Adnexal torsion: contribution of MR imaging in diagnosis
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Section: Genital (female) imaging
Area of Interest: Genital / Reproductive system female
Procedure: Surgery
Imaging Technique: MR
Case Type: Clinical Cases

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Patient: 22 years, female

Clinical History:
A 22-year old woman was admitted for acute pain in the right lower abdominal quadrant. Laboratory analysis showed mild leukocytosis and slight elevation of C-reactive protein. Transvaginal sonography revealed a complex right adnexal mass and a moderate amount of fluid in the Douglas pouch. A pelvic MR study was indicated.

Imaging Findings:
MR imaging of the pelvis revealed right adnexal enlargement with the coexistence of a cystic mass, both not enhancing after contrast material administration (Figure 1). The lesion was entirely cystic, with signal intensity similar to that of water (Figure 1a-d) and free diffusion (Figure 1f), without solid components. The ipsilateral fallopian tube was thickened, slightly hyperintense on T1-weighted images and extremely hypointense on T2-weighted images, findings suggestive for acute hemorrhage (Figure 1a-d). Acute hemorrhagic parts caused a dramatic signal drop in the area on diffusion-weighted images, due to T2* effect and had no measurable ADC values (Figure 1f). Imaging findings were strongly suggestive of hemorrhagic necrosis of the adnexa following torsion and were confirmed surgically and pathologically (Figure 2, 3). The cystic mass proved to correspond to ovarian cystadenofibroma on histology.

Discussion:
Background
Adnexal torsion is a rare cause of lower abdominal pain, often presenting as a diagnostic problem due to the nonspecific clinical, laboratory and sonographic findings, as it was seen also in this patient [1-7]. It is associated with an ipsilateral ovarian tumour or cyst in 50-81% of cases, which is almost always benign, in our case proved to represent an ovarian cystadenofibroma on pathology [1-7]. Early diagnosis is mandatory, allowing a conservative, ovary-sparing surgery in young women.

Imaging perspective
The sonographic findings of adnexal torsion are usually nonspecific and include the presence of a cystic, solid or complex adnexal mass, as it was seen in this patient [8-11]. Free intraperitoneal fluid is found in one to two thirds of patients. The most suggestive sonographic sign is the presence of multiple spherical cystic structures, up to 25 mm...
in diameter at the periphery of an enlarged ovary [8-11]. However, this sign may be a normal finding in a young fertile woman. The value of colour Doppler sonography in the diagnosis of adnexal torsion is under dispute. Normal adnexal blood flow may be seen in almost half of the patients with torsion.

CT and MR imaging is usually recommended in subacute or chronic cases to confirm the diagnosis of adnexal torsion and to differentiate haemorrhagic from nonhaemorrhagic infarction [1-4]. Common CT and MR imaging findings of adnexal torsion include fallopian tube thickening, ascites and uterus deviation to the twisted side, all met in this case. Tube thickening or a twisted vascular pedicle is considered as the most specific finding, related to the presence of congestion and oedema with or without haemorrhagic infarction of the tube. It also indicates a twisted oedematous pedicle, connecting the lesion with the uterus and engorged blood vessels [1]. Imaging findings suggestive of haemorrhagic infarction include eccentric smooth wall thickening exceeding 10 mm in a cystic ovarian mass, lack of contrast enhancement of the internal solid component or the thickened wall of a twisted adnexal mass, haemorrhage within the tube or adnexal mass, or haemoperitoneum [1-4]. Differentiating haemorrhagic from nonhaemorrhagic infarction due to adnexal torsion is extremely important for treatment planning, allowing a more conservative approach in cases of nonhaemorrhagic infarction [1]. Lack of contrast material enhancement and the presence of acute haemorrhage within the thickened tube suggested hemorrhagic infarction in our case, as proved subsequently on histopathology.

**Differential Diagnosis List:** Adnexal torsion with haemorrhagic infarction., Appendicitis, Meckel diverticulum, Obturator hernia, Ectopic pregnancy, Pelvic inflammatory disease, Ruptured graafian follicle, Gastroenteritis, Diverticulitis, Mesenteric lymphadenitis, Renal colic or infection

**Final Diagnosis:** Adnexal torsion with haemorrhagic infarction.

**References:**


Description: Transverse T1-weighted image shows right adnexal enlargement, with the presence of a cystic mass (asterisk), detected of low signal intensity. The ipsilateral fallopian tube (arrow) is thickened, and slightly hyperintense. Origin:
**Description:** Transverse T2-weighted image. Right adnexal mass (asterisk) is of cystic nature, hypointense and hyperintense on T1 and T2-weighted images, respectively. A small amount of fluid (long arrow) in the peritoneum is seen. **Origin:**
**Description:** Transverse T2-weighted image. Tube thickening (arrow) is detected as an amorphous solid masslike structure. A small amount of fluid (long arrow) in the Douglas space is seen. **Origin:**
**Description:** Sagittal T2-weighted image depicts a few small cystic structures (small arrows) in the periphery of the enlarged adnexa, probably related to transudation of fluid into the ovarian follicles due to ovarian congestion. **Origin:**
Description: Coronal T2-weighted image shows uterus deviation to the right side (arrow). The right adnexa is located mainly to the left of the midline. Normal left ovary (small arrow). Origin:
Description: Transverse ADC map. Acute haemorrhage in the fallopian tube causes dramatic signal drop (arrow), due to T2* effect. The ADC values of the cystic component (asterisk) were $3.37 \times 10^{-3}$ mm$^2$/second. Origin:
Description: Transverse post-contrast fat-saturated T1-weighted image demonstrates lack of enhancement by the right adnexa and the cystic mass (asterisk), indicating interruption of blood flow. Peritoneal enhancement (arrow) is detected. Origin:
Description: Sagittal post-contrast fat-saturated T1-weighted image demonstrates lack of enhancement by the right adnexa and the cystic mass (asterisk). Origin:
Figure 2

Description: Laparoscopic image depicts the enlarged, necrotic adnexa. Origin:
Figure 3

**Description:** Microscopic section of the fallopian tube (H-E X100). Extensive dilatation and congestion of the blood vessels, as well as hemorrhagic infiltration of the wall is noted. **Origin:**
Description: Microscopic section of the cyst (H-E X100). The cyst wall is lined by a single layer of flat cells, without complex architectural pattern or cytologic atypia. There is extensive hemorrhagic infiltration and edema. Origin: