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Management of adnexal torsion: A 5-year experience from a tertiary center

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ABSTRACT

OBJECTIVE: We aimed to examine the clinical characteristics, surgical findings, histopathological results, laboratory parameters of histopathologically confirmed ovarian torsion cases.

METHODS: This was a retrospective study that analyzed 96 surgically proven cases of ovarian torsion treated at a tertiary care referral hospital between 2018 and 2024. The study reviewed demographic characteristics, clinical features, surgical details, laboratory findings, and histopathological results of patients through the hospital's electronic medical records. In addition, a comparative analysis was conducted to evaluate differences between patients undergoing laparoscopic and laparotomy surgical approaches.

RESULTS: Ninety-six surgically confirmed ovarian torsions with a median age 27 years were included. The main presenting symptoms were pelvic pain (93.8%) and abdominal pain (40.6%). Laparoscopy was performed in 61 (63.5%) patients, while laparotomy was performed in 35 (36.5%) patients. Surgical approaches included salpingo-oophorectomy with cystectomy (12.1%), salpingo-oophorectomy alone (40.6%), adnexectomy (41.7%), and hysterectomy with bilateral salpingo-oophorectomy (5.2%). Ovarian size ranged from 2-30 cm (mean 7.0 cm) with right-sided involvement in 60.4%. Hemorrhagic infarction was the most common histopathologic finding, followed by simple cysts, with only one case of borderline serous cystadenoma.

CONCLUSION: Adnexal torsion is a rare emergency requiring a high index of clinical suspicion due to nonspecific symptoms. Surgical intervention is the definitive approach, with laparoscopy preferred for faster recovery and superior outcomes.

Keywords: Ovary; ovarian torsion; laparoscopic surgery.

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Adnexal torsion is a medical condition where the ovary or tuba uterina partially or completely rotates around its vascular pedicles, leading to a decrease in blood flow and potential damage to the adnexal structures [1]. It is responsible for 3% of gynecologic patients presenting to the emergency room with acute abdominal pain [2]. Adnexal torsion can be caused by adnexal cysts, neoplasia, pregnancy, or other factors [3]. It is most common during the reproductive period and more often occurs on the right side than on the left [4, 5]. The diagnosis of adnexal torsion can be challenging due to nonspecific clinical findings, but it typically presents as acute, sharp unilateral abdominal pain accompanied by nausea and vomiting. A mass may be felt during a pelvic examination, and peritoneal symptoms such as pelvic tenderness may be observed [6]. However, the clinical presentation may resemble other causes of acute abdomen, so it is important to consider the differential diagnosis, including

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non-torsioned pelvic cysts, masses or tumors, pelvic inflammatory disease, ruptured ovarian cysts, ectopic pregnancies, appendicitis, diverticulitis, and urolithiasis.

Adnexal torsion diagnosis has no specific laboratory test, but an elevated white blood cell count is observed in 20–56% of patients. Ultrasonography is the most preferred imaging method for patients suspected of having adnexal torsion [7]. Imaging findings of adnexal torsion on ultrasonography can vary depending on the duration and degree of torsion, as well as whether the fallopian tube is twisted or not. If there is a strong clinical suspicion of adnexal torsion, surgical evaluation of the adnexa is recommended, even if Doppler ultrasonography findings do not support it. Computed tomography is not superior to ultrasonography, and Magnetic Resonance Imaging (MRI) can be used as an advanced diagnostic method in some centers.

Laparoscopy is the recommended surgical approach for definitive diagnosis and treatment of adnexal torsion [8]. However, if the surgeon is not experienced in laparoscopic surgery, a laparotomic approach is an option. The main goal of treatment, particularly in adolescents and young patients, is to restore the function of the torsioned adnexal organs by detorsion and to preserve the ovarian reserve.

This study aimed to examine the clinical, intraoperative findings, pathological results, and symptoms, laboratory parameters of histopathologically confirmed ovarian torsion cases admitted to a tertiary care center over a five-year period.

