Original Study

Presentation, Diagnosis, and Treatment of Ovarian Torsion in Premenarchal Girls

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A B S T R A C T

Study Objective: To describe the clinical characteristics and treatment of ovarian torsion in premenarchal girls with surgically verified ovarian torsion.

Design and Participants: A retrospective cohort study design was used. The medical charts of all premenarchal girls with surgically verified ovarian torsion treated in a university-affiliated tertiary medical center from 1997 to 2012 were reviewed for clinical, treatment, and outcome data.

Results: Thirty-two premenarchal girls were identified. Their median age was 9 years. There were 7 recurrences during the study period (17.9%), for a total of 39 cases. The main presenting symptoms were abdominal pain (92.3%) and nausea and vomiting (84.6%). Physical examination revealed abdominal tenderness in 25 cases (64.1%). Abdominal ultrasound, performed in 31 patients (38 cases), yielded pathologic findings in 28 (73.7%), mainly an enlarged ovary (11 cases, 28.9%). Doppler flow studies were abnormal in 15 cases. In 26 cases (68.4%), the tentative preoperative working diagnosis was ovarian torsion. Laparoscopy was performed in 26 cases, laparotomy in 10, and laparoscopy converted to laparotomy in 3 cases. Conservative management, mainly with additional cyst drainage or cystectomy, was used in 37 cases (95.2%) with oophoropexy in 5 cases. Two patients required oophorectomy because of a suspected neoplasm and severe ovarian necrosis. Pathologic examination demonstrated 5 simple cysts, 1 necrotic ovary, and 1 mature cystic teratoma.

Conclusions: Ovarian torsion in premenarchal girls is associated with nonspecific signs and symptoms. Abdominal ultrasound and Doppler imaging may assist in the diagnosis. Laparoscopy with conservative management is preferred. Owing to the high recurrence rate, oophoropexy may be considered.

Key Words: Ovarian torsion, Premenarche, Adnexal torsion, Conservative surgery, Ultrasound

Introduction

Torsion of the ovary, tube, or both is considered to account for 2.7% of all gynecologic emergencies.[1] It occurs mostly in patients of child-bearing age[2] and is less common in females aged 1 to 20 years, in whom the reported prevalence is 4.9 per 100,000 females.[3] Signs and symptoms are nonspecific; even with the assistance of laboratory tests, sonography, and Doppler flow studies, ovarian torsion is frequently misdiagnosed.[2,4,5] This leads to a delay in diagnosis and a long lag time of hours to days from symptom onset to surgery.[2] An interval of more than 10 hours is associated with adnexal necrosis, but the actual duration of ischemia beyond which the damage is irreversible remains unknown.

The preferred treatment of confirmed ovarian torsion is controversial. A growing number of studies advocate conservative surgery, mainly untwisting with additional cyst drainage or cystectomy; however, all have so far been limited to adult patients.[6–10] Although resection of the affected adnexa can have an adverse impact on future reproductive potential,[11] concerns about missing a malignant lesion, thromboembolic complications, and a severe ischemic and nonviable ovary have led to the use of oophorectomy.[6–10]

A few recent reports have focused on ovarian torsion in the pediatric population,[5,7,12] but very few stratified for premenarchal girls. Therefore, the aim of the present study was to characterize the signs, symptoms, and treatment of ovarian torsion in premenarchal girls.

Methods

Study Population and Setting

The study cohort consisted of all premenarchal patients with surgically verified ovarian torsion who were diagnosed and treated in a university-affiliated tertiary medical center between 1997 and 2012.

According to our local department protocols, every girl with abdominal pain admitted to the emergency department, either pediatric or gynecologic, undergoes a meticulous history, physical examination, and urine analysis. Further laboratory tests (complete blood count, electrolytes, liver and kidney function tests) are performed at the discretion of the attending physician. In addition,

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abdominal ultrasound is performed with a full bladder, including pelvic sonography with Doppler flow imaging. When ovarian/adnexal torsion is suspected, surgery is performed by gynecologic personnel. The surgical approach is usually based on the surgeon's preference.

