Ovarian teratoma and its variants: the role of imaging for the differential diagnosis

Poster No.: C-3203
Congress: ECR 2019
Type: Educational Exhibit
Authors: M. Dimarco¹, F. Arnone², V. Putorti¹, R. Cannella¹, D. Giambelluca¹, M. Midiri¹; ¹Palermo/IT, ²Partinico/IT
Keywords: Pathology, Diagnostic procedure, Ultrasound, MR, CT, Genital / Reproductive system female, Abdomen
DOI: 10.26044/ecr2019/C-3203

Any information contained in this pdf file is automatically generated from digital material submitted to EPOS by third parties in the form of scientific presentations. References to any names, marks, products, or services of third parties or hypertext links to third-party sites or information are provided solely as a convenience to you and do not in any way constitute or imply ECR's endorsement, sponsorship or recommendation of the third party, information, product or service. ECR is not responsible for the content of these pages and does not make any representations regarding the content or accuracy of material in this file.

As per copyright regulations, any unauthorised use of the material or parts thereof as well as commercial reproduction or multiple distribution by any traditional or electronically based reproduction/publication method is strictly prohibited.

You agree to defend, indemnify, and hold ECR harmless from and against any and all claims, damages, costs, and expenses, including attorneys' fees, arising from or related to your use of these pages.

Please note: Links to movies, ppt slideshows and any other multimedia files are not available in the pdf version of presentations.

www.myESR.org
Learning objectives

To illustrate the most frequent types of ovarian teratoma, describing the typical aspects by using various imaging techniques, with elements of differential diagnosis.
Background

Ovarian teratoma is the most common form of ovarian germ cell tumours. The term "teratoma" actually includes a series of tumor subtypes made up of tissues originating from one or all three germ cell layers, more or less differentiated.

Therefore, it is possible to classify ovarian teratoma in three big categories:

1. Mature teratoma
2. Immature teratoma
3. Monodermal teratoma
Findings and procedure details

Mature teratoma is the most common benign tumor of the ovary. It is typically found in young women and it may be bilateral in 25% of cases. It contains mature elements from germ cell layers (ectoderm, mesoderm, endoderm). The cystic form (or dermoid cyst) represents the most frequent form of mature teratoma: it is unilocular and delimited by a thick wall covered by squamous epithelium, sometimes with intralesional calcification. It may contain sebaceous material, fat and elements deriving from the germinal layers. An endocytic excrescence (Rokitansky nodule) may be often visualized, in which is not unusual to see dental and bone elements [1]. Because of its different and heterogeneous components, dermoid cyst may be visualized and correctly diagnosed using almost all conventional imaging techniques. This clinically silent lesion is often discovered as an occasional finding during radiological exams carried out for other reasons.

Most of these lesions can be visualized on plain radiograph as radiopaque formations in the pelvis, because of the bone components; since it is not possible to provide an immediate diagnosis of nature (as well as the differential diagnosis with other radiopaque images in pelvic excavation, i.e. phlebolis or faecal material), it is necessary to go on with further imaging modalities.

On US examination, they have a cystic appearance, sometimes with sebaceous material or hairs within. It is not rare to observe small hyperechogenic components with a posterior acoustic shadowing (dental and bone elements). The Rokitansky nodule appears as a mural, hyperechoic tubercle and often its visualization in a cystic lesion within the pelvis allows an easy diagnostic orientation. Integration with Color Doppler shows no intralesional vascularization (this aspect is clearly important for assessing any malignant degeneration, possible in 1% of cases).

CT has a high sensitivity in the diagnosis of cystic teratoma although it is not recommended as a routine examination due to exposition to ionizing radiation. Typically, CT images show cystic lesion in the pelvis containing fat, fat-fluid levels, calcifications (sometimes dentiforms), Rokitansky nodules and hair in different percentages [2], which allows a diagnosis of nature. Malignant degeneration of dermoid cysts should be suspected where the size of the lesion exceeds 10 cm or an aspect of the vegetative lesion with irregular shape is observed [3].

