Case 13122

Tubo-ovarian abscess: MRI findings and role
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Section: Genital (female) imaging
Area of Interest: Genital / Reproductive system female
Procedure: Diagnostic procedure
Imaging Technique: Ultrasound
Imaging Technique: MR
Special Focus: Abscess Case Type: Clinical Cases
Authors: Tonolini Massimo, M.D.
Patient: 45 years, female

Clinical History:

A middle-aged G0 woman presented with a past history of uterine myomectomy, spontaneous menopause at 39 years of age, multiple sclerosis, and an allergy to gadolinium contrast medium. Findings at a routine gynaecological examination one year ago were normal. The patient currently presents with pelvic pain and tenderness, worsening of urinary symptoms related to a neurological disease, without fever.

Imaging Findings:

Confirming physical findings of intense pain at adnexal mobilisation, initial transvaginal ultrasound (Fig.1) showed a sizeable ovoid-shaped multiloculated cystic lesion occupying the right adnexal region, minimal fluid in the peritoneal cul-de-sac, and normal postmenopausal uterus and left ovary. Laboratory results revealed moderately increased (27 mg/L) C-reactive protein.

To resolve the gynaecologist’s uncertainty between an infectious and neoplastic adnexal mass, the attending radiologist performed an urgent MRI (Fig.2) without gadolinium contrast due to a history of allergy. The 6x4x3.5 cm complex multiloculated adnexal mass showed predominantly fluid signal, septations, minimally thickened peripheral rim, and an absence of haemorrhagic changes. Additionally, the fluid-filled ventral tubular portion consistent with a dilated fallopian tube and extensive parametrial oedema of fat-suppressed images favoured tubo-ovarian abscess over a cystic tumour.

Antibiotic therapy resulted in prompt clinical improvement and normalized C-reactive protein. Repeated ultrasound (Fig.3) revealed a decreased size and volume of the complex adnexal mass with increased fluid-like regions, and a disappearance of peritoneal effusion.

Discussion:

Mostly encountered in premenopausal women, pelvic inflammatory disease (PID) results from infection ascending from the vagina to internal genital organs. Risk factors include multiple sexual partners and intrauterine contraceptive devices. Neisseria gonorrhoeae and Chlamydia are the commonest causative organisms, 30%–40% of cases are polymicrobial. Manifestations include pelvic pain, tenderness, fever, mucopurulent discharge. Clinical diagnosis is supported by leukocytosis and elevated C-reactive protein, and confirmed by microscopy of vaginal secretions. The PID spectrum encompasses salpingitis, pyosalpinx and tubo-ovarian abscess (TOA) resulting from an increased production of inflammatory exudates, pus and blood. Bilateral involvement is not uncommon. Timely diagnosis and adequate antibiotic therapy allow preventing both progression to complicated forms and long-term
sequelae such as infertility, ectopic pregnancy and chronic pain [1].
Ultrasound readily complements clinical examinations in females with acute pelvic complaints. Alternatively, multidetector CT is nowadays often used, particularly when a gynaecologic condition is not initially suspected, sonographic findings are equivocal, pain or ultrasound changes extend beyond the pelvis. Imaging of PID is required in severe presentations or unresponsiveness to treatment, when surgery or abscess drainage are considered. Due to availability of faster scanners and acquisition protocols, MRI is increasingly used and highly helpful for urgent assessment of acute gynaecologic disorders. MRI is particularly attractive for patients with concerns about ionizing radiation and contrast agent use [2-6].
Due to its superior soft-tissue contrast, MRI reliably allows categorization of genital lesions according to anatomic location and internal structure. As this case exemplifies, even without intravenous gadolinium, MRI reliably identifies or excludes the presence of blood, depicts dilated pus-filled fallopian tubes as tubular fluid-filled structures, and detects parametrial oedema on fat-suppressed T2-weighted images which suggest pyosalpinx over hydrosalpinx.
Further progression of infection causes destruction of normal adnexal structures and formation of TOA, which has a nonspecific, often confusing complex sonographic appearance. MRI shows TOA as a thick-walled, septated heterogeneous mass with high T2 signal intensity corresponding to fluid and internal debris, and restricted diffusion which does not respect anatomic boundaries. Associated changes include parametrical fat inflammation, unspecific free pelvic fluid. Pyosalpinx and TOA display variable T1 signal according to presence of haemorrhagic or proteinaceous material. Post-gadolinium sequences show very strong enhancement of the thickened fallopian tube walls, septa and periphery of TOA, and surrounding inflammatory stranding. Appreciation of the tubular-shaped, serpiginous or tortuous tubal component is useful to differentiate PID from cystic tumours and pelvic abscess of another origin [5, 7-11].
**Differential Diagnosis List:** Tubo-ovarian abscess, Hydrosalpinx in chronic PID, Tubal tuberculosis, Tubal actinomycosis, Hemorrhagic ovarian cyst / Endometrioma, Adnexal torsion, Fallopian tube carcinoma, Ovarian cystadenoma/cystadenocarcinoma, Abscess from other source (Crohn disease diverticulitis or appendicitis).

