ORIGINAL ARTICLE

Sonographic and MRI features of ovarian torsion

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Abstract   *Purpose:* This study aimed to determine the different sonographic and MRI findings in surgically proven cases of ovarian torsion.

Patients & method: The study retrospectively enrolled 14 incidences of surgically confirmed ovarian torsion. All patients had underwent US and MRI examination preoperatively. Retrospective review of patients' radiological images and reports was conducted looking for the presence of imaging features of ovarian torsion.

Results: The most common findings in US and MRI were edematous enlarged ovary with peripherally displaced follicles and pelvic collection. Other common MR features included abnormal poor ovarian enhancement. MRI also appeared to be useful in detection of tube thickening and twisted pedicle which had different patterns increasing the reliability of ovarian torsion diagnosis.

Conclusion: It is critical to be familiar with ovarian torsion manifestations on the different imaging modalities in order to expeditiously arrive to its diagnosis. The most common findings in US and MRI were edematous enlarged ovary with peripherally displaced follicles and pelvic collection. Other common MR features included abnormal poor ovarian enhancement. Also it appeared to be useful in detection of tube thickening and twisted pedicle which had different patterns increasing the reliability of ovarian torsion diagnosis.

1. Introduction

Ovarian torsion is defined as partial or complete rotation of the ovarian vascular pedicle resulting in obstruction to venous outflow and arterial inflow (1). It is an infrequent but significant cause of acute lower abdominal pain in females. It is reported to be the fifth most common gynecologic emergency condition encountered in adult female, with a prevalence of 2.7% (2).

A confident diagnosis and prompt surgical intervention are required to save the adnexal structures from infarction; however, the clinical presentation is often nonspecific, misleading, and overlapping with more commonly encountered entities, with few distinctive physical findings, making the diagnosis challenging and resulting in delay in surgical management (3).

Ultrasound (US) is the primary mode of evaluation of a female patient with lower abdominal pain because it is noninvasive, accessible, and cost-effective; however, it has a variable but less sensitivity and specificity for diagnosis of torsion (1). Color Doppler flow imaging offers correlation between

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morphologic features and physiologic and pathophysiologic blood flow patterns. It has been shown to be of value in the evaluation of patients with acute pelvic pain (3).

With its high contrast resolution, its ability to provide good tissue characterization, and its multiplanar imaging capabilities, magnetic resonance imaging (MRI) is increasingly used to evaluate pelvic pathology (4).

The aim of this study was to determine the different sonographic and MRI findings in surgically proven cases of ovarian torsion.

2. Patients & methods

2.1. Patients

For a period of 2 years, 13 patients with 14 incidences of ovarian torsion (as one of the patients had two attacks of ovarian torsion within 2 yrs interval), who were surgically proven as having ovarian torsion in Ain Shams University Hospital, were included in our study. All of them had underwent preoperative gray scale and color doppler Sonography as well as MRI studies. Excluded from this study are cases of ovarian torsion with incomplete or no sonographic or MR examinations. Retrospective review of patients' radiological images and reports was conducted looking for the presence of imaging features of ovarian torsion. Consent was not required due to retrospective nature of our study.

2.2. Ultrasound technique

Gray-scale and color doppler US was performed in all patients using a GE, LOGIQ 500, PRO series with 3.5 MHz curved-array probe for transabdominal examination and 7.5 MHz endovaginal probe for the endovaginal ultrasound examination. The later wasn't done in virgin patient.

2.2.1. Data interpretation

We retrospectively reviewed the sonograms, assessing the following criteria: ovarian enlargement (by its size and volume), superficial location of the ovary, peripheral displacement of follicles, ground glass appearance of stroma center, pathological mass, and collection in cul-de-sac.

Using Color flow sonography, flow was assessed in a qualitative fashion for the central vasculature. Three patterns were described: normal, decreased, or absent flow when compared to contralateral ovary. Quantification of flow with peak systolic velocities or centimeters per second was not possible because of the retrospective nature of this study. Additionally, findings suggestive of twisted vascular pedicle were reviewed, looking for the presence or absence of juxtra/extra ovarian abnormally coursing vessels in the form of loops, coils or the classically described whirlpool sign.

2.3. MRI techniques

MRI was performed on a 1.5-T superconductive magnet system (Philips Achieva 1.5T SE), using SENSE XL Torso coil. Before contrast injection the following sequences were done: three-plane localizer; axial, sagittal and coronal T1 weighted FSE; axial T2 weighted FRFSE fat saturation; coronal and sagittal T2 weighted FRFSE; axial, sagittal and coronal STIR; and axial T1-weighted fat-suppressed sequence. Post-contrast axial, coronal and sagittal T1 weighted images (T1 WIs) with fat saturation were obtained after automatic injection of 1 ml/10 kg of Gadolinium at a rate of 1.5 ml/s.

2.3.1. Data interpretation

The scans were reviewed for the presence or absence of the following features: abnormal location of the ovary i.e. midline, anterior or superior to the uterus, but not at ovarian fossa, peripherally located follicles, stromal edema (evident by increased T2 signal intensity, T2 SI), subacute hemorrhage (evident by punctuate increased SI in T1 fat sat.), abnormal decrease in ovarian enhancement, pathological mass (if cyst, smooth wall thickening is looked for), ipsilateral uterine deviation (the ovary looks near the uterine cornu), free pelvic collection, peaking of the ovary into twisted pedicle, engorged ovarian vessels, and finally findings suggestive of twisted vascular pedicle as juxtra/extra ovarian target/whirlpool sign, nodular or tubular structure (enhancing and of high SI in T2WI).

2.4. Statistical method

Data were expressed as both number and percentage for the categorical data (qualitative variable).

3. Results

Fourteen cases of surgically proven ovarian torsion were included in this study. Patients' ages ranged from 9 to 51 years (the average 26.5 years). Ten patients (71.4%) were of reproductive age (20–39 years), two were children (14.28%), and two were postmenopausal (14.28%). All cases were not pregnant nor had ovulation induction. Right side involvement was in 8 cases (57.1%) while left side was in 6 cases (42.85%). Ovarian cyst was found in 6 patients (42.85%). Tables 1 and 2 summarize the imaging findings of ovarian torsion using US and MRI respectively.

Table 1 Sonographic findings in ovarian torsion.

	Findings		No of Cases (n = 14)	% of Cases
Gray scale US	Ovarian enlargement		14	100
	Superficial location of the ovary		4	28.57
	Peripheral displacement of follicles		10	71.4
	Ground glass stroma		8	57.1
	Pathological mass		6 cystic	42.85
	Cul-de-sac collection		10	71.4
Color Doppler US	Central vasculature	Normal	2	14.28
		Decreased	6	42.85
		Absent	6	42.85
	Twisted vascular pedicle	Whirlpool sign	2	14.28
		Loops, or coils	2	14.28