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Case Series

Retrospective study of ultrasound defined adnexal masses in adolescent girls: a case series

Usha Natarajan, Navina Nathan*, Mala Vijayakrishnan

Department of Obstetrics and Gynaecology, Vijaya Hospitals, Chennai, Tamil Nadu, India

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***Correspondence:**
Dr. Navina Nathan,
E-mail: navina.nathan84@gmail.com

ABSTRACT

Ovarian torsion is an uncommon but critical surgical emergency in adolescent girls, often presenting as acute lower abdominal pain that can mimic other abdominal conditions. Prompt diagnosis and timely surgical intervention are essential to prevent irreversible adnexal damage and preserve fertility. Objective was to analyse the clinical presentation, diagnostic findings, surgical management, and histopathological outcomes of ultrasound-defined adnexal masses in adolescent girls. This retrospective study was conducted on 18 adolescent girls aged 11–19 years diagnosed with adnexal masses at Vijaya Hospital, Chennai, from 2019 to 2025. Data regarding demographic details, symptoms, imaging findings, intraoperative observations, management procedures, and histopathological diagnoses were reviewed. The mean age of presentation was 17 years. Most patients presented with acute-onset right-sided lower abdominal pain of less than 48 hours' duration, often associated with vomiting. Ultrasound was the primary diagnostic modality, though the presence of vascular flow did not exclude torsion. Laparoscopic detorsion with cystectomy was the most frequent management approach. Histopathological evaluation predominantly showed benign lesions such as serous, mucinous, and para-ovarian cysts. Follow-up imaging revealed either normal or polycystic ovaries in most cases. Ovarian torsion should be considered in all adolescent girls presenting with sudden lower abdominal pain. Ultrasound remains the initial diagnostic tool, but surgical exploration confirms the diagnosis. Conservative management with detorsion is recommended to preserve ovarian function and future fertility.

Keywords: Adnexal mass, Adolescent girls, Ovarian torsion, Ultrasound, Laparoscopy, Ovarian preservation

INTRODUCTION

Paediatric ovarian torsion is a rare but important cause of acute abdominal pain in children. However, pre-operative diagnosis is often challenging, as the clinical presentation can mimic other acute abdominal conditions, such as appendicitis or gastroenteritis. If untreated, ovarian torsion may progress to infection, peritonitis, or complete loss of the adnexa. Most cases of ovarian torsion are associated with underlying ovarian masses, such as functional cysts or neoplasms. Torsion is reported to be more common on the right side, with a ratio of approximately 3:2. This right-sided predominance may be attributed to the presence of the sigmoid colon on the left, which restricts movement, or a more mobile cecum on the right, which facilitates torsion.[1] Clinically, acute-onset lower abdominal pain accompanied by vomiting is a consistent presentation in cases of ovarian torsion. Ultrasound remains the diagnostic modality of choice. However, the presence of vascular flow on Doppler imaging does not reliably exclude the diagnosis of torsion.[2-6]

Selection criteria

Adolescent girls aged 11 to 19 years diagnosed with ovarian masses or ovarian cysts were included. Other adnexal masses were also included. Girls aged more than 19 years and other causes of acute abdomen, mostly surgical (appendicitis, gastro-enteritis) were excluded.

Data collection

The data reviewed included vital signs, laboratory and imaging results, pathology reports, and operative notes. Demographics of patients, symptom characteristics, including onset, duration, and nature (e.g., "sharp," "colicky," or "dull" pain), gynaecologic and menstrual history, vital signs at presentation, clinical examination findings of abdomen were noted. Imaging studies: Doppler ultrasound or computed tomography (CT), intraoperative findings, surgical management, including procedures such as detorsion and cystectomy and histopathological diagnosis were studied.

CASE SERIES

Acute ovarian torsion is a rare but significant cause of abdominal pain in children and adolescents. In this retrospective review of adolescent patients diagnosed with adnexal masses at our institution, several findings were consistent with, those reported in previous studies.

Demography and clinical presentation of adnexal masses

The average age of patients in our cohort was 17 years, which aligns with existing literature that identifies late adolescence as a common age group for adnexal pathology. All the patients in our study had attained menarche. Eleven patients had normal BMI (<25), 7 were classified as obese (>25). Regarding menstrual cycles, nine girls had regular cycles, seven had infrequent cycles, one had frequent cycles and one had heavy menstrual bleeding.

The majority of patients presented with acute-onset right-sided lower abdominal pain, typically of less than 48 hours in duration. 12 number of patients having right sided pain. This is consistent with prior studies documenting the sudden and localized nature of pain in ovarian torsion.[2-5,7,10,11]

Table 1: Demography, clinical presentation, diagnostic modality, management, pathologic findings and follow-up in girls with adnexal mass.

