



Ovarian Torsion: 10 Years' Experience of a Tertiary Medical Center

Over Torsiyonu: Tersiyer Merkezin 10 Yıllık Deneyimi

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Abstract/Öz

Introduction: This study aimed to draw attention to the clinical, sonographic, intraoperative, and pathological signs and symptoms of histopathologically confirmed ovarian torsion cases and their relationship with each other.

Methods: The medical data of histopathologically confirmed ovarian torsion cases, which were diagnosed and operated in the 10-year period, were retrospectively analyzed. Data were analyzed according to demographical, clinicopathological, and sonographic findings.

Results: Mean age was 33.6 ± 13.8 years. Abdominal or pelvic pain was the main symptom in all patients with ovarian torsion in our study. The main sonographic findings were diffused ovarian hyperechogenicity, increased ovarian size, and free fluid (periovarian or in cul-de-sac). In Doppler sonography, 2/3 of the patients showed abnormal findings. 75% of patients had been urgent intervention. The mean intervention time was 49 hours. The number of ovarian pedicles twisting was approximately 3. The twisting count of pedicle was higher in cases with abnormal Doppler sonographic findings. In the 75% cases, torsioned ovaries were black. Statistically, the twisting number of black ovaries was higher and intervention time was shorter. Adnexectomy was the main surgical procedure.

Conclusion: To maximize the chance of right diagnosis of ovarian torsion, we should carefully investigate acute abdominopelvic pain and combine the sonographic and Doppler findings with clinical features. Early diagnosis and early surgical intervention allow continuation of ovarian viability and preservation of fertility.

Keywords: Ovary, sonography, torsion

Amaç: Çalışmamızın amacı, özellikle reproduktif çağda görülen ve kolay tanı konulamayan over torsiyonunun önemine dikkat çekmektir.

Yöntemler: Son 10 yılda cerrahi müdahale edilen ve cerrahi olarak over torsiyonu tanısı almış olan hastaların tıbbi kayıtları retrospektif olarak incelendi.

Bulgular: Ortalama yaş 33,6 olarak saptandı. Tüm hastaların başvuru şikayeti ağrı idi. En belirgin sonografik bulgu, solid ve boyutları artmış overin diffüz heterojenitesi ve periovaryan serbest sıvı görülmesi idi. Doppler incelemede, vakaların 2/3'ünde anormal bulguya rastlandı. Vakaların %75'ine acil müdahalede bulunuldu. Ortalama müdahale zamanı 49 saat olarak tespit edildi. Ortalama ovaryan pedikül dönüş sayısı yaklaşık 3 idi. Doppler bulgusu olan vakalarda torsiyon dönüş sayısı daha fazla idi. Vakaların %75 inde torsiyone overin rengi siyah idi. İstatistiksel olarak, siyah izlenen overlerin dönüş sayısı daha fazlaydı ve müdahale zamanı daha kısa olarak izlendi. Vakaların %89'unda cerrahi prosedür salpingo-ooferektomi idi.

Sonuç: Vakalarımızda doğru tanı koyma şansımızı artırmak için, akut abdominopelvik ağrıyla dikkatle incelemeli, sonografik ve doppler bulguları ile kombine bir değerlendirme yapmalıyız. Erken tanı ve cerrahi müdahale, over rezervi ve fertilité kapasitesini koruduğu için özellikle reproduktif çağdaki kadınlarda erken ve doğru tanı özellikle önem kazanmaktadır.

Anahtar Kelimeler: Over, sonografi, torsiyon

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Introduction

The rate of ovarian torsion is 3% in patients that admit to the emergency room with acute abdominal pain (1-4). It ranks fifth in the gynecological emergencies (1-4). It is challenging to make a correct diagnosis (1-4). Ovarian torsion is mostly seen in reproductive age periods, but it can be seen in all ages, including intrauterine period (1-5). Almost 20% of patients are pregnant and the majority are in the first or second trimester (1-5).

The etiology of ovarian torsion is unclear; however, an ovarian cyst and neoplasia are predisposing factors (1-7). The pathophysiologies of ovarian torsion are the same in all age groups (1-7). Torsion of ovarian pedicle induce the blockage of venous drainage and arterial blood flow, and these events result in edema, inflammatory reaction, ischemia, and eventually necrosis.

The clinical signs of ovarian torsion are non-specific (1-7). Patient's first complaint is sudden abdominal pain, which can be accompanied by nausea, vomiting, peritoneal irritation findings, and leukocytosis. In these patients, Doppler and grayscale sonography are the first and base imaging methods to be performed (1-12). In ovarian torsion diagnosis, the diagnostic accuracy of sonography is 74.6%, but this is largely dependent on the talent and experience of the sonographer (range, 60%-100%) (11). In the treatment of the disease, conservative or radical laparoscopy and laparotomy are the applied surgical approaches (1-15).

The aim of this study was to draw attention to the clinical, sonographic, intraoperative, and pathological signs and symptoms of histopathologically confirmed ovarian torsion cases and their relationship with each other.

Methods

This is a retrospective descriptive case study covering the years 2005-2015. The study was performed only with histopathologically confirmed ovarian torsion cases. Thirty-six cases who definitely diagnosed as ovarian torsion were included in the study. Laparoscopic or laparotomic detorsion cases were not included in this study. The medical records of these patients were examined. Data were analyzed according to demographic, clinicopathological, and sonographic findings. Patients' existing sonograms were re-evaluated according to sonographic torsion findings in the literature (ovarian size, hyperechogenicity, pearl sign, ring sign, whirlpool sