

Computed Tomography / Tomodensitométrie

Computed Tomography Imaging of the Acute Pelvis in Females

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Abstract

Sonography is the primary imaging modality for the evaluation of pelvic pain in female patients, especially if gynaecological pathology is suspected. However, computed tomography (CT) is frequently used in patients who present to emergency departments (and elsewhere) with otherwise nonspecific abdominal and pelvic pain and may be the first imaging modality to demonstrate an acute gynaecological abnormality. Computed tomography can also be used prospectively in selected patients to further evaluate findings initially identified on sonography, although to reduce radiation exposure, magnetic resonance imaging is being used more frequently in this situation. The purpose of this article is to discuss the spectrum of gynaecological findings of the acute female pelvis that may be identified on CT by the emergency radiologist and by the general radiologist, with a brief review of the imaging literature of each specific diagnosis.

Résumé

L'échographie demeure la principale modalité d'imagerie pour évaluer les cas de douleurs pelviennes chez les femmes, particulièrement pour exclure une pathologie gynécologique. La tomodensitométrie (TDM) est toutefois fréquemment utilisée comme modalité de première intention, chez les patientes évaluées au service d'urgence (ou en externe) en raison de la non-spécificité des douleurs abdominales et pelviennes. Elle peut donc constituer la modalité d'imagerie initiale pour diagnostiquer les pathologies gynécologiques aiguës. On peut également recourir à la TDM prospectivement chez certaines patientes, afin de préciser les résultats de l'échographie initiale. Toutefois, à des fins de radioprotection, l'imagerie par résonance magnétique est favorisée dans ce type de situation. Le présent article vise à explorer les pathologies gynécologiques associées aux douleurs pelviennes chez la femme et pouvant être décelées à la TDM en radiologie d'urgence et en externe. Une brève analyse de la documentation sur l'imagerie des différents diagnostics est également présentée.

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Sonography (US) is the primary imaging modality for the evaluation of pelvic pain in female patients, especially if gynaecological pathology is suspected prospectively. Magnetic resonance imaging (MRI) is being increasingly used selectively in stable patients, when available, as a problem-solving tool, in pregnancy, or as a follow-up examination to reduce patient radiation exposure. However, computed tomography (CT) of the abdomen and pelvis is widely used as the initial cross-sectional imaging examination in the emergency setting of patients undergoing evaluation for otherwise nonspecific signs and symptoms associated with an acute abdomen. It is our frequent experience and the experience of other radiologists that a wide variety of gynaecological abnormalities are

identified by using CT when such diagnoses are not prospectively expected (eg, in a woman with right lower quadrant pain and suspected appendicitis, who is then diagnosed with a gynaecological condition).

In recent years, CT has been increasingly used in the emergency setting for evaluation of the acute abdomen. Occasionally, CT will be performed after equivocal US or after US to further evaluate the findings (eg, in complex pelvic inflammatory disease (PID), when the findings extend beyond the field of view and/or involve bowel) [1]. However, when a diagnosis is established on the basis of an initial pelvic US, unless it does not correlate with the history and physical examination (ie, a small ovarian cyst, which does not explain the patient's significant pain, as per the assessment of the referring physician), CT should then be obtained only when truly indicated, to reduce radiation exposure.

Similarly, pelvic US is usually not needed after a definitive diagnosis is established based on initial CT (eg, a small

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simple or hemorrhagic ovarian cyst without any evidence for ovarian torsion is identified, and the rest of the examination is unremarkable, or if there is a definitive CT diagnosis of ovarian torsion or PID), or if the pelvic component of the CT is normal, and US, therefore, should also be used selectively [2–5]. Further imaging with US is warranted when the CT findings are equivocal (eg, in possible torsion) or for further evaluation of suspected endometrial abnormalities as well as in cases that are suspicious but not definitive for pelvic malignancy [2,4]. In a recent retrospective series of 70 patients, there was no patient in whom an abnormal US followed a completely normal CT examination of the pelvis, although there was increased radiologist confidence with the addition of US for less-experienced interpreters [2]. The purpose of this article is to review the CT imaging of the acute female pelvis, covering a spectrum of gynaecological disorders that may be identified and diagnosed by the radiologist, with a brief review of the imaging literature and accompanying case demonstrations.

