CASE REPORT

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Source of financing: self-financed

Conflict of interest: none

Statement of use of artificial intelligence: No artificial intelligence was used in the analysis of the study or in the preparation of the manuscript.

Received: 27 November 2023

Accepted: 31 March 2024

Online publication: 5 June 2024

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Cite as: Lacunza Paredes RO. Ultrasonographic characteristics of dysgerminoma, apropos of 3 cases. Rev peru ginecol obstet. 2024;70(29. DOI: https://doi.org/10.31403/rpgo.v70i2634

Ultrasonographic features of dysgerminoma, apropos of 3 cases

Características ultrasonográficas del disgerminoma, a propósito de 3 casos

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DOI: https://doi.org/10.31403/rpgo.v70i2634

ABSTRACT

Ovarian germ cell tumors are a very diverse histologic group. The most frequent malignant tumor of this lineage is dysgerminoma, which mainly affects young women. There are few reports on the particular characteristics on ultrasound, being included dysgerminoma indistinctly in series of ovarian tumors as a solid mass. Computed tomography and magnetic resonance have contributed significantly to the characterization of dysgerminoma. The following is a description of three cases of dysgerminomas suspected by ultrasound, in order to determine common characteristics and contrast them with the findings in the literature.

Key words: Ovarian neoplams, Dysgerminoma, Ultrasonography

RESUMEN

Los tumores de células germinales del ovario constituyen un grupo histológico muy variado. El tumor maligno más frecuente de esta estirpe es el disgerminoma, que afecta principalmente a mujeres jóvenes. Existen pocas comunicaciones sobre las características particulares al ultrasonido, siendo incluido el disgerminoma indistintamente en series de tumoraciones ováricas como una masa sólida. La tomografía y resonancia han contribuido de forma importante a la caracterización del disgerminoma. A continuación, se describe tres casos de disgerminomas sospechados por el ultrasonido, de manera de poder determinar características comunes y contrastarlas con los hallazgos en la literatura.

Palabras clave. Neoplasias ováricas, Disgerminoma, Ultrasonografía

Introduction

Ovarian germ cell tumors (OGCT) represent a very varied histological group that includes mature teratoma, immature teratoma, mature teratoma with malignant degeneration, dysgerminoma, yolk sac tumor, embryonal carcinoma, choriocarcinoma, among others. The most frequent benign tumor of this lineage is mature teratoma and the most frequent malignant tumor is dysgerminoma. They constitute 20% of all ovarian tumors and only 5% of malignant tumors.

The incidence of malignant germ cell tumors is approximately 0.34 to 0.41 per 100,000 women, affecting mainly in the first decades of life[(1)]. They may present with symptoms related to the size of the mass, such as abdominal pain, pedicle torsion, hemorrhage or capsule rupture. The characteristic tumor markers of these tumors are hCG-beta, alpha-fetoprotein and lactate dehydrogenase (LDH), which have characteristic patterns according to the type of cell lineage[(1,2)].

Dysgerminoma accounts for 35% of all malignant OGCT and is the most frequent. Equivalent to testicular seminoma, it has an incidence of approximately 0.1/100,000 women and occurs predominantly in adolescents and young adults. Pure dysgerminomas have no hormone production, but the presence in 5% of cases of syncytiotrophoblast portions is associated with hCG-beta elevation. Also, when it presents as a mixed germ cell tumor associated with yolk sac tumor elements, it can produce elevated alpha-fetoprotein[(1,2)].

Macroscopic examination shows a solid mass with different soft and fleshy lobules, gray, white or light yellow in color. Areas of coagulative necrosis and hemorrhage can be observed, with cystic changes[(1)].

The following are three cases of dysgerminoma suspected by ultrasound and confirmed by surgical and histological findings.

Cases presentation

Case 1. A 21-year-old woman G0P0 presented to the physician with increased abdominal volume and a feeling of heaviness. She denied menstrual irregularity. Abdominal ultrasound showed an elongated solid mass at the pelvic level, 197 x 68 x 100 mm, which appeared to be dependent on the right ovary and with outline of external lobulations, hypoechogenic with hyperechogenic areas (Figure 1A). The central area was hyperechogenic and with increased vascularization (Figure 1B), the external borders were smooth, with no presence of free fluid. The tumor was classified as probably malignant and was referred to gynecologic oncology. The tumor markers, the assessment according to IOTA and the final result can be seen in Tables 1 and 2.

Case 2. An 18-year-old female presented to the emergency room with abdominal pain of sudden onset and great intensity. On physical examination a painful pelvic mass was palpated. She denied having sexual intercourse. Ultrasound showed an ellipsoid tumor measuring 110 x 78 x 88 mm with a smooth external border, heterogeneous echogenicity with isoechogenic predominance and a central hyperechogenic area (Figure 2A). Rounded peripheral lobules of varying size were noted, with vascularity present predominantly central and in areas of hyperechogenic septa (Figure 2B and 2C). She was operated with the diagnosis of adnexal tumor with twisted pedicle, with operative finding of ovarian

Figure 1. A: Sagittal view of dysgerminoma, the arrow points to the central hyperechogenic area. B: Doppler-visible vascular flow, centrally distributed following the fibrous septa (arrow).

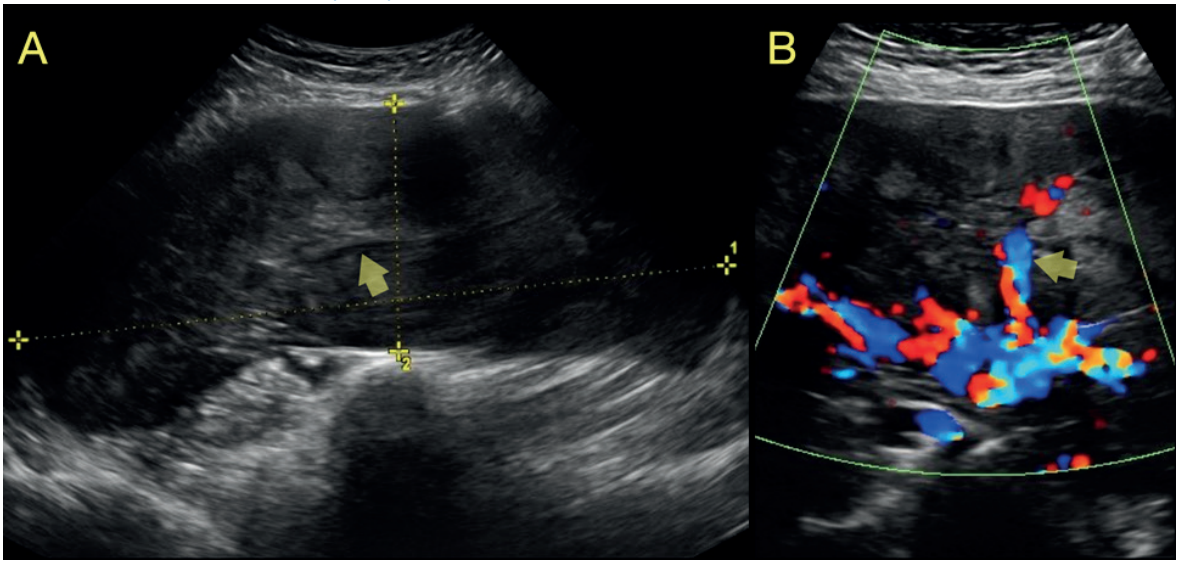


Table 1. Summary of the case characteristics.

	Age	β-hCG	Ca-125 (U/mL)	Alpha fetoprotein (ng/mL)	LDH (U/L)	Pathology	Size of the mass (mm)
Case 1	21	460	18	4.1	4,806	Dysgerminoma	197 x 68 x 100
Case 2	18	0	0.8	4.9	401	Dysgerminoma	110 x 78 x 88
Case 3	25	1934	55	2	143	Dysgerminoma	109 x 138 x 87

LDH= lactate dehydrogenase.

Table 2. Summary of the characteristics of the cases evaluated according to the ADNEX calculator of IOTA and O-RADS.

