Acute Adnexal Torsion: Is Immediate Surgical Intervention Associated with a Better Outcome?

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Keywords

Acute adnexal torsion · Early surgical intervention · Ovarian function · Ovarian torsion · Whirlpool sign

Abstract

Objectives: We aimed to investigate whether surgery for adnexal detorsion within 6 h from admission to the hospital was associated with less adnexal ischemia. **Design:** This is a retrospective cohort study. **Participants/Materials, Setting, and Methods:** This retrospective study was conducted at two university-affiliated medical centers and assessed women aged 18–45 years with adnexal torsion who were hospitalized within 12 h from the pain onset and underwent surgery for detorsion within 24 h. The study group was divided into 2 groups: early, surgical intervention within less than 6 h and late, surgical intervention between 6 and 24 h. The primary outcome was the rate of macroscopic appearance of ischemic adnexa. **Results:** Two hundred and twenty women fulfilled the inclusion criteria. In 101 women, the adnexa with the torsion appeared macroscopically ischemic. There was no difference in ischemic adnexa between the early and late intervention groups (48% vs. 40%; $p = 0.269$). No significant association was found between the physical examination or

ultrasonographic findings and the rate of ischemic adnexa within each group. **Limitations:** The main limitations of our study are its retrospective nature. Much of the clinical and ultrasonographic data are subjective and operator-dependent. The decision to operate may vary from one surgeon to another. **Conclusion:** Immediate surgical intervention in patients with adnexal torsion is not associated with a lower rate of adnexal ischemia. These findings suggest that in acute adnexal torsion, there is a wider time window for a thorough evaluation before surgery.

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Introduction

Adnexal torsion is twisting of the ovary and sometimes the fallopian tube, cutting off the blood supply of these organs. It results in progressive tissue damage followed by hemorrhagic infarction and necrosis and may ultimately reduce fertility [1]. Adnexal torsion may be characterized by suggestive clinical and sonographic data. However, a review of the literature highlights the difficulty of obtaining a definitive diagnosis without surgical intervention [1, 2].

Fig. 1. Distribution of patients according to time to surgery.

The incidence of adnexal torsion is greatest among women under the age of 30 years [3]. Up to 20% of adnexal torsion occurs in pregnant women, more commonly during the first trimester and following ovarian stimulation protocols [4]. Typical symptoms include unilateral abdominal pain often accompanied by nausea and vomiting [5]. The usual presentation includes the presence of a pelvic mass, peritoneal irritation, low-grade fever, leukocytosis, and elevated C-reactive protein [1]. Sonographic imaging confirms an enlarged ovarian cyst or edematous appearance in the form of ring-like cystic structures in the ovarian cortex. Free pelvic fluid, lack of arterial or venous blood flow, and the formation of “whirlpool-sign” coiled vessels are all typical occurrences [6, 7]. A normal Doppler flow does not exclude the presence of ovarian torsion; however, the lack of flow may signify compromised vitality of ovarian tissue [8]. The absence of blood flow on a twisted vascular pedicle may indicate ovarian necrotic tissue. However, in our previous series, we could not find any significant association between preoperative ultrasound findings and intraoperatively observed adnexal ischemia [9]. Operative detorsion may preserve ovarian function [10, 11].

Whether immediate surgical intervention is crucial for saving the ovary has been partially investigated [12]. There are cases where the patient’s complaints are long-standing, and surgery is not considered urgent. In contrast, there are

women with acute symptoms where emergent surgery is performed. In many cases, the clinical and ultrasonographic evaluations are not clear, and the surgeon has to decide whether to perform immediate surgery to prevent ovarian damage or to follow until the clinical picture is more certain. The aim of this study was to investigate whether in acute torsion, surgery within 6 h of emergency room admission is associated with lower rates of the ischemic adnexa.

Material and Methods

We conducted a retrospective study based on record analysis of all consecutive women who had surgically verified adnexal torsion between 2000 and 2015 in 2 university-affiliated hospitals. The inclusion criteria were surgically diagnosed adnexal torsion that includes the ovary in women aged 18–45 years, duration of symptoms of less than 12 h prior to presenting to the emergency room, and surgery for detorsion within 24 h since hospitalization. We excluded from the study tubal torsion only, lack of recorded data, and preoperative symptoms of more than 12 h. Data retrieved from the medical records included medical history, physical examination, and sonographic and operative details. The patients were divided into 2 groups according to the time from arriving at the hospital and surgery: early surgical intervention was defined as surgery within less than 6 h from hospitalization and late surgical intervention as surgery between 6 and 24 h. The primary outcome was the rate of the ischemic adnexa. Ischemic adnexa is defined as a blue-black-color-appearing adnexa at the surgery.