Although it's not used as a routine investigation for the diagnosis of dermoid cyst, MRI is particularly sensitive to the adipose component of this lesion. The fat suppression technique and the chemical shift artifact can be effectively used for a correct diagnosis. Furthermore, the use of contrast medium allows to identify solid invasive components in case of malignant degeneration. Mature cystic teratoma can be usually remain completely
asymptomatic unless it is complicated by ovarian torsion or rupture, causing acute pelvic pain.

**Immature teratoma** has a malignant degenerative potential. It represents 1% of all teratomas and it is mostly found in the second decade of life. At Imaging, it appears as a voluminous and heterogeneous mass with a prominent solid component, sometimes with tumor extension to surrounding tissues due to the invasion of the capsule. On US, immature teratoma appears as a heterogeneous, partially solid, often calcified lesion; on CT and MRI as a large lesion with calcifications and hemorrhagic areas. The administration of contrast agent can help to identify malignant lesions and perform local staging. As well as the benign form, even the immature teratoma may undergo rupture (due to sudden increase in size) and cause acute pelvic pain.

In **monodermal teratoma**, there is only one tissue type. The most frequent subtype, struma ovarii, is composed entirely or predominantly of thyroid tissue and contains follicles of variable size with colloidal material. It represents 0.3-1% of all ovarian tumors and about 3% of all mature cystic teratomas. Due to its content of functioning thyroid tissue, it can show as a hyperthyroidism up to a real thyrotoxicosis (5-8% of cases). Although the imaging aspect is not highly specific, on US it has a "complex-mass" appearance due to the alternation of cysts to solid areas. On CT it appears as a multicystic mass with regular margins, hyperdense on non-contrast scan. Cysts do not show significant wall enhancement after contrast agent administration [4]. On MRI, struma ovarii appears as a multiloculated cystic mass, with solid components. On T1 and T2 weighed images, cysts have both high and low signal intensities due to the presence of a gelatinous colloid (the presence of areas with very low signal intensity in T2-weighted images is considered to be pathognomonic for struma ovarii). Solid components may show enhancement after contrast administration.
Fig. 1: Abdominal US of a 15-year-old patient. In the right adnexa, there is a solid oval lesion (measuring 5.3 x 3.4 cm) heterogeneously hypoechoic which presents two hypoechoic areas in its periphery (arrows). These findings are suggestive for ovarian teratoma.

© - Palermo/IT
**Fig. 2**: Axial CT scan of a 45-year-old woman, performed before (A) and after administration of contrast agent (B). In the left adnexa, oval formation of non-homogeneous adipose density, with central enhancing nodule (Rokitansky nodule, curved arrow) and millimetric calcification (straight arrow), suggestive for ovarian teratoma.
**Fig. 3:** Axial scan of a CT scan acquired on portal venous phase in a 28-year-old woman. In the left adnexa (straight arrow) there is an oval mass with heterogeneous density due to the presence of various components (cystic, adipose, calcific) consistent with ovarian teratoma. Moreover, in the right adnexal (curved arrow), a contralateral oval mass is appreciated with mainly fluid density and multiple septa of different thickness in the context, suspected for ovarian cystic lesion.

© - Palermo/IT

**Fig. 4:** Axial scans acquired on the portal phase of CT of a 26-year-old woman with abdominal pain. A) Presence, in the right adnexa, of a lobulated expansive formation, with heterogeneous density, hypodense content and calcifications (curved arrow), with thin enhancing walls B) In the ipsilateral tuba note the "whirpool sign" due to torsion (straight arrow). Ovarian teratoma may constitute a be a predisposing factor for ovarian torsion.

© - Palermo/IT
Fig. 5: MRI of a 35-year-old patient. A) Pre-contrast axial T1 image; B) axial T1 image after administration of paramagnetic contrast agent, C) thrive; D) T2-w. A right ovarian lesion (curved arrow) is found with a regular wall of millimeter thickness, low intensity in all the sequences, without significant variations after contrast agent administration with some hypointense areas in T1-w e in T2- sequences, straight arrows). These findings are suggestive for a right ovarian teratoma.

© - Palermo/IT
Conclusion

Knowledge of the typical aspects of ovarian teratoma in its variants is crucial for characterization, differential diagnosis and, finally, to direct the patient to the most appropriate treatment.
References


