Original Study

# Surgical Approach to Ovarian Torsion in Children

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A B S T R A C T

*Study Objective:* Ovarian torsion in children is a relatively rare cause of acute abdominal pain. This study evaluates the diagnosis and treatment of ovarian torsion with an emphasis on conservative treatment approaches including the long-term follow-up results.
*Design and Participants:* Patients with surgically treated ovarian torsions between December 2006 and February 2014 were included in this retrospective study. The patient population consisted of 41 patients with 42 ovaries involved. The mean age was 11 ± 3.9 (range, 1-17) years. The most common presenting symptom was abdominal pain.
*Intervention:* All patients underwent preoperative pelvic color Doppler ultrasonography that identified torsion in 34 (81%) ovaries.
*Results:* During surgery, a right-sided torsion was detected in 25 (59.5%), and a left-sided one was detected in 17 (40.5%) ovaries. An excisional surgery was used for 16 (38%) ovaries, and detorsion with conservation of the ovary was used for 26 (62%). A trend toward conservative management was seen over the years. Regular follow-up for those patients who underwent conservative surgery was done in 22 patients for a mean of 25 months (range, 1.5-83 months). Control color Doppler ultrasonographic results were within normal limits in terms of ovarian size and blood supply in 17 (77%) patients. Despite normal parenchymal echogenicity, an involved ovary was smaller in size compared to the other ovary in five patients. Ovarian follicles were present in three of them.
*Conclusion:* The ovary-sparing, conservative surgery is found to be highly successful in the presented series. Although malignancies are rarely encountered in torsed ovaries with associated masses, biopsy samples should be obtained in suspicious cases.
*Key Words:* Ovarian torsion, Surgery, Detorsion, Follow-up, Child

## Introduction

Ovarian torsion in children is a relatively rare cause of acute abdominal pain.[1] Where ovarian torsion is suspected, it is necessary to rule out other diagnoses like appendicitis, urinary stones or infection, mesenteric lymphadenopathy, pelvic inflammatory disease, and ectopic pregnancy. The diagnosis of ovarian torsion may be delayed where there is a lack of specific symptoms.[1–3] In the past, ovary-sparing surgery for ischemic ovarian torsion was not a preferred option because of the possibility of complications such as thromboembolism, malignancy, or even peritonitis.[1,4] However, the frequency of these complications is not high, and ovary-sparing surgery is regarded as a safe and efficacious preventive treatment. Moreover, long-term follow-up has shown that the ovaries continue to function.[5–8]

This study evaluates the diagnosis and treatment of ovarian torsion with an emphasis on conservative treatment approaches including the long-term follow-up results.

## Patients and Methods

The study was conducted in the pediatric surgery department of a university-affiliated teaching hospital. The patients treated for ovarian torsion between December 2006 and February 2014 were retrospectively evaluated. Any ovarian surgery performed on ovaries without torsion was excluded. Operations were performed by 8 pediatric surgeons. Demographic data, presenting symptoms, tumor markers, radiological findings, operative findings, and pathology findings, as well as follow-up investigations, were recorded. Postoperative color Doppler ultrasonography (US) examination was performed as a routine follow-up procedure in patients who had undergone ovary-preserving surgery. One of the 2 radiologists informed about the clinical data, including previous surgery, assessed ovarian size, parenchymal echogenicity, and the presence of follicular cysts.

## Results

Ovarian torsion was detected in 46 ovaries in 44 patients during surgery within the defined time period. Among these, there were 3 newborns with 4 ovaries who had an antenatal diagnosis. These were excluded from further analysis. Thus, the patient population consisted of 41 patients with 42 ovaries involved. There was an asynchronous contralateral torsion in 1 patient with a 5-year interval between the 2 torsions. The mean age was 11 ± 3.9 years (range, 1-17 years) (Fig. 1). The number of postpubertal children was 22 (53%) with 22 ovaries involved. The patient with asynchronous ovarian torsion was prepubertal during the first torsion and postpubertal during the second. The

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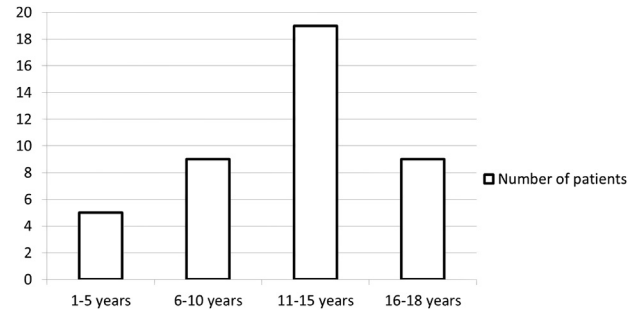


**Fig. 1.** Age distribution of patients with ovarian torsion.

presenting symptoms were abdominal pain in 38 (90%) patients and inguinal pain in 4 (10%). There was associated vomiting in 20 (48%) patients.

All patients underwent preoperative pelvic color Doppler US, which showed the absence of arterial flow to the involved ovary in 33 and the absence of venous return despite presence of arterial flow in 1. Additionally, ovarian morphology was defined as being increased in size with peripherally located follicular cysts in 12, increased in size with or without associated cysts in 12, or harboring cystic areas or masses within the parenchyma in 10. As a whole, color Doppler US identified ovarian torsion in 34 (81%) ovaries. In the remaining 8 ovaries (19%), it did not identify torsion but instead an ovarian mass. Among ovaries with torsion, an accompanying ovarian or paraovarian mass was seen in 18 ovaries on color Doppler US. Additional preoperative magnetic resonance imaging (MRI) was performed in 6 patients with evidence of associated mass, and computed tomography (CT) was performed in 2. Plasma tumor markers were studied in 23 patients in the preoperative period. The measured α-fetoprotein, β-human chorionic gonadotropin, and carcinoembryonic antigen levels were within normal limits. CA 19-9 level was 84 U/mL (range, 0-35) in 1 patient who had dysgerminoma as the final diagnosis. CA 125 level was high in 2 patients, at 127 U/mL (range, 0-35) in one and 179.9 U/mL (range, 0-35) in the other. The final diagnosis was mature cystic teratoma in both.

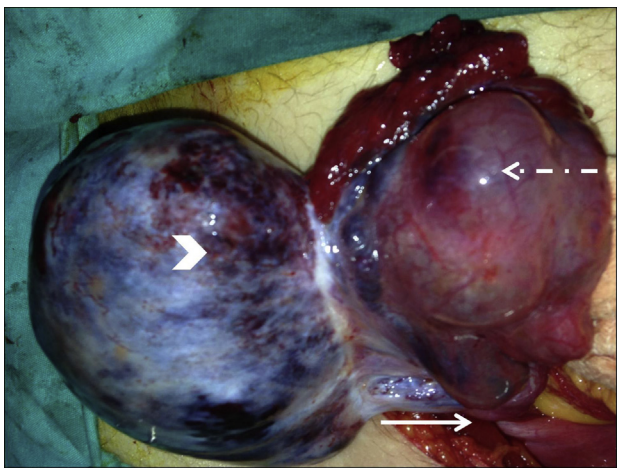

**Fig. 2.** Intraoperative picture of torsion (arrow), congested and discolored ovary (arrow head), and paratubal cystic mass (dashed arrow).

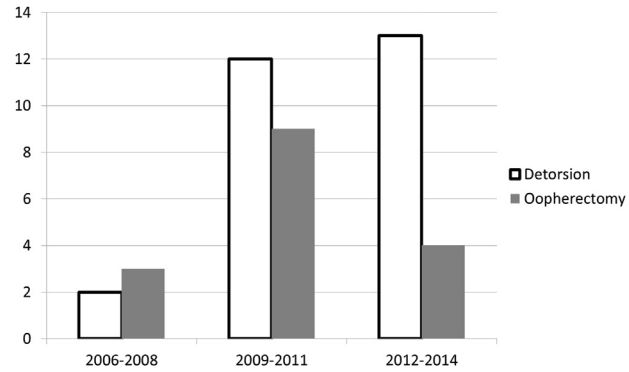


**Fig. 3.** Conservative management versus radical surgery distribution according to year intervals.

The operative approach was mainly via the open surgical approach. Laparoscopic intervention was used in 5 (12%) patients. The choice of the technique was mainly dictated by the availability of the necessary equipment. During surgery, a right-sided torsion was detected in 25 (59.5%) and a left-sided torsion in 17 (40.5%) ovaries (Fig. 2). Operative approach was detorsion with preservation of the ovary in 26 (62%) ovaries and either salphingo-oopherectomy or oopherectomy for 16 (38%) ovaries. Among these, 12 (60%) ovaries were preserved with detorsion of 20 prepubertal ovaries and 14 (63%) were preserved of 22 postpubertal ovaries. Distribution of surgical approach according to the study years is shown in Fig. 3.

Ovarian fixation was performed in 12 ipsilateral and 2 contralateral ovaries. Ovarian biopsy samples were taken during surgery in 14 (33.3%) patients. Among these, 7 had isolated torsion and the remaining 7 had suspicion of associated ovarian masses according to the operative findings. In the first group of patients with isolated torsion, histopathologic examination revealed hemorrhagic necrosis in 6 and normal ovarian tissue in the remainder. In the second group of patients with suspected associated masses during surgery, histopathology showed hemorrhagic necrosis in 4 ovaries, bleeding with congestion in 2, and "dysgerminoma" in 1. The patient with dysgerminoma was operated on with the diagnosis of isolated recurrent torsion. She had previously undergone an ipsilateral ovarian detorsion surgery in another hospital. During the second surgery, the ovary looked engorged without an identifiable discrete mass. Because of a history of previous detorsion surgery, an ovarian wedge biopsy specimen was taken, which showed dysgerminoma on microscopic examination. The patient underwent a tertiary surgery for salphingo-oopherectomy. Associated ovarian masses are listed in Table 1 according to the final histopathology results.

There were 2 patients who were thought to have ovarian solid masses in addition to torsion and necrosis during surgery. Both underwent oopherectomy. The histopathology was consistent with hemorrhagic ovarian necrosis.

The patients who underwent ovary-sparing surgery are routinely asked for follow-up visits and Doppler US evaluation. Among 25 patients with 26 ovaries who underwent ovary-sparing surgery, the patient with dysgerminoma later underwent excisional surgery. There were 3 patients who