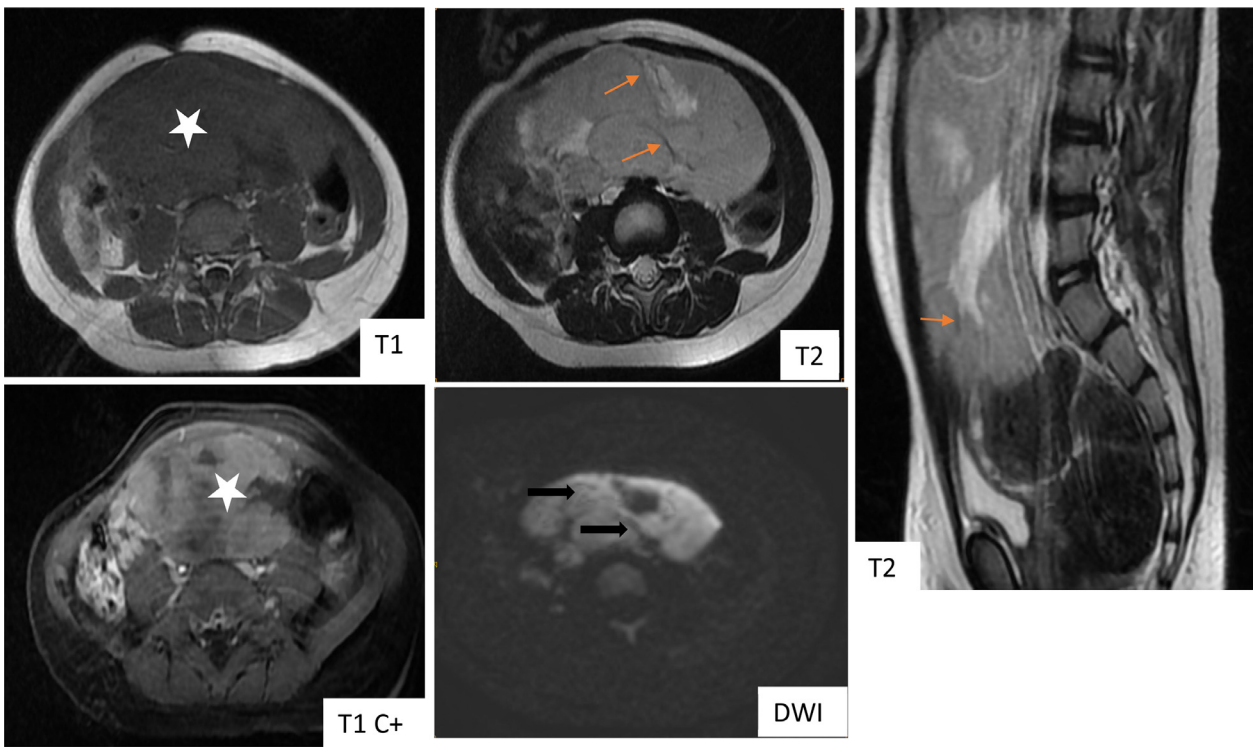

Fig. 4 – MRI images show a large multi-lobulated heterogeneous mass (white star) with thin, hypointense septa (orange arrows). This mass is restrictive on DW imaging, while the septa have low signal intensity (black arrows) on DW imaging.

Conclusion

Ovarian dysgerminoma is a rare germ cell tumor that can be challenging to diagnose. While histological examination is the only means of definitive diagnosis, various radiological features should prompt suspicion of its presence. The best imaging method for assessing these radiologic features is MRI, which allows an accurate characterization of OD showing a large, solid, and lobulated tumor with markedly enhancing septa in a young woman [9]. Knowledge of the pathology, symptoms, and markers of OD is also essential to optimizing the radiological interpretation and enabling timely treatment and appropriate follow-ups [9].

Patient consent

Informed written consent was obtained from both patients for publication of the Case Report and all imaging studies.

REFERENCES

[1] Zhao S, Sun F, Bao L, et al. Pure dysgerminoma of the ovary: CT and MRI features with pathological correlation in 13 tumors. J Ovarian Res 2020;13:71. doi:10.1186/s13048-020-00674-z.

[2] Santesson L. Clinical and pathological survey of ovarian tumors treated at Radium hemment: dysgerminoma. Acta Radiol 1947;28:644–68.

[3] Heo SH, Kim JW, Shin SS, Jeong SI, Lim HS, Choi YD, et al. Review of ovarian tumors in children and adolescents: radiologic-pathologic correlation. Radiographics 2014;34:2039–55.

[4] Euscher ED. Germ cell tumors of the female genital tract. Surg Pathol Clin 2019;12(2):621–49. doi:10.1016/j.path.2019.01.005.

[5] Khandwala K, Shahid J, Nadeem N, Tariq MUU. Torsion of ovarian dysgerminoma in a child: role of computed tomography. Cureus 2018;10(4):e2522. doi:10.7759/cureus.2522.

[6] Singha T, Prabhakara N, Singlab V, Bagga R, Khandelwal N, et al. Spectrum of magnetic resonance imaging findings in ovarian torsion. Pol J Radiol 2018;83:e588–99.

[7] Li YK, Zheng Y, Lin JB, et al. CT imaging of ovarian yolk sac tumor with emphasis on differential diagnosis. Sci Rep 2015;5:11000. doi:10.1038/srep11000.

[8] Cacioppa LM, Crusco F, Marchetti F, Duranti M, Renzulli M, Golfieri R. Magnetic resonance imaging of pure ovarian dysgerminoma: a series of eight cases. Cancer Imaging 2021;21(1):58. doi:10.1186/s40644-021-00427-1.

[9] Amante S, Félix A, Cunha TM. Ovarian dysgerminoma: clues to the radiological diagnosis. Diagn Interv Radiol 2023;29(1):18–23 Epub December 21, 2022. doi:10.5152/dir.2022.21317.

[10] PDQ® Adult Treatment Editorial Board PDQ ovarian germ cell tumors treatment, Bethesda, MD: National Cancer Institute; July 2022. Available at: https://www.cancer.gov/types/ovarian/hp/ovarian-germ-cell-treatment-pdq [PMID: 26389449].