Review of the use of pelvic MRI in the evaluation of adnexal non-neoplastic diseases.

Poster No.: C-1950
Congress: ECR 2012
Type: Educational Exhibit
Keywords: Neoplasia, Outcomes analysis, Observer performance, MR, Pelvis, Genital / Reproductive system female
DOI: 10.1594/ecr2012/C-1950

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Learning objectives

The purposes of the exhibit is:

• Describe the features of adnexal non-neoplastic diseases found in pelvic MRI.
• Justifying the use of this method in the evaluation of these lesions and the main differential diagnoses, using current techniques and advanced MRI sequences.
Background

- Many adnexal lesions can be assessed clinically and conducted using ultrasound, but the multiplanar capability of MRI, the quality of images obtained and the fact of not being dependent on the observer, especially in cases of complicated differential diagnosis between benign and malignant, make MRI pelvis an important method in evaluating these lesions.
- Many diseases, benign and malignant non-expanding also involve the ovary with hydrosalpinx, endometriosis, and pelvic peritoneal metastases, inclusion cyst, and are not classified as mass lesions.
- Magnetic resonance imaging (MRI) has emerged for several years as the imaging examination of second-line indications in the majority of female pelvic imaging, after ultrasonography and provides the anatomical aspects of adnexal pathologies, plus the signal characteristics, type of contrast enhancement and relations with adjacent structures.
- Recently the technique of diffusion MRI is used for the diagnosis of malignant lesions with high cellularity.
Imaging findings OR Procedure details

- Describe the main adnexal non-neoplastic evaluated by MRI such as paraovarian cyst, polycystic ovaries, ovarian stimulate to fertility treatments, endometriomas and others.
- Present the specific aspects and the signs characterizes of its own, the contrast enhancement, and anatomic relations.
- Demonstrate the value of diffusion sequences and additional findings in this lesions.

Paraovarian cyst:

- Paraovarian cysts are not ovarian masses but arise from mesothelial, paramesonephric (müllerian), or mesonephric (wolffian) structures.
- They usually occur in the mesosalpinx between the ovary and fallopian tube, so that cystic masses close to the ipsilateral round ligament can be demonstrated at MR imaging.
- Most paraovarian cysts were homogeneous cystic masses near the ipsilateral round ligament and the uterus.
- Demonstration of a normal ipsilateral ovary close to, but separated from, the adnexal cyst may be an important MR finding for the diagnosis of paraovarian cysts.

Unilocular cystic masses:

- Functional cysts, paraovarian cysts, hydrosalpinx, and serous cystadenomas usually appear as unilocular cystic masses. They are well-circumscribed cystic masses.
- In uncomplicated cases, they have low signal intensity on T1-weighted images and high signal intensity on T2-weighted images.
- Functional cysts almost always regress within 2 months. Therefore, the cysts require follow-ups over several months. Sometimes these cysts are complicated by rupture and cause abdominal pain and hemoperitoneum.

Hydrosalpinx:

- Hydrosalpinx is a common adnexal lesion that may occur either in isolation or as a component of a complex pathologic process (eg, pelvic inflammatory disease, endometriosis, fallopian tube tumor, or tubal pregnancy) that leads to distal tubal occlusion.
- Hydrosalpinx-when large enough-may also mimic a cystic ovarian tumor. Typically, dilated fallopian tubes appear as fluid-filled structures that are sausage-shaped and/or C- or S-shaped when viewed in multiple planes.
Although hydrosalpinx is most often seen on ultrasonographic images, it also may be delineated on multiplanar MR images. MR imaging also may be useful for determining the cause of a hydrosalpinx or its associated adnexal process by characterizing the nature of the contents of the dilated tube. Understanding the pathogenesis and clinical manifestations of conditions associated with hydrosalpinx may aid in the timely diagnosis of complex adnexal masses at MR imaging, enabling avoidance of unnecessary procedures.

Endometriomas:

- Endometriosis is characterized by the presence of tissue resembling endometrium outside the uterus.
- Endometriotic cysts usually have a thick fibrotic wall with chocolate-colored hemorrhagic material.
- MR imaging findings for ovarian endometriotic cysts are: adnexal cysts of high signal intensity on both T1- and T2-weighted images or high signal intensity on T1-weighted images and low signal intensity on T2-weighted images (shading).
  Methemoglobin causes T1 shortening. Chronic cyclic hemorrhage and high viscosity of the contents in the endometriotic cysts cause T2 shortening and produce shading.
- Besides endometriotic cysts, however, hemorrhagic adnexal processes includes functional cysts, abscess, hematosalpinx, and ovarian neoplasms.

Massive Ovarian Edema:

- partial or intermitent torsion leading to venous and lymphatic obstruction with subsequent ovarian enlargement
- enlarged ovary with edematous appearance and peripheral follicles
- location : right 75%, predisposition of the ovary may be due to elevated right ovarian pressure relative to the left reducing the tolerance of the right ovary to parcial torsion ; bilateral 15%
- morphology ovoid shape , massive enlarged ovary
- presence of blood flow does not exclude the diagnosis of massive ovarian edema

Pathology:

- partial or intermitent torsion
- idiopathic attributes massive ovarian edema to recurrent partial torsion of the meso-ovarium
- obstruction to the venous and lymphatic return
- evidence of torsion is found only in half of the cases
- secondary theory attributes massive ovarian edema to underlying processes such as stromal hyperplasia or hyperthecosis facilitate torsion of an abnormally enlarged ovary

**Diffusion-weighted imaging (DWI):**

- The addition of diffusion sequences to a conventional MR imaging protocol improved the diagnostic accuracy in the characterization of complex adnexal masses.
- On DWI, high signal intensity was observed more often in malignant than in benign lesions.
- DW imaging showed abnormal signal intensity in the thickened fallopian tube and in the wall of cystic ovarian lesions. These findings would be feasible to diagnose adnexal torsion. Early diagnosis of ovarian torsion can help prevent irreversible damage to the adnexal structures in women desiring to maintain fertility.
Fig. 1: Paraovarian cysts on the right.

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**Fig. 2:** Endometriotic cysts on right. High signal intensity on T1-weighted fat sat images and low signal intensity on T2-weighted images

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Fig. 3: Functional cysts.

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Fig. 4: Hydrosalpinx. Dilated fallopian tubes appear as fluid-filled structures that are sausage-shaped.

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**Fig. 5:** Massive Ovarian Edema. Intermittent pelvic pain. Enlarged ovary with edematous appearance and peripheral follicles. T2 weighted sequences (with and without fat sat).

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Fig. 6: Same case fig 5: sagittal and coronal planes. Note the compression of the uterus by the adnexal lesion.

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Fig. 7: Same case fig 5,6: T1 FAT SAT: Discrete peripheral enhancement after intravenous administration of paramagnetic contrast.

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Conclusion

- Our study evaluates adnexal non-neoplastic diseases, with its characteristic features in pelvic MRI and demonstrates the importance of this method in the differential diagnosis for lesions described.
- Inclusion of MRI in the diagnostic algorithm of the indeterminate adnexal mass allows better differentiation of ovarian lesions resulting in a change of therapeutic decision-making with net cost savings.
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