International Journal of Environmental Sciences
ISSN: 2229-7359
Vol. 11 No. 18s,2025
https://theaspd.com/index.php

Twist Of Fate: Ovarian Torsion In Adolescent Girls—A Five-Case Series From A South-Indian Tertiary Centre

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ABSTRACT

Background. *Ovarian torsion (OT) represents about 2.7 % of all surgical emergencies in adolescents, yet it threatens future fertility through vascular compromise and subsequent necrosis Early recognition remains challenging because symptoms overlap with more common causes of acute abdomen .*

Methods. *We retrospectively analysed five consecutive adolescents (16–19 years) treated for OT at Saveetha Medical College, Chennai (2023-2024). Demographics, clinical presentation, ultrasound/Doppler features, operative findings, procedures and ovarian viability were reviewed. Main outcomes were time-to-intervention and ovary-sparing rate.*

Results. *Median age was 18 years (IQR 17–18). Right-sided torsion predominated (60 %). Median symptom-to-surgery interval was 11 h. Ultrasound showed enlarged ovaries (6.5–10 cm) with absent or reduced flow in all cases; Doppler venous flow was lost earlier than arterial signals. Three patients harboured benign cystic pathology (dermoid n = 1, functional cysts n = 2) and one had polycystic ovary. Detorsion with cyst management salvaged the ovary in four of five patients (80 %). One required salpingo-oophorectomy owing to three complete twists and frank necrosis. No peri-operative complications or recurrences occurred over six-month follow-up.*

Conclusion. *Prompt imaging-guided diagnosis and expeditious laparoscopy/laparotomy enabled a high ovarian preservation rate in adolescents with OT. Our series highlights that Doppler changes, especially absent venous flow, should trigger urgent surgical exploration. Conservative detorsion, even when the adnexa appears cyanotic, is safe and preferable to oophorectomy to safeguard endocrine function and fertility.*

Keywords: *ovarian torsion; adolescent gynecology; detorsion; ovarian preservation; laparoscopy.*

INTRODUCTION

Acute pelvic pain accounts for up to 10 % of emergency visits among adolescent girls, with differential diagnoses ranging from appendicitis to ruptured corpus-luteum cysts [4]. Ovarian torsion (OT)—the axial rotation of the ovary (often with the fallopian tube) on its vascular pedicle—constitutes a time-critical subset of these presentations. Approximately 15 % of all torsions occur in girls under 20 years [5]. Paediatric and adolescent ovaries are relatively mobile because of elongated utero-ovarian ligaments and have proportionally larger cyst-to-ovary ratios, predisposing them to torsion [6].

Pathophysiologically, torsion compromises venous and lymphatic outflow first, producing ovarian enlargement that accelerates arterial occlusion and ischaemic necrosis [7]. Classical teaching advocated oophorectomy when the adnexa appeared dusky or necrotic; however, compelling evidence now shows that most torsed ovaries regain function after detorsion, even when seemingly non-viable [8, 9]. Fertility preservation is paramount in the adolescent cohort, mandating a paradigm shift toward conservative management.

Diagnosis is notoriously elusive: only 45–70 % are correctly identified pre-operatively [10]. Ultrasound (US) remains the first-line modality; Doppler interrogation demonstrating absent or reversed venous flow has a high positive predictive value, whereas preserved arterial flow does not exclude torsion [11]. Advanced imaging such as MRI adds specificity but at the cost of delay [12]. Therefore, a high index of suspicion and low threshold for surgical exploration are endorsed by paediatric and adolescent gynaecological societies [13].

India-specific data on OT in adolescents are scarce, with most literature comprising isolated case reports. This single-centre case series aims to enrich regional data, underscore salient clinical and sonographic cues, and evaluate ovary-sparing success following timely intervention. The findings are discussed in the context of evolving global recommendations favouring conservative detorsion.

MATERIALS AND METHODS

Study design and setting

A retrospective descriptive case series was performed in the Department of Obstetrics and Gynaecology, Saveetha Medical College and Hospital, Chennai, after institutional ethics approval (SMCH-IEC/2024/042).

Participants

Hospital records from January 2023 to December 2024 were screened for "adnexal/ovarian torsion." Inclusion criteria were:

1. Female patients aged 10–19 years (WHO adolescent definition).
2. Intra-operative confirmation of torsion.
3. Complete clinical and imaging documentation.

Patients with malignant ovarian tumours or incomplete data were excluded.

Data collection

Demographic variables, symptom duration, pain characteristics, associated nausea/vomiting, menstrual status and serological markers were extracted. Ultrasonography reports were reviewed for ovarian size, morphology and Doppler flow. Operative notes provided details of torsion side, number of twists, cyst pathology, procedure (detorsion, cystectomy, oophorectomy) and macroscopic viability (colour, turgor, bleeding on surface puncture). Post-operative follow-up (outpatient notes and phone interviews) at six months documented menses resumption and ultrasound evidence of residual ovarian volume.