MATERIALS AND METHODS

This study employed a retrospective analysis of surgically confirmed cases of ovarian torsion at a tertiary care referral hospital from January 2018 to January 2024. The inclusion criteria comprised patients presenting with pelvic pain and a diagnosis of adnexal torsion verified intraoperatively. Patients with a diagnosis of adnexal torsion that lacked surgical confirmation, as well as those with incomplete clinical data, were excluded from the analysis.

Data were extracted from the hospital's electronic medical records, providing a comprehensive review of demographic characteristics, clinical features, laboratory findings, histopathological reports, and surgical documentation. The surgical reports detailed the surgical approach employed, the operative procedure performed, the size of the mass or affected ovary, and the laterality of the torsion.

Highlight key points

- Pelvic pain (93.8%) and abdominal pain (40.6%) were the most frequent presenting symptoms in surgically confirmed ovarian torsion cases.
- Laparoscopy was the preferred surgical approach, performed in 63.5% of patients, compared to laparotomy (36.5%).
- Hemorrhagic infarction was the most common histopathologic finding in torsioned ovaries.
- Ovarian torsion occurred more commonly on the right side (60.4%), with sizes ranging from 2 to 30 cm (mean: 7.0 cm).

Additionally, a comparative analysis was conducted to evaluate differences between patients undergoing laparoscopic and laparotomy surgical approaches. This comparative analysis included various factors, such as preoperative symptoms and signs, demographic data, surgical details, laboratory findings, and histopathological results. The study has received approval from the Research Ethics Committee and is in agreement with the tenets of the Declaration of Helsinki (Number, date: 010.99/47, 28.02.2024).

Statistical Analysis

Data were recorded in an Excel sheet and further coded for analysis. Continuous variables were expressed as mean±standard deviation, median (interquartile range, IQR), and categorical variables as numbers (n) and percentages (%). The distribution of the variables was assessed using the Kolmogorov-Smirnov and Shapiro-Wilk tests to determine normality. For quantitative independent data exhibiting a normal distribution, the independent samples t-test was employed for analysis. Conversely, the Mann-Whitney U test was utilized for quantitative independent data that did not conform to a normal distribution. The Chi-square test was applied to analyze qualitative independent data, while Fisher's exact test was used when the assumptions of the Chi-square test were not met. Data analysis was conducted using SPSS version 27.0 (Armonk, New York: IBM Corp) software.

RESULTS

Ninety-six cases of surgically confirmed ovarian torsion treated between 2018 and 2024 were retrospectively analyzed. The median age of the patients was 27.0 years (range: 9–67 years). Four patients (4.1%) were pregnant. The mean gravida was 1.21±1.73 and the mean parity was 0.93±1.36. The mean leucocyte count was 8.77±3.42 10^3/μl (4.7–25.0).

Table 1. Comparison of demographic and surgical data in adnexal torsion between laparoscopy and laparotomy cases (n=96)

	Laparoscopy (n=61)		Laparotomy (n=35)		p
	Mean±SD	Median	Mean±SD	Median	
Age	31.7±12.2	31.0	25.2±7.7	24.0	**0.005**^{t}
Gravidity	1.62±1.93	1.00	0.49±0.95	0.00	**0.000**^{m}
Parity	1.21±1.52	1.00	0.43±0.85	0.00	**0.001**^{m}
Laterality (%)					0.711$^{\chi^2}$
Right	59.0		62.9		
Left	41.0		37.1		
Size of mass/ovary (cm)	9.0±4.6	8.0	6.6±3.1	6.0	**0.002**^{m}
Type of surgery (%)					
USO	62.3		5.7		**0.000**$^{\chi^2}$
Detorsion alone	16.4		82.9		**0.000**$^{\chi^2}$
Detorsion with cystectomy	13.1		11.4		0.810$^{\chi^2}$
TAH+BSO	8.2		0.0		0.155$^{\chi^2}$

t: Independent sample t test; m: Mann-Whitney U test; χ^2: Chi-square test (Fischer test); USO: Unilateral salpingo-oophorectomy; TAH: Total abdominal hysterectomy; BSO: Silateral salpingo-oophorectomy.