Characteristics	Values
Total cases	18
Age of the group	14-19 years
Menarche attained	Yes-all-100%, no-0
Menstrual cycle pattern	Regular cycles-9/18 (50%), infrequent cycles-7/18 (38%), frequent cycles-1/18 (5%), heavy menstrual bleeding-1/18 (5%)
Body mass index category	Normal BMI-11/18 (61%), obese-7/18 (38%)
Laterality	Right sided-12/18 (66%), left sided-6/18(33%)
Duration of pain	4 hours to 1 week
Site of pain	Lower abdomen-7/18 (38%), iliac fossa-5/18 (27%), loin-3/18 (16%)
Intensity of pain	Severe colicky to dull aching
Associated symptoms	Vomiting-10/18 (55%), fever-no, palpable mass-no
Diagnosis	Ovarian or para-ovarian cyst with torsion -12/18 (66%), ovarian cyst without torsion-4/18 (22%), tubo-ovarian abscess-1/18 (5%)
Procedure	Detorsion + cystectomy-12/18 (66%), cystectomy-4/18(22%), abscess drainage-1/18 (5%)
Histopathology	Simple ovarian and para-ovarian cysts-12/18 (66%), benign epithelial ovarian cyst-5/18 (27%), tubo-ovarian mass-1/18 (5%)
Follow-up	Normal viable ovaries-5/18 (27%), polycystic viable ovaries-5/18 (27%), lost follow-up-8/18 (44%)

The maximum duration of pain was 1 week. A particular focus of our study was the characterization of pain. Descriptions such as "sharp," "colicky," or "dull" were noted in the records, highlighting the importance of a thorough pain history in differentiating ovarian torsion from other causes of acute abdominal pain in adolescent females.

Vomiting was a prominent associated symptom in most cases, providing clinical clue in ovarian torsion. However, fever was not observed in our study. Vomiting was present in ten patients. Documentation of a palpable per abdomen pelvic mass was not observed in our review

Overall, our findings emphasize the need for heightened clinical suspicion and prompt imaging in adolescent girls presenting with sudden lower abdominal pain, even in the absence of systemic signs or palpable masses. Early diagnosis is critical to preserve ovarian function and reducing morbidity (Table 1).

Diagnostic modality, surgical procedure, histo-pathology and follow-up in girls with adnexal mass

The most consistent sonographic findings include the presence of an adnexal mass with echogenic areas and non-

visualization of the ipsilateral ovary, or non-homogenous mass.[9,12] Ovaries appeared bulky and enlarged. Majority of the cohort was associated with ovarian cyst. In some patient's vascularity was present, in some, reduced or absent flow in doppler was seen. Torsion was a finding seen in 12 patients, with whirlpool sign and follicular ring sign.

Ovarian or para ovarian cyst with torsion was seen in 12 patients, detorsion with cystectomy was done. Cystectomy was done for ovarian cyst in 4 patients, ovariotomy was done for a complex cyst in 1 patient and abscess drainage in 1 patient. Most surgical specimens in our review revealed simple ovarian cysts, para-ovarian cysts, consistent with torsion as a complication of functional ovarian cysts. 5 patients had benign epithelial ovarian cyst. Tubo-ovarian mass seen in 1 patient, which was not tubercular.

DISCUSSION

The age of our cohort was late adolescence. The average age of our patient population was 17 years. Other studies of paediatric patients with ovarian torsion have found a mean age of presentation ranging 9 to 12.5 years.[2,3,7-11] The largest study of paediatric ovarian torsion reported a mean age of 9.2 years This may be explained by the preponderance of ovarian cysts among menarchal or peri-menarchal girls.[9] In terms of sexual development, all our patients were post-menarchal. In the largest paediatric series of ovarian torsion by Kokoska and colleagues roughly half of the patients were post-menarchal.[2] In contrast, Meyer and colleagues reported on 12 patients with ovarian torsion, only 3 of whom were post-menarchal.[5] Torsion in otherwise normal ovaries is well described. However, it is postulated that menarchal girls are more prone to ovarian cysts due to anovulation. These cysts may act as a fulcrum for ipsilateral ovarian torsion. Ipsilateral cysts were found in most of our patients. Pain and vomiting are consistent with other studies. Pain was sharp or colicky or dull aching in character.

The diagnosis of ovarian torsion is primarily established through ultrasonography. Ultrasound, with or without Doppler, remains the most accessible and radiation-free imaging modality, making it the preferred initial diagnostic tool. It is also useful in differentiating ovarian pathology from other causes of acute abdomen, such as appendicitis. However, our study, consistent with previous reports, found that the presence of vascular flow on Doppler imaging does not reliably exclude ovarian torsion.[13] This can be explained by two mechanisms. The dual blood supply to the ovary from both the ovarian and uterine arteries may maintain persistent arterial flow even during torsion.