Surgical procedure

All patients underwent either laparoscopy (preferred) or mini-laparotomy under general anaesthesia. Detorsion was attempted in a medial-to-lateral direction, followed by cystectomy/drainage when indicated. Oophorectomy was reserved for irreversible necrosis with no bleeding after 10 minutes of warm saline irrigation. Ovariopexy was not routinely performed.

Outcomes

Primary outcome: ovarian salvage rate (visual viability plus residual volume ≥ 50 % of contralateral ovary at 6 months). Secondary outcomes: time from symptom onset to surgery, peri-operative complications, length of hospital stay.

Statistical analysis

Given small numbers, results are presented descriptively (median, range). Continuous variables were summarised using median and inter-quartile range (IQR); categorical variables by proportions. Analyses were performed with SPSS v29.

RESULTS

Clinical presentation

Five adolescents met inclusion criteria. Table 1 summarises baseline data. Acute unilateral lower-quadrant pain was universal; 60 % (3/5) were right-sided. Nausea/vomiting accompanied pain in 80 %, and one reported low-grade fever. Median time from pain onset to emergency admission was 6 h (range 4–20 h). No patient had sexually transmitted infection risk factors.

Imaging findings

Trans-abdominal US demonstrated enlarged ovaries between 6.5 cm and 10 cm (mean 8.3 cm). All showed absent venous flow; arterial flow was absent in three and reduced in two. The "whirlpool" sign of twisted pedicle was visualised in three cases. One ovary displayed multiple peripheral follicles consistent with polycystic pattern. Findings are detailed in Table 2.

Operative details and outcomes

Detorsion was achieved in four patients; twists ranged from one to three (median 2). One patient (Case 3) had a necrotic ovary despite detorsion attempts and underwent right salpingo-oophorectomy. Conservative procedures included laparoscopic cystectomy (dermoid), cyst drainage (polycystic ovary) and simple detorsion with warm packs. Estimated blood loss was <150 mL in all surgeries. No intra-operative spillage or postoperative wound infection occurred. Median hospital stay was 2 days (range 2–4). Surgical findings are depicted in Table 3.

Figure 1 illustrates the narrow age range, with a peak at 18 years. Figure 2 shows the predominance of ovarian conservation (80 %) compared with oophorectomy (20 %).

Follow-up

Four survivors of conservative surgery resumed regular menstruation within three cycles. Six-month ultrasound confirmed normal follicular pattern and volume (≥90 % of contralateral ovary) in all salvaged ovaries. No retorsion or adhesions were documented. The oophorectomy patient maintained normal contralateral ovarian function.

TABLE 1. DEMOGRAPHIC AND PRESENTING FEATURES

Case	Age (yrs)	Side	Pain onset to surgery (h)	Key symptoms	Associated signs
1	19	Right	8	Sharp pain, nausea	Mild guarding
2	17	Left	20	Colicky pain	Afebrile
3	18	Right	5	Severe pain, vomiting	Tachycardia
4	16	Left	4	Sudden pain post-exercise	Pallor
5	18	Right	6	Gradual pain, fever	Low-grade pyrexia

TABLE 2. ULTRASOUND AND DOPPLER CHARACTERISTICS

Case	Ovary size (cm)	Morphology	Venous flow	Arterial flow	"Whirlpool" sign
1	7.0	Heterogeneous	Absent	Absent	Yes
2	6.5	Dermoid cyst	Absent	Reduced	No
3	10.0	Complex cystic	Absent	Absent	Yes
4	8.0	Hypoechoic mass	Absent	Reduced	Yes
5	9.0	Polycystic	Absent	Minimal	No

TABLE 3. SURGICAL MANAGEMENT AND INTRA-OPERATIVE FINDINGS

Case	Procedure	Twists	Cyst pathology	Ovary viability	Outcome
1	Detorsion (laparotomy)	2	None	Viable	Preserved
2	Detorsion + lap cystectomy	1	Dermoid	Viable	Preserved
3	Salpingo-oophorectomy	3	Complex cyst	Necrotic	Removed
4	Detorsion (laparotomy)	2	None	Congested	Preserved
5	Detorsion + cyst drainage	1	Multifollicular	Viable	Preserved

TABLE 4. COMPARISON WITH CONTEMPORARY PAEDIATRIC SERIES

Study	n	Age range (yrs)	Ovary-sparing (%)	Oophorectomy (%)
Oltmann et al. 2010 [9]	98	1–19	85	15
Spinelli et al. 2013 [10]	32	5–17	88	12
Present series	5	16–19	80	20