**Final Diagnosis:** Tubo-ovarian abscess

**References:**
Description: A complex multiloculated cystic lesion measuring 55x39x35 mm (Calipers) was seen occupying the right adnexal region. Additional findings included minimal fluid in the peritoneal cul-de-sac, normal-sized postmenopausal uterus and left ovary. Origin: Tonolini Massimo, Department of Radiology, "Luigi Sacco" University Hospital – Milan (Italy)
Description: Multiplanar T2-weighted images (a...f) confirmed normal-sized postmenopausal uterus (short arrows in a). Origin: Tonolini Massimo, Department of Radiology, "Luigi Sacco" University Hospital – Milan (Italy)
**Description:** Multiplanar T2-weighted images confirmed a 6x4x3.5 cm multiloculated cystic right adnexal mass (arrows) with predominantly fluid signal, septations and minimally thickened peripheral rim (thin arrows). **Origin:** Tonolini Massimo, Department of Radiology, "Luigi Sacco" University Hospital – Milan (Italy)
Description: Multiplanar T2-weighted images confirmed a 6x4x3.5 cm multiloculated cystic right adnexal mass (arrows) with predominantly fluid signal, septations and minimally thickened peripheral rim (thin arrows). Origin: Tonolini Massimo, Department of Radiology, “Luigi Sacco” University Hospital – Milan (Italy)
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Description: The multiloculated cystic right adnexal mass (arrows) had an identifiable fluid-filled ventral tubular portion (arrowheads) consistent with dilated fallopian tube, which favoured infection over tumour. Note septations and minimally thickened peripheral rim (thin arrows). Origin: Tonolini Massimo, Department of Radiology, "Luigi Sacco" University Hospital – Milan (Italy)
Description: The multiloculated cystic right adnexal mass (arrows) had an identifiable fluid-filled ventral tubular portion (arrowheads) consistent with dilated fallopian tube, which favoured infection over tumour. Note septations and minimally thickened peripheral rim (thin arrows). Origin: Tonolini Massimo, Department of Radiology, "Luigi Sacco" University Hospital – Milan (Italy)
Description: Additionally, fat-suppressed heavily T2-weighted images (g, h) showed minimal effusion in the peritoneal cul-de-sac (*), extensive hypersignal (+) consistent with parametrial oedema. Origin: Tonolini Massimo, Department of Radiology, “Luigi Sacco” University Hospital – Milan (Italy)
Description: Additionally, fat-suppressed heavily T2-weighted images (g, h) showed minimal effusion in the peritoneal cul-de-sac (*), extensive hypersignal (+) consistent with parametrial oedema.

Origin: Tonolini Massimo, Department of Radiology, “Luigi Sacco” University Hospital – Milan (Italy)
Description: Unenhanced T1-weighted images (i, fat-suppressed j) showed the complex multiloculated right adnexal mass (arrows) with heterogeneous, predominantly low signal intensity, without haemorrhagic portions. Origin: Tonolini Massimo, Department of Radiology, “Luigi Sacco” University Hospital – Milan (Italy)
Description: At discharge, follow-up ultrasound at revealed decreased size (32x36x39 mm) and volume (23.5 ml compared to 36 ml initially) of the complex right adnexal mass, with increased fluid-like anechoic regions; disappearance of peritoneal cul-de-sac effusion. Origin: Tonolini Massimo, Department of Radiology, “Luigi Sacco” University Hospital – Milan (Italy)