	Age	Ca-125 (U/mL)	Size of the mass (mm)	ADNEX: Malignancy risk (%)	ADNEX: Stage I risk (%)	ADNEX: Stage II-IV risk (%)	O-RADS
Case 1	21	18	197 x 68 x 100	42	29.2	3.9	4
Case 2	18	0.8	110 x 78 x 88	12	8.8	0.1	4
Case 3	25	55	109 x 138 x 87	47	25	11.9	4

IOTA: Internacional ovarian tumor analysis
ADNEX: Assessment of Different NEoplasias in the adneXa
O-RADS : Ovarian Adnexal Imaging Reporting Data System

tumor twisted once on its pedicle. Externally it was pinkish-white-grayish with whitish internal fleshy areas and peripheral yellowish areas that were correlated with the lobules identified by ultrasound (Figure 3A and 3B). The IOTA assessment and tumor markers are shown in Tables 1 and 2. The pathology result was dysgerminoma.

Case 3. A 25-year-old female patient was evaluated for an abdominal mass, G0P0 and with no significant history. A solid mass with well-defined borders measuring 109 x 138 x 87 mm, isoechogenic, with lobulated areas that appeared hyperechogenic and small cystic areas within hyperechogenic lobules was also observed (Figure 3A). There were thin hyperechogenic septa with vascularity distributed along their course (Figure 3B and 3C). Tumor marker tests and classification according to IOTA can be seen in Tables 1 and 2.

Discussion

Currently, ultrasound evaluation of ovarian masses is recommended by means of the IOTA (International Ovarian Tumor Analysis) methodology, which favors the prediction of malignancy over the specific characteristics (cell lineage) of each malignant tumor. By means of some ultrasound markers, such as tumor size, solid or cystic, number of papillae, internal borders of the mass, number of lobules, amount of vascular flow on Doppler, it is possible to select the masses at risk of malignancy. As we can see in Table 2, all the cases presented were considered as possibly malignant due to their size, being solid and with Doppler flow present[3]. However, this methodology is focused on primarily serous and mucinous masses. In the recent ADNEX (Assessment of Different NEoplasias in the adneXa) risk model, only the serum tumor marker CA125 is considered, limiting its capacity to detect masses of other cell lines[4].

The great contribution of the IOTA methodology is the standardization of the descriptions and terminology of the characteristics of the masses by ultrasound. These are the guidelines we used to describe the tumors in the present study.

The characteristic pattern of tumor markers of dysgerminomas is given by increased LDH, elevated hCG-beta in some cases, occasionally mild elevation of CA 125 and being negative for alpha-fetoprotein, except if associated with yolk sac tumor[1,2]. In the cases presented, this pattern was compatible with our findings.

Figure 2. A: Sagittal view of dysgerminoma; the arrow points to the hyperechogenic center. B: Doppler shows vascularity hinting at lobules. C: Arrows point to lobules defined by thin hyperechogenic septa.