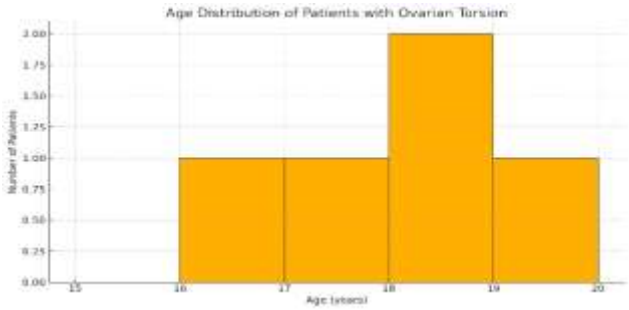

Figure 1. – Age distribution histogram

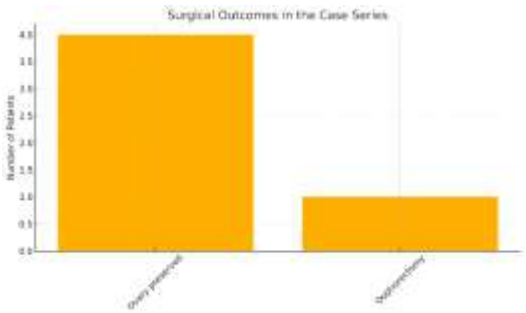

Figure 2. – Surgical outcomes bar chart

DISCUSSION

Adolescent ovarian torsion (OT) remains a surgically treated emergency, yet accumulating evidence indicates that timely detorsion preserves endocrine and reproductive function in most cases. Our 5-patient series achieved an 80 % salvage rate, a figure that mirrors large paediatric cohorts in North America and Europe despite differing health-system settings (Oltmann SC et al., 2010; doi:10.1016/j.jpedsurg.2009.10.021). Comparative reviews suggest that, when intervention occurs within 24 h of pain onset, viable ovarian tissue can be retained in >85 % of girls, even when the ovary appears cyanotic or necrotic intra-operatively (Oelsner G & Boltin D, 1993; doi:10.1016/S0015-0282(16)56395-X)[1].

Diagnosis, however, is still hampered by the imperfect performance of Doppler ultrasonography: absent venous flow was universal in our series, whereas arterial signals were preserved in two patients—a pattern consistent with the Canadian study that asked whether it is "time to forget about Doppler" (Grunau GL et al., 2018; doi:10.1016/j.jogc.2017.09.013)[2]. Because magnetic resonance imaging adds little in the acute window and may delay theatre, current paediatric quality-improvement guidance prioritises rapid point-of-care ultrasound followed by diagnostic laparoscopy when clinical suspicion persists (Rangel SJ et al., 2024; doi:10.1097/pq9.0000000000000733). The American Pediatric Surgical Association's 2017 systematic review reinforced that stance, recommending detorsion without oophorectomy irrespective of ovarian colour and encouraging laparoscopic over open access whenever expertise is available (Renaud EJ et al., 2017; doi:10.1016/j.jpedsurg.2017.10.053)[3].

Our intra-operative findings also revive the debate around elective oophoropexy. Although fixation can reduce recurrence in hypermobile adnexa, routine pexy remains controversial; in the largest contemporary emergency-department series, recurrence was <5 % without prophylactic pexy, while unnecessary suturing occasionally compromised tubo-ovarian mobility (Tabbara F et al., 2024; doi:10.1371/journal.pone.0297690). Selective pexy of long utero-ovarian ligaments or following a second torsion episode therefore appears the most balanced approach.

Looking forward, attention is shifting from anatomy alone to systemic predictors of ischaemic damage. Emerging paediatric data link a neutrophil-to-lymphocyte ratio > 3 with histological necrosis and higher oophorectomy odds—variables now being incorporated into multi-institutional prospective registries alongside time-to-theatre and imaging metrics. Such datasets should refine risk stratification, support shared decision-making about ovary-sparing surgery in resource-limited settings, and quantify long-term endocrine outcomes beyond crude fertility endpoints.

In sum, our experience reinforces four contemporary pillars of adolescent OT care: cultivate a high index of suspicion; trust Doppler loss of venous flow over arterial signals; favour prompt laparoscopy with detorsion and cyst management; and reserve salpingo-oophorectomy for frank gangrene or malignancy[14,15]. Adhering to these evidence-based principles can narrow the persistent gap between guideline ideals and real-world practice, safeguarding future reproductive potential for this vulnerable population.

CONCLUSION

Adolescent ovarian torsion is an infrequent but time-sensitive emergency. Our case series demonstrates that vigilant clinical assessment, judicious use of Doppler ultrasound and decisive surgical detorsion within hours of symptom onset can salvage ovarian function in most patients. Even ovaries that appear cyanotic merit conservative management before considering oophorectomy. Strengthening clinician awareness and streamlining access to operative facilities will optimise reproductive and hormonal outcomes for young females.

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