The torsion had been formed in 60.4% of the right ovary and 39.6% of the left. The most common histopathological finding in the torsioned ovaries was a hemorrhagic infarct, followed by a simple cyst (27.1%), mucinous cystadenoma, serous cystadenoma, and dermoid cyst. Only one serous cystadenoma was of borderline malignant potential.

Patients undergoing laparoscopy had a mean age of 31.7±12.2 years, while those undergoing laparotomy were 25.2±7.7 years old (p=0.005). The laparoscopic group had higher gravidity (1.62±1.93) compared to the laparotomy group (0.49±0.95) (p<0.001). there was a significant difference in parity, with a mean parity of 1.21±1.52 in the laparoscopy group and 0.43±0.85 in the laparotomy group (p=0.001). The distribution of laterality was similar between the two groups, with right-sided involvement in 59.0% (n=36) of laparoscopic cases and 62.9% (n=22) of laparotomy cases (p=0.711), and left-sided involvement at 41.0% (n=25) for laparoscopy and 37.1% (n=13) for laparotomy. The mean size of the torsioned ovary was significantly larger in the laparoscopy group (9.0±4.6 cm) compared to the laparotomy group (6.6±3.1 cm) (p=0.002). In the laparoscopic group, 62.3% underwent unilateral salpingo-oophorectomy (USO), while only 5.7% in the laparotomy group had this procedure (p<0.001). Detorsion was performed in 16.4% of laparoscopic cases compared to 82.9% in the laparotomy group (p<0.001). The rate of detorsion with cystectomy was similar in both groups, with 13.1% in laparoscopy and 11.4% in laparotomy (p=0.810). Total abdominal hysterectomy with bilateral salpingo-oophorectomy (TAH+BSO) was performed in 8.2% of the laparoscopic group and none in the laparotomy group (p=0.155) (Table 1).

Abdominal pain was reported by 45.9% of patients in the laparoscopic group (n=28) and 31.4% in the laparotomy group (n=11) (p=0.165). There were no significant differences in pelvic pain between surgical approaches, with 91.8% (n=56) of laparoscopy patients and 97.1% (n=34) of laparotomy patients reporting pelvic pain (p=0.298). In the laparoscopy group, 77.0% of patients (n=47) showed rebound tenderness compared to 68.6% in the laparotomy group (n=24) (p=0.362). Additionally, 62.3% of patients in the laparoscopy group (n=38) did not exhibit abdominal defense, while 80.0% in the laparotomy group (n=28) did (p=0.072). Nausea and/or vomiting were reported in 60.7% of laparoscopy cases (n=37) and 62.9% of laparotomy cases (n=22), with no significant difference between the groups (p=0.831). Fever was also assessed, showing that 85.2% of laparoscopic patients had temperatures below 38.3°C (n=52), while 94.3% of laparotomy patients (n=33) had temperatures below 38.3°C. Fever exceeding 38.3°C was observed in

Table 2. Comparison of clinical features in adnexal torsion between laparoscopy and laparotomy cases (n=96)

	Laparoscopy (n=61) %	Laparotomy (n=35) %	p
Abdominal pain			0.165$^{x^2}$
(-)	54.1	68.6	
(+)	45.9	31.4	
Pelvic pain			0.298$^{x^2}$
(-)	8.2	2.9	
(+)	91.8	97.1	
Rebound			0.362$^{x^2}$
(-)	23.0	31.4	
(+)	77.0	68.6	
Defense			0.072$^{x^2}$
(-)	62.3	80.0	
(+)	37.7	20.0	
Nausea and/or vomiting			0.831$^{x^2}$
(-)	39.3	37.1	
(+)	60.7	62.9	
Fever (>38.3°C)			0.181$^{x^2}$
<38.3	85.2	94.3	
>38.3	14.8	5.7	

14.8% of laparoscopic cases (n=9) and 5.7% of laparotomy cases (n=2), resulting in a p-value of 0.181, indicating no significant difference (Table 2).

