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Pictorial Review

Adnexal torsion — A multimodality imaging review

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Adnexal torsion is a gynaecological surgical emergency as prompt restoration of ovarian blood flow may prevent permanent irreversible damage. Patients frequently present with non-specific symptoms and signs and therefore adnexal torsion is often an unexpected radiological diagnosis. Although ultrasound is the initial imaging technique of choice in suspected adnexal torsion, many patients undergo computed tomography (CT) or magnetic resonance imaging (MRI) either as a first-line test following non-specific presentation, or as a confirmatory test following equivocal ultrasound findings. Using multiple techniques, this review illustrates the wide variety of imaging features observed in adnexal torsion enabling a confident diagnosis that may result in a more favourable surgical outcome.

Introduction

Adnexal torsion is the fifth most common gynaecological emergency with an estimated prevalence of 2.7%.[1] It is defined as complete or partial rotation of the ovarian vascular pedicle on its long axis.[1] It usually involves both the ovary and the fallopian tube,[2,3] thus the term "adnexal torsion" is preferred to "ovarian torsion." As with torsion of many other structures, venous flow is initially compromised resulting in congestion and oedema of the ovary. This is followed by arterial flow compromise leading to ischaemia and necrosis, and if left untreated peritonitis and death may result.

Adnexal torsion primarily affects premenopausal women,[4] but may occur in any age group, and occurs more commonly on the right than the left.[5] It may also occur in pregnancy, with an incidence of approximately 1 in 5000.[6] Torsion is associated with the presence of an underlying adnexal mass lesion in up to 81% of cases,[2,7] commonly a non-adherent benign cystic mass, such as a cystic teratoma.[8] Other factors reported to predispose to torsion include ovarian hyperstimulation for *in vitro* fertilization, long ovarian ligaments,[9] laparoscopic hysterectomy,[10] and polycystic ovaries. However, torsion can occur in the otherwise normal ovary, usually in the pre-pubertal female.

The clinical presentation of adnexal torsion is often non-specific, with symptoms and signs such as abdominal pain, nausea, vomiting, pyrexia and leucocytosis.[11] The differential diagnoses for this presentation are wide and include acute appendicitis, ureteric calculus, diverticulitis, colitis, mesenteric adenitis, and other acute gynaecological conditions, such as ectopic pregnancy, pelvic inflammatory disease, and ruptured ovarian cyst. This clinical picture is further complicated by the sometimes subacute or intermittent nature of the process, and it is, therefore, often initially misdiagnosed.[12] In a series of 135 patients with adnexal torsion, only 58% were correctly diagnosed on first presentation.[13]

As the clinical features of adnexal torsion can mimic other causes of an acute abdomen, the diagnosis might be made on ultrasound (US), computed tomography (CT) or magnetic resonance imaging (MRI) depending on a variety

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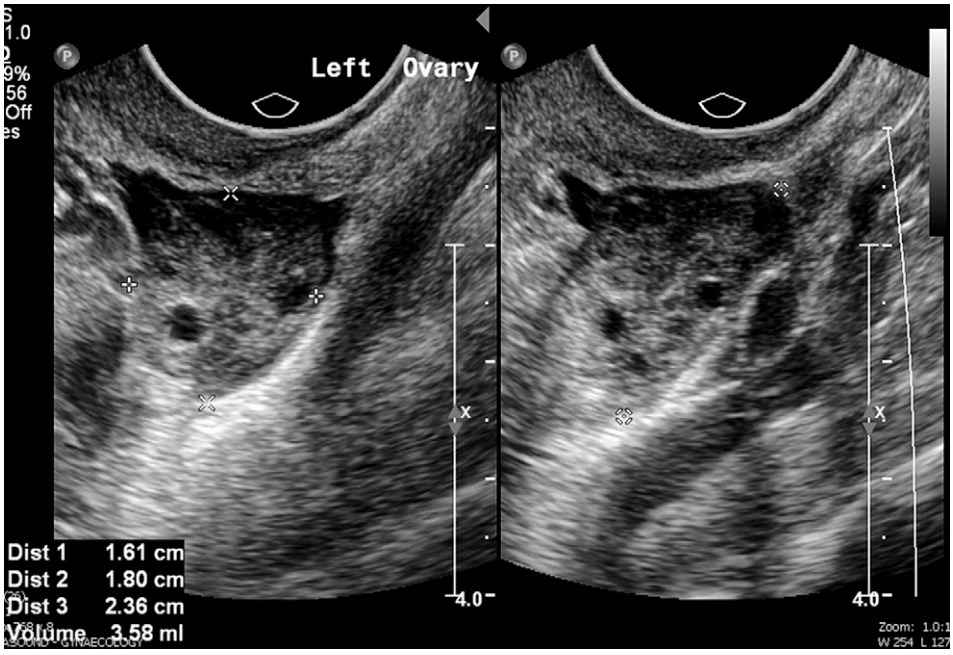