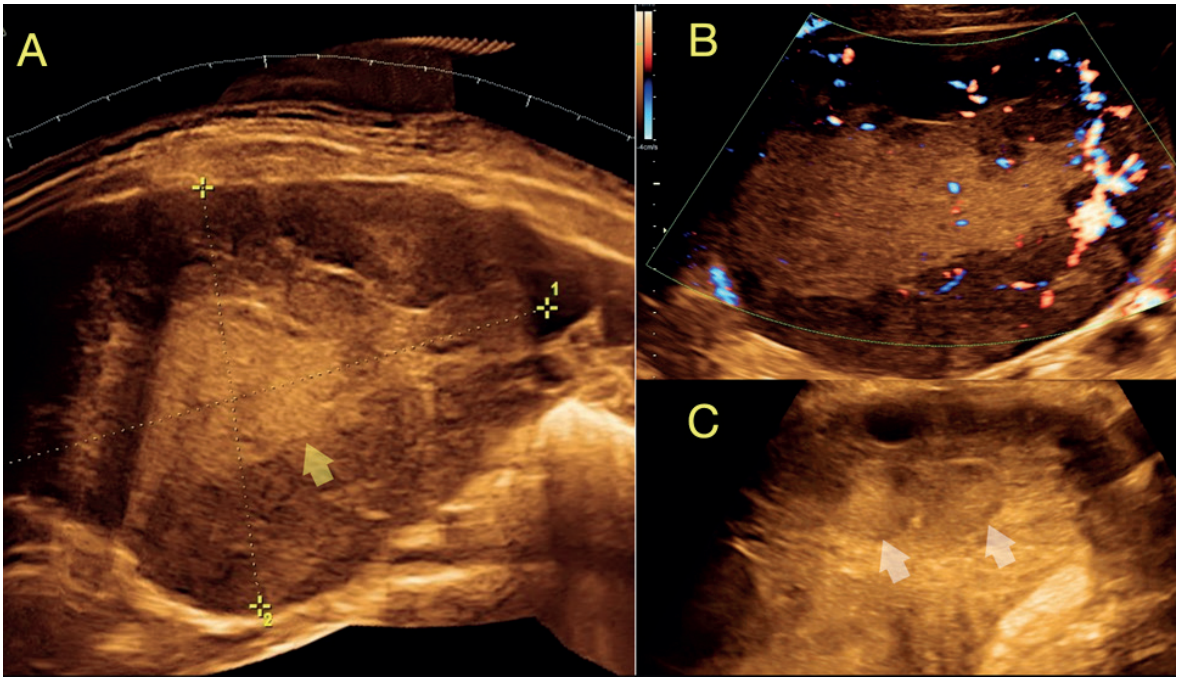


Figure 3. Correlation between ultrasound and macroscopy. Ultrasound image highlighting mostly peripheral lobules in the dysgerminoma. Note the correlation between the images indicated by the arrows.

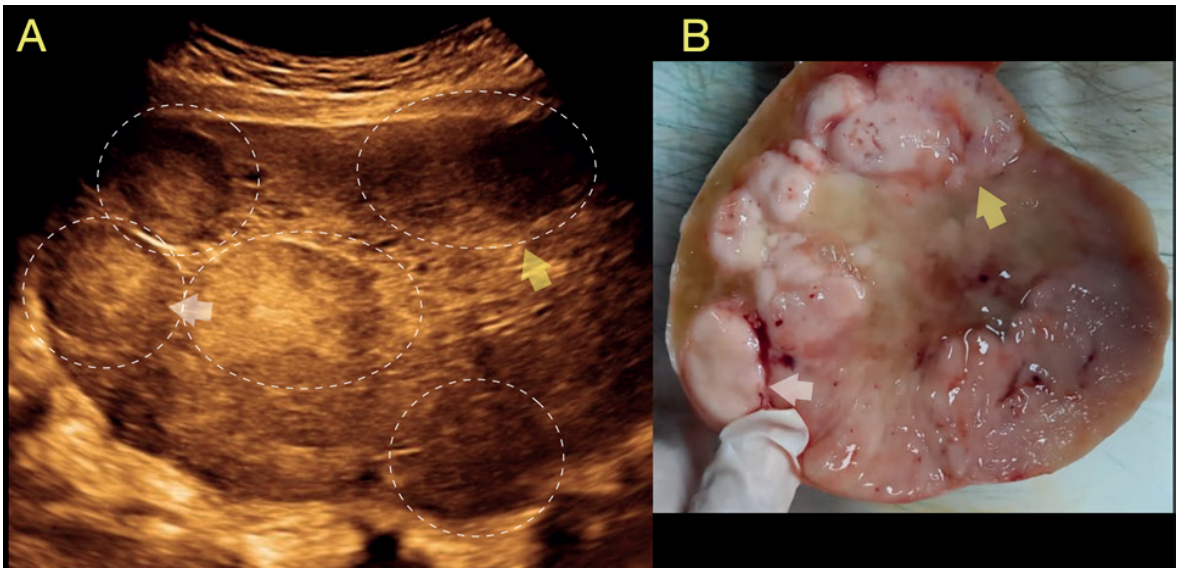
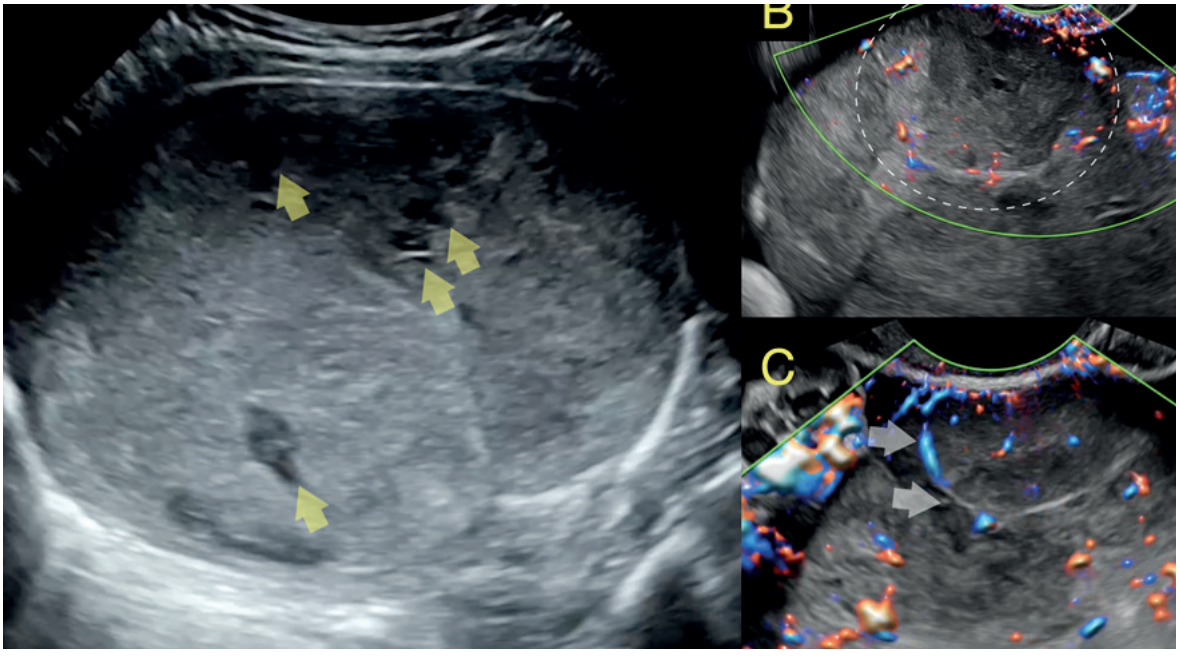