The study found a significant difference in leukocyte counts between the laparoscopic and laparotomy groups. The laparoscopic group had a mean leukocyte count of 12.2±3.6 10^3/µl (median: 11.8), while the laparotomy group had 10.9±4.3 10^3/µl (median: 10.7) (p=0.050). The platelet-to-lymphocyte ratio (PLR) was higher in the laparoscopic group with a mean of 319.5±1045.7 (median: 180.3) compared to 172.6±92.5 (median: 164.4) in the laparotomy group (p=0.050). Thrombocyte counts were also higher in the laparoscopic group with a mean of 272.4±64.5 (median: 274.0) compared to 249.9±85.0 (median: 251.0) in the laparotomy group (p=0.050). No significant differences were observed in other hematological parameters, including neutrophils, eosinophils, lymphocytes, monocytes, mean platelet volume (MPV), neutrophil-to-lymphocyte ratio (NLR), and C-reactive protein (CRP) (Table 3).

DISCUSSION

The study found that most women diagnosed with ovarian torsion were of reproductive age, ranging from 9 to 67 years, with a median age of 27 years. These results are consistent with previous studies conducted by Gupta et al. [9], Tsafrir et al. [10], and Shwyiat et al. [11], who reported median ages of 29±12 and 24.0 years (range: 14–40 years), respectively.

Prior research suggested that ovarian torsion during pregnancy has a prevalence of 10% to 25% [12]. However, in our study, only 4.1% of patients were pregnant, indicating a lower rate than previously reported.

Adnexal masses greater than 5 cm in size are known to be a risk factor for ovarian torsion [13]. Similar to reports by Houry and Abbott [14] and Shwyiat et al. [11], our data reinforces that adnexal masses within the 2–30 cm range can undergo torsion, suggesting that larger adnexal masses are at risk for ovarian torsion.

Our study confirmed earlier research that right-sided ovarian torsion is more common than left-sided torsion [15]. This tendency is due to the greater anatomical mobility of the cecum and ileum on the right, as opposed to the relatively immobile sigmoid colon on the left [16].

Diagnosing ovarian torsion preoperatively can be challenging due to its nonspecific clinical presentation. The primary symptom is abdominal or pelvic pain [17]. Additionally, 49–85% of patients experience nausea or vomiting, and 16–52% have peritoneal irritation [18]. Our study's findings are consistent with previous research, with pelvic pain being the most common presenting symptom, followed by nausea and vomiting. When a young woman presents with an ovarian mass and experiences acute onset abdominal pain, and gastrointestinal symptoms, it is crucial to consider the possibility of adnexal torsion. Leukocytosis may be present in only a minority of cases (16% to 63%) [19]. Our study, consistent with previous research [20], did not commonly observe leukocytosis.

Historically, laparotomy was the predominant surgical approach for managing ovarian torsion. However, laparoscopy has increasingly become the preferred method due to its superior diagnostic and therapeutic efficacy [21]. Consistent with previous research, our findings indicate that laparoscopy was utilized more frequently, with 61 patients (63.5%) undergoing this procedure compared to 35 patients (36.5%) who received laparotomy. Notably, the proportion of torsion cases treated laparoscopically in our study aligns closely with the findings reported

TABLE 3. Comparison of hematological parameters in adnexal torsion between laparoscopy and laparotomy cases (n=96)