Table 1. Clinical characteristics by group

Characteristics	Study groups		<i>p</i> value
	surgery within 6 h (<i>n</i> = 153)	surgery after 6 h (<i>n</i> = 67)	
Age, years	27.18±6.54	26.55±6.99	0.22
Parity	1.49±1.61	1.36±1.88	0.59
Deliveries	0.84±1.18	0.81±1.32	0.59
Abortions	0.30±0.72	0.28±0.18	0.59
History of adnexal torsion	20 (13.1)	9 (13.4)	0.59
Pregnant women	54 (35.2)	21 (31.3)	0.53
Women with vomiting	83 (54.2)	26 (38.8)	0.03
Women with leukocytosis	66 (43.1)	21 (31.3)	0.10
Fever (>37.5°C) on presentation	2 (1.1)	3 (4.5)	0.17
History of surgery			
No abdominal surgery	114 (74.5)	47 (70.1)	0.82
Ipsilateral to adnexal torsion	24 (15.7)	12 (17.9)	0.93
Contralateral to adnexal torsion	2 (1.3)	1 (1.5)	0.11
Other abdominal surgery	13 (8.5)	7 (10.4)	0.80
Location of pain			
Diffuse	21 (13.7)	15 (22.4)	0.18
Unilateral	123 (80.4)	46 (68.7)	0.16
Bilateral	9 (5.9)	6 (9.0)	0.56
Type of pain			
Sharp	127 (83.0)	55 (82.1)	0.78
Dull	10 (6.5)	6 (8.9)	0.58
Undefined	16 (10.5)	6 (9.0)	1.00
Contraception			
None	98 (64.0)	48 (71.6)	0.65
OCP	7 (4.6)	3 (4.5)	0.395
IUD	2 (1.3)	1 (1.5)	1.005
Unknown	46 (30.0)	15 (22.3)	0.43
Current pregnancy			
Spontaneous	25 (53.2)	8 (44.4)	0.81
ART	22 (46.8)	10 (55.6)	0.81

Data are presented as mean ± standard deviation or *n* (%). ART, assisted reproductive technology.

The study was approved by the local institutional review board of Barzilai and Rabin Centers. The study power analysis performed assumed a proportion of patients with ischemic adnexal torsion of 0.4 in the early surgery and 0.6 in the late surgery. We assumed the proportion of patients with early surgery would account for two-thirds of the patients. With an α of 0.05 and a power of 0.80, the total number of patients needed was 219. Statistical analysis was performed with Student *t* test and Fisher's exact test as appropriate. $p < 0.05$ was considered significant.

Results

We identified 320 patients who had undergone surgical intervention for adnexal torsion within the study period. Of these, 220 patients fulfilled the inclusion criteria. The median time to surgery was 4 h (range 1–24 h). The

distribution of patients according to time to surgery is shown in Figure 1. One hundred fifty-three (69.5%) patients underwent surgery within 6 h from admission, and 67 (30.4%) patients underwent surgery between 6 and 24 h. Only 3 (1.3%) women underwent adnexectomy.

There were no significant differences in the patient's clinical characteristics of women in the early and the late surgery groups (Table 1). Moreover, there were no significant differences between the groups in the ultrasonographic findings (Table 2). The number of adnexal twists observed at surgery was not significantly different between the early and late groups (2.16 ± 1.2 vs. 1.89 ± 1.10 ; $p = 0.11$). There was no significant difference in the proportion of cases with ischemic adnexa between the early and late surgical intervention groups (48% vs. 40%; $p = 0.269$) (Table 3).