Figure 4. A: Dysgerminoma showing some small cystic areas. B and C: Lobulation showing preferential peripheral flow through the fibrous septa.



Only three articles so far describe the specific sonographic features of dysgerminoma. Lazebnik[5] published a case of a 3 cm dysgerminoma that was in the differential diagnosis of an ectopic pregnancy; he reports the characteristics of the mass as solid, hypoechogenic, multilobulated and with flow present on Doppler. Kim[6], in 1995, published 3 cases of dysgerminoma (one giant and others of 20 cm and 5 cm) with ultrasound images as solid masses that impressed with lobules of different sizes and thin fibrous septa that showed vascularity at Doppler. Guerreiro[7], in a large retrospective series from several European centers, was able to collect 21 cases and consolidate the ultrasound characteristics of typical dysgerminoma: size between 4 and 21 cm in diameter, mostly solid tumor, with multiple lobulations of various sizes, mainly hypo- or isoechogenic but heterogeneous, with well-defined external borders and abundant vascularity present on Doppler, with well-defined vessels of irregular branching and caliber that followed the distribution of thin and sometimes difficult to demarcate septa. As can be seen, the char-

acteristics of the three masses presented here agree with what has been previously published, which reinforces that this description has a high association with the histologic diagnosis of dysgerminoma.

The series of cases that evaluated dysgerminomas by tomography and MRI reaffirm the ultrasound findings and contribute to understand the image profile that characterizes this tumor. Tanaka[8], in 1994, described in 3 cases the dysgerminoma as solid masses with lobulated, smooth, homogeneous, iso or hypointense surface, with multiple internal lobes and attenuation in the periphery and separated by hypointense septa that show vascularity to contrast. The series of dysgerminomas evaluated with resonance by Zhao[9] and Cacioppa[10], in a total of 20 dysgerminomas consolidated the description of a solid tumor with a multilobulated border, mostly hyper or isointense in T2, with multiple internal lobules of different sizes, separated by thin hypertensive fibrovascular septa, with intratumoral vascular flow that runs preferentially through them. Upon contrast administration, most of the tumors increased in intensity on MRI.