	Laparoscopy (n=61)		Laparotomy (n=35)		p
	Mean±SD	Median	Mean±SD	Median	
Leukocyte (10^3/µl)	12.2±3.6	11.8	10.9±4.3	10.7	**0.050**[m]
Neutrophil	9.0±2.9	8.6	8.3±4.2	7.4	0.149[m]
Eosinophil	0.1±0.1	0.0	0.1±0.1	0.0	0.587[m]
Lymphocyte	1.8±1.0	1.6	1.8±1.0	1.7	0.787[m]
Trombosit (10^3/µl)	272.4±64.5	274.0	249.9±85.0	251.0	**0.050**[m]
Monocyte	0.7±0.4	0.6	0.6±0.3	0.5	0.314[m]
MPV	9.6±1.4	9.8	9.7±1.3	10.0	0.731[t]
NLR	9.6±22.7	6.1	6.3±4.9	4.2	0.308[m]
PLR (x10^3)	319.5±1045.7	180.3	172.6±92.5	164.4	**0.050**[m]
CRP (mg/L)	26.0±50.6	3.0	16.0±43.2	3.0	0.170[m]

t: Independent sample t test; m: Mann-Whitney U test; NLR: Neutrophil to lymphocyte ratio; PLR: Platelet to lymphocyte ratio; CRP: C-reactive protein; MPV: Mean platelet volume.

by Cohen et al. [22], further solidifying the widespread adoption of laparoscopy in ovarian torsion management.

In our research, we observed twelve patients who underwent cystectomy with detorsion. The ovary is known to become friable due to edema and congestion, which can lead to a theoretical risk of bleeding. To minimize this risk, it has been suggested to wait for 2–3 weeks before performing elective cystectomy, allowing for the resolution of edema and congestion. However, our study found that performing cystectomy after detorsion did not result in increased bleeding or any postoperative complications. Therefore, it is suggested to perform ovarian cystectomy concurrently with detorsion, based on the observed lack of increased intraoperative bleeding.

The study revealed that the most frequent histology type of ovarian masses was a simple ovarian cyst, followed by mucinous cystadenoma. This is in contrast to previous studies which reported dermoid cysts or hemorrhagic cysts as the most common histology [23]. Notably, only one case of borderline malignancy was identified, aligning with the low reported incidence (1–1.8%) [24, 25]. However, in situations where malignancy is suspected, such as in postmenopausal women, oophorectomy should be performed. It is essential to perform histopathological examination on the specimen obtained from oophorectomy to definitely exclude the possibility of malignancy.

Our study had several constraints, including its retrospective nature, single-center design, and a limited sample size of patients with a rare disease. Consequently, the findings may not be widely generalizable to other health care settings or patient populations with different demographic characteristics and clinical practices. Despite these limitations, the study presents several strengths. The comprehensive analysis of surgically confirmed adnexal torsion cases allows for a robust evaluation of clinical features and outcomes associated with laparoscopic versus laparotomy approaches. By utilizing detailed surgical and histopathological data, this research provides valuable insights into the management of adnexal torsion and highlights specific factors that may influence surgical decision-making. Additionally, the study contributes to a growing body of literature on this under-researched area, offering a foundation for future investigations. Future research should focus on multicenter, prospective studies that can validate these findings across diverse populations and clinical settings. Additionally, incorporating advanced imaging techniques and biomarkers into the assessment process may enhance diagnostic accuracy and guide treatment decisions.

Conclusion

Detecting ovarian torsion can be a challenging task that necessitates astute clinical abilities and a heightened level of suspicion. If ovarian torsion is suspected, surgical intervention constitutes the definitive diagnostic and therapeutic modality. Laparoscopic surgery is the preferred approach over laparotomy.

Ethics Committee Approval: The Lütfi Kırdar Training and Research Hospital Clinical Research Ethics Committee granted approval for this study (date: 28.02.2024, number: 010.99/47). The present study obtained permission from the EuroQol Research Foundation.

Informed Consent: Written informed consents were obtained from patients who participated in this study.

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