For the present study, cases of ovarian/adnexal torsion were identified retrospectively using the hospital's comprehensive computerized database. Eligibility was based on ICD-9 codes for ovarian/adnexal torsion. Data were collected from the patient files and electronic records as follows: patient age; medical and gynecologic history; presenting symptoms and signs; findings on physical examination, laboratory work-up and imaging studies; time elapsed from symptom onset to emergency department (either pediatric or gynecologic) admission, from emergency department admission to gynecologic evaluation and from emergency department admission to first incision made in the operating room; surgical findings; surgical treatment of the ovarian torsion; and postoperative complications. We also recorded whether the index ovarian torsion was a primary event or a recurrence. In cases in which the ovarian vessels were wrapped around a central axis in a clockwise or counterclockwise direction, a whirlpool sign on Doppler imaging was considered.

The study protocol was approved by the local institutional review board.

Data Analysis

Data analysis was performed with the SPSS package, version 19.0 (Chicago, IL). Normally distributed variables are reported as means and standard deviations, and non-normally distributed variables as medians.

Results

Background Characteristics

A total of 32 premenarchal patients met the study criteria. Median age was 9 years (range 3 months to 14 years); mean age was 7.7 years (standard deviation 4.4 years). During the study period, ovarian torsion recurred in 6 patients (18.7%), for a total of 39 cases: 5 patients had 2 episodes of ovarian torsion each and 1 patient had 3 episodes. Previous abdominal surgery was performed in 1 patient, and an additional 6 patients had a history of pelvic surgeries.

Physical Examination

The median interval from symptom onset to emergency department admission was 24 hours. The most common presenting symptom was abdominal pain (36/39 episodes of torsion, 92.3%), followed by nausea and/or vomiting (33/39, 84.6%). Other gastrointestinal and urinary complaints are listed in Table 1. The most common sign on physical examination was abdominal tenderness in 25 cases (64.1%), followed by high fever (>38.0°C) in 5 cases (12.8%). Leukocyte level was elevated ($>12 \times 10^3/\mu L$) in 15 cases (38.4%).

Table 1
Signs and Symptoms of Ovarian Torsion in 32 Premenarchal Patients (39 Cases)

Signs and Symptoms	N (%)
Abdominal pain	36 (92.3)
Lower abdomen	24 (61.5)
Diffuse	12 (30.7)
Nausea and vomiting	33 (84.6)
Diarrhea	3 (7.6)
Restlessness	5 (12.8)
Urinary symptoms	3 (7.6)
Fever >38°C	5 (12.8)
Abdominal tenderness	25 (64.1)
Abdominal distension	4 (10.2)
Pelvic mass	3 (7.6)
White blood cells $>12 \times 10^3/\mu L$	15 (38.4)

Ultrasound and Doppler Imaging

Abdominal ultrasound with a full bladder, performed in 31 patients (38 cases, 97.4%), revealed a pathologic pelvic finding in 28 cases (73.7%), most commonly an enlarged ovary (4 cm or greater in at least in 1 dimension) (11 cases, 28.9%) and ovary edema (9 cases, 23.6%), defined as an accumulation of fluid within the ovarian stroma separating normal follicular structures (Table 2). Doppler flow studies were considered pathologic in 15 cases, and a whirlpool sign was observed in 2 cases. Additional findings included simple and complex cysts. Ovarian torsion was suspected by abdominal ultrasound in 26 cases (68.4%). Computed tomography was performed in only 2 patients and demonstrated an ovarian mass.

Surgical Findings and Treatment

The median interval from emergency department admission to the first incision in the operating department was 9.5 hours. The majority of cases of torsion occurred on the left side (53.5%). Laparoscopy was performed in 26 cases and laparotomy in 10; in the remaining 3 cases, laparoscopy was converted to laparotomy. Mode of surgery was primarily based on surgeon preference (Table 3).

The median number of adnexal twists was 2.5 (range 1 to 5). Additional pathologic findings at surgery included a bluish-black ovary in 25 cases, an enlarged ovary in 13, and ovarian or para-ovarian cysts in 10 cases (7 simple and 3 complex according to the pathologic report). Other

Table 2
Abdominal Ultrasound Findings Associated with Ovarian Torsion in 31 Premenarchal Patients (38 Cases)

Ultrasound Findings	N (%)
Any abnormal finding	28 (73.7)
Enlarged ovary	11 (28.9)
Edema of the ovary	9 (23.6)
Enhanced echogenicity	1 (2.6)
Free pelvic fluid	3 (7.9)
Abnormal Doppler flow	
Absence of venous flow	1 (2.6)
Absence of arterial and venous blood flow	14 (36.8)
Whirlpool sign	2 (5.2)
Additional findings	
Simple cyst	11 (28.9)
Complex cyst	4 (10.5)
Normal abdominal ultrasound	10 (26.3)