CT Technique

As with all female patients of reproductive age, a human chorionic gonadotropin (HCG) level needs to be checked before CT, unless it is an absolute emergency (eg, in the trauma setting). Protocols vary, depending on patient's symptoms and institutional protocols and/or radiologist preference, but generally, routine intravenous contrast is administered, with portal venous phase images obtained. Oral contrast may be given in women with suspected appendicitis or other bowel disorders, although (paradoxically, because if gynaecological pathology is the initial clinical consideration, then pelvic US, not CT, should be performed first) for most gynaecological entities oral contrast would not be expected to have utility in most patients. Typically, 3-mm axial images as well as coronal reformations would be reconstructed. In very selected cases, delayed images of the pelvis may help to clarify the relationship of the urinary tract to gynaecological pathology which is identified on initial review of the CT images. Routine use of radiation dose reduction techniques are advocated, particularly in women of reproductive age and in female children.

Ovarian Torsion

Ovarian torsion (OT) is the result of rotation of the ovary on its axis. Arterial, venous, and lymphatic stasis results, and, then if untreated, infarction. OT affects prepubertal girls without a pre-existent ovarian lesion due to hypermobility of the adnexa, may rarely occur prenatally, and may also occur during pregnancy, as well as in patients undergoing treatment for infertility. Alternatively, an enlarged ovary due to a lead point, particularly a benign mass such as a large cyst or a teratoma (ie, a dermoid) also predisposes to OT. Spontaneous detorsion is relatively common, and the patient, therefore, may have a history of similar episodes of pain. The pain is often severe but may be nonspecific or lower grade. There is

a palpable mass in approximately 50% of the patients, and there may be associated nausea, vomiting, and fever. The right ovary undergoes torsion more frequently than the left, because the space occupied by the sigmoid colon presumably “protects” the left ovary from twisting [6–8].

US with Doppler interrogation of the ovary is the imaging test of choice if OT is prospectively suspected (although establishing the US diagnosis of torsion can also be difficult). However, it has been our experience and the experience of other researchers that CT may be obtained first, and the radiologist must maintain a high index of suspicion for OT and must be able to make or at least suggest the diagnosis when appropriate [3,7,9–11]. CT and MRI are also useful if the US findings are indeterminate [7]. In a retrospective review of 28 patients with surgically-proven OT who underwent CT, the diagnosis of OT was mentioned in fewer than a third of the CT reports [3]. In another series, of 25 patients, OT was not correctly diagnosed based on initial US, but was suggested or diagnosed by using CT in 16 of the patients [12]. However, in that same series, which included a total of 58 cases of proven OT, overall, a correct diagnosis was made by using US in 71% of cases, whereas CT yielded a correct diagnosis in only 38% [12]. The inaccuracy reported for CT was at least partially attributed to the lack of radiologist awareness of the CT findings of OT [3].

The CT (and MRI) findings of OT include an enlarged, oedematous ovary (generally substantially, mean 9.5 cm in 1 series) with or without an identifiable cyst or mass, deviation of the uterus to the side of the torsion, rotation of an adnexal mass to the contralateral side of the pelvis, twisting of the fallopian tube and vascular pedicle, engorgement of the involved adnexal vessels, a thickened fallopian tube, a small amount of ascites, oedema of the

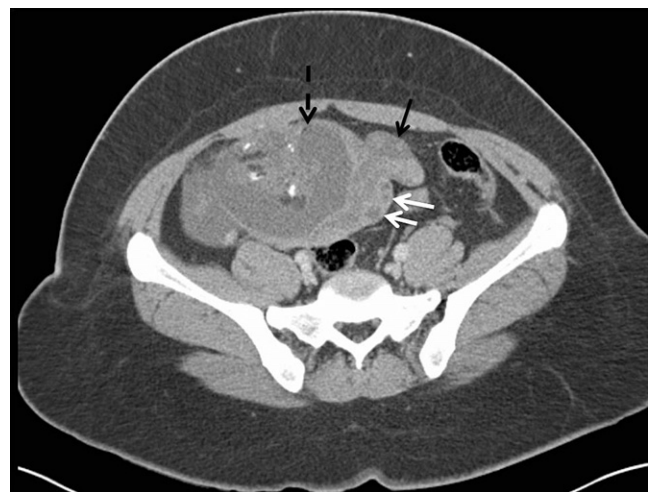


Figure 1. Left ovarian torsion related to a dermoid in a 23-year-old patient who presented with left lower quadrant pain. Axial contrast-enhanced computed tomography, revealing a 10-cm left ovarian mass that contains fat, soft tissue, and calcifications, which is diagnostic of a dermoid (black dashed arrow). There are multiple peripheral follicles (white arrows) in the left ovary. There is swelling of the left fallopian tube (black arrow), which may contain hemorrhage. There is associated right lower quadrant fluid as well as inflammatory changes of the fat adjacent to the left ovary.

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