Tsuboyam[11] emphasizes in a series of 3 cases the coexistence of foci of multiple cell lines of germ cell tumors within the dysgerminoma. This may explain why in many cases the images show heterogeneous areas either on ultrasound, CT or MRI. Not to mention possible areas of necrosis or intratumoral hemorrhages.

In conclusion, we can say that the characteristic image of a dysgerminoma by ultrasound in most cases corresponds to a solid tumor with well-defined borders, hypo or isoechogenic, with lobulations of preferential peripheral distribution and a usual hyperechogenic center. On Doppler flowmetry they are richly vascularized, with central distribution of vessels and also by the fibrous septa of the lobulations.

References

1. Shaaban AM, Rezvani M, Elsayes KM, Baskin H Jr, Mourad A, Foster BR, et al. Ovarian malignant germ cell tumors: cellular classification and clinical and imaging features. Radiographics. 2014;34(3):777-801. doi: 10.1148/rg.343130067
2. 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(7):2039-55. doi: 10.1148/rg.347130144
3. Timmerman D, Valentin L, Bourne TH, Collins WP, Verrelst H, Vergote I; International Ovarian Tumor Analysis (IOTA) Group. Terms, definitions and measurements to describe the sonographic features of adnexal tumors: a consensus opinion from the International Ovarian Tumor Analysis (IOTA) Group. Ultrasound Obstet Gynecol. 2000;16(5):500-5. doi: 10.1046/j.1469-0705.2000.00287.x
4. Van Calster B, Van Hoorde K, Valentin L, Testa AC, Fischerova D, Van Holsbeke C, et al; International Ovarian Tumour Analysis Group. Evaluating the risk of ovarian cancer before surgery using the ADNEX model to differentiate between benign, borderline, early and advanced stage invasive, and secondary metastatic tumours: prospective multicentre diagnostic study. BMJ. 2014;15;349:g5920. doi: 10.1136/bmj.g5920
5. Lazebnik N, Balog A, Bennett S, Redline R, Liu J. Ovarian dysgerminoma: a challenging clinical and sonographic diagnosis. J Ultrasound Med. 2009;28(10):1409-15. doi: 10.7863/jum.2009.28.10.1409
6. Kim SH, Kang SB. Ovarian dysgerminoma: color Doppler ultrasonographic findings and comparison with CT and MR imaging findings. J Ultrasound Med. 1995;14(11):843-8. doi: 10.7863/jum.1995.14.11.843
7. Guerriero S, Testa AC, Timmerman D, Van Holsbeke C, Ajossa S, Fischerova D, et al. Imaging of gynecological disease (6): clinical and ultrasound characteristics of ovarian dysgerminoma. Ultrasound Obstet Gynecol. 2011;37(5):596-602. doi: 10.1002/uog.8958
8. Tanaka YO, Kurosaki Y, Nishida M, Michishita N, Kuramoto K, Itai Y, et al. Ovarian dysgerminoma: MR and CT appearance. J Comput Assist Tomogr. 1994;18(3):443-8. Doi: 10.1097/00004728-199405000-00019
9. Zhao S, Sun F, Bao L, Chu C, Li H, Yin Q, et al. Pure dysgerminoma of the ovary: CT and MRI features with pathological correlation in 13 tumors. J Ovarian Res. 2020;17;13(1):71. doi: 10.1186/s13048-020-00674-z
10. 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;28;21(1):58. doi: 10.1186/s40644-021-00427-1
11. Tsuboyama T, Hori Y, Hori M, Onishi H, Tatsumi M, Sakane M, et al. Imaging findings of ovarian dysgerminoma with emphasis on multiplicity and vascular architecture: pathogenic implications. Abdom Radiol (NY). 2018;43(7):1515-23. doi: 10.1007/s00261-018-1503-6