Venous congestion typically precedes arterial compromise, which can result in clinical symptoms despite detectable arterial flow on imaging. Therefore, ultrasound with doppler may be misleading, and a high index of clinical suspicion is necessary. If torsion is suspected, laparoscopy remains the gold standard for diagnosis and management.

Table 2: Clinical presentation of ovarian torsion across paediatric studies.

Study	Patients age mean in years	Mean duration of symptoms before surgery	Right sided %	% of vomiting	% of fever	Diagnostic modality
Meyer et al[5]	10 (0–15)	4.6 days	58.3	50	16.6	Ultrasound
Kokoska et al[2]	12.5 (8–16)	4.8 hours	57	73	22	Ultrasound, CT, OT
Anders and Powell[11]	10.2 (3–15)	94.3 hours	40.9	77	18	Ultrasound, CT
Rousseau et al[10]	11 (3–14)	NR	57.5	67.5	NR	Ultrasound, CT
Galinier et al[8]	11 (2–17)	3 days	NR	NR	NR	Ultrasound, OT
Oltmann et al[9]	10.9 (0–17)	NR	68	NR	NR	NR
Our study	17	48 hours	66	55.5	NR	Ultrasound, CT

NR–not reported, CT–computed tomography, OT–operation theatre

In a large study by Oltmann et al, 98% of torsion cases were found to be benign, with common findings including infarcted tissue, oedematous ovaries, benign cysts, and benign neoplasms.[9] Only about 2% of cases were associated with malignancy.[4,5,9] No malignancy was observed in our study.

Torsion is the most common complication of ovarian neoplasms in children, and benign teratomas are the most frequently implicated adnexal mass. Our study did not find any such cases. This may be attributed to age-related factors, as younger girls tend to have idiopathic torsion or torsion secondary to mature cystic teratomas. Several previous studies have identified teratomas in association with torsion.[2,4,7,14] Although some literature suggests anatomical predispositions such as congenitally long utero-ovarian ligaments, no such anatomical abnormalities were identified in our patient cohort.[15]

Historically, the standard management of ovarian torsion involved oophorectomy, based on concerns that a haemorrhagic ovary was nonviable, and fears of thromboembolism or leaving behind an undiagnosed malignancy.[7] However, with mounting evidence of low

malignancy risk, a more conservative surgical approach has gained favour.[2,3,7] This involves detorsion, with or without cystectomy, and aims to preserve ovarian tissue and if necessary second look surgery for cystectomy. Studies have shown even after up to 72 hours of torsion, normal ovarian function is resumed.[18]

Multiple follow-up studies have reported sonographic evidence of viable, perfused ovaries despite their intraoperative appearance.[3,16-19] In our study, 10 patients came for follow up. 5 patients had normal viable ovaries in follow up ultrasound, 5 patients had polycystic ovaries. 8 patients dint come for follow up.

A postoperative ultrasound at 6 weeks is recommended to rule out malignancy, enabling safe resection if necessary, and avoiding the technical challenges of operating on a haemorrhagic ovary.[7] Regarding the contralateral ovary, oophoropexy remains controversial, but may be considered in cases of recurrent torsion. Nevertheless, emerging evidence supports detorsion alone as a viable and increasingly accepted standard of care in paediatric and adolescent populations.

Limitations

The primary limitations of this study are its retrospective design and the small sample size, as it was conducted in a single, medium-sized tertiary care centre. However, these limitations are expected when studying a rare condition like ovarian torsion in people. We are not able to identify possible predictors of ovarian torsion.

CONCLUSION

Ovarian torsion is an uncommon but critical cause of acute abdominal pain in girls and adolescents, and timely diagnosis is crucial to prevent irreversible damage to the ovary and fallopian tube. It should be considered in any female presenting with sudden-onset lower abdominal pain, especially when accompanied by vomiting. While clinical and laboratory features of torsion may vary widely, our study found that pain is often constant or colicky, and unlike appendicitis, does not typically migrate. Ultrasound, with or without Doppler, remains the initial imaging modality of choice, although the presence of vascular flow does not rule out torsion, making clinical judgment essential. Importantly, conservative surgical management including detorsion and oophoropexy is now advocated, even when the ovary appears necrotic, as ovarian function can often be restored. Early imaging and prompt surgical intervention remain the cornerstone of management and are essential to reducing morbidity and preserving fertility in this vulnerable population.

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