Figure 1 Transvaginal ultrasound images demonstrating normal appearances of the premenopausal ovary with ovoid shape and small randomly distributed follicles.

of factors including patient presentation, local expertise, and referral patterns. Despite the advances in these techniques in recent years, it has been shown that reaching a specific radiological diagnosis in many pelvic conditions, including adnexal torsion, can be difficult.[14,15] Therefore, it is important to be familiar with the range of imaging features of adnexal torsion on all techniques and to maintain a high degree of suspicion in females with lower abdominal or pelvic pain. A prompt and accurate diagnosis is vital given that urgent surgical intervention may result in a more favourable outcome with ovarian salvage.[16]

US features

In many centres, US is the initial imaging technique of choice in the investigation of lower abdominal or pelvic pain in the premenopausal woman. However, US is neither 100% sensitive nor specific for the diagnosis of adnexal torsion,[17] with detection rates quoted at between 46 and 74%.[18]

In order to appreciate many of the signs of adnexal torsion, it is important to be familiar with the normal ovarian ultrasound appearances (Fig 1). In the pre-menopausal woman the ovary is seen as an ellipsoid structure with multiple randomly distributed follicles, with echogenicity similar to that of uterine myometrium. Depending on the phase of cycle a dominant follicle or corpus luteum up to 4.7 cm in diameter may be present.[19] Normal mean ovarian volumes as measured by US are approximately 3 ml pre-menarche, 9.8 ml in menstruating women, and 5.8 ml in the postmenopausal woman.[20]

There are a wide range of sonographic appearances in adnexal torsion, the most common finding being enlargement of the ovary,[21] with volumes as high as 4308 ml reported.[22] In cases not as marked as this, comparison with the contralateral ovary may be useful with a difference in overall volume of 5 ml being significant.[23] As well as enlargement, the ovary may take on a more rounded shape than normal, and oedema and haemorrhage may lead to a heterogeneous appearance of the ovarian stroma (Fig 2).

Another feature suggestive of adnexal torsion is the presence of multiple small peripherally placed follicles within the ovary (Fig 3),[24] which is thought to reflect displacement by oedema[5] and transudation of fluid into the

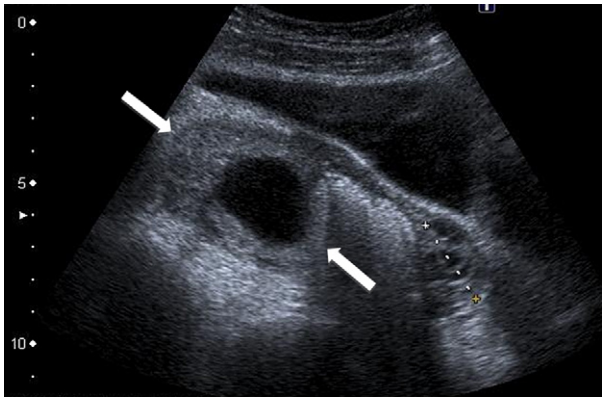

Figure 2 Sagittal transabdominal ultrasound image from a 13-year-old female patient presenting with lower abdominal pain and suprapubic tenderness demonstrates an enlarged oedematous right ovary (arrows) when compared to the normal left ovary (dashed line). Histology confirmed a torted and infarcted right ovary.