Table 2. Ultrasonographic findings by group

Characteristics	Study groups		<i>p</i> value
	surgery within 6 h (<i>n</i> = 153)	surgery after 6 h (<i>n</i> = 67)	
Whirlpool sign	6 (3.9)	7 (10.4)	0.06
Fluid in the Douglas pouch	15 (9.8)	6 (9.0)	0.06
Ultrasonographic findings suggestive of edema	79 (51.6)	34 (50.7)	0.06
Doppler flow			
No blood flow	55 (35.9)	15 (22.4)	0.17
Decreased flow	24 (15.7)	12 (17.9)	0.71
Normal flow	74 (48.3)	40 (59.7)	0.40
Ovarian sonographic findings			
Normal adnexa	31 (20.3)	10 (14.9)	0.58
Enlarged without cystic findings	71 (46.4)	35 (52.2)	0.59
Enlarged with cystic findings	51 (33.3)	22 (32.8)	1.00

Data are presented as mean±standard deviation or *n* (%).

Table 3. The presence of ischemic adnexal torsion, associated with early and late adnexal torsion surgery

Adnexa with ischemia	Study groups		<i>p</i> value
	less than 6 h (<i>n</i> = 153)	more than 6 h (<i>n</i> = 67)	
With ischemia	74 (48.4)	27 (40.3)	0.27
Without ischemia	79 (51.6)	40 (59.7)	0.627

Data are presented as *n* (%).

Discussion

In our study, we did not find significant differences in the clinical characteristics, ultrasonographic findings, or the rates of macroscopic ischemic adnexa in women admitted to the hospital with acute adnexal torsion who had early or late surgery. Age and history of previous adnexal torsion did not change the time to surgery. Perceived hesitancy to operate on pregnant women did not delay surgery [13, 14]. These findings differ from previous reports [3, 11]. We expected that patients with significant ultrasonography findings, such as enlarged ovaries, signs of edema, a lack or partially absent Doppler flow, and a positive whirlpool sign, would be associated with early surgery. These indicators are all previously mentioned as being associated with a high probability of ischemic adnexal torsion and therefore surgeons weigh these indicators when deciding when to operate [4, 6, 7]. In our study, we could not find a clinical or ultrasonographic characteris-

tic that would be prognostic for early surgery (Tables 1, 2). It is difficult to estimate how long ovarian function will be preserved in twisted adnexa before surgical detorsion can be performed. On the other hand, the gross appearance of the ischemic adnexa during the surgery is not always correlated with future ovarian function and should not be used as a determinant of oophorectomy [15].

To date, there is no consensus on the best time window for surgical intervention when adnexal torsion is suspected. The reasonable assumption that early surgical intervention will produce a reduction in the rate of ischemic adnexa was not observed in our study. Moreover, also physical examination and ultrasound findings had no significant correlation to the time window for surgical intervention.

In a limited study by Anders and Powell [12] of 22 pediatric cases (mean age 10.2 years), prolonged duration of symptoms prior to initial examination did not preclude ovarian salvage. In our study, a delay of up to 24 h for surgery was not associated with a greater proportion of women with macroscopic ischemic adnexa. Our study emphasizes the possibility for comprehensive clinical evaluation before urgent surgery in case of suspected acute adnexal torsion not sufficiently supported without compromising the outcome of the twisted adnexa up to 24 h from admission. The salutary value of urgent surgery may be weighed against obtaining further clinical support for the diagnosis of adnexal torsion or the potential risks associated with limited fasting.

The main limitations of our study are its retrospective nature. Much of the clinical and ultrasonographic data

are subjective and operator dependent. The decision to operate may vary from one surgeon to another. The classification of adnexa as ischemic is based on the surgeon's subjective macroscopic examination of the adnexa. Additionally, the reproductive potential of the re-twisted ovary was not assessed. Our findings suggest that in acute adnexal torsion, the time window of up to 24 h from admission to surgical intervention for better evaluation and fasting completion probably does not deprive the viability of the adnexa.

Statement of Ethics

This article does not contain any studies with human participants or animals performed by any of the authors. The study was designed as a retrospective study. The study protocol was approved by the institutional review board. All data were collected anonymously. The review board waived informed consent.

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Conflict of Interest Statement

We the authors declare that we have no conflict of interest.

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Author Contributions

O. Yaakov: manuscript writing–editing; E. Ashwal: manuscript editing and data analyzing; O. Gemer: manuscript writing–editing and supervisor; Y. Peled: data analyzing; V. Kapustian: data collection; A. Namazov: data analyzing; R. Eitan: data analyzing; and H. Krissi: supervisor, project administration, manuscript editing, and data analyzing.

Data Availability Statement

Data are available on request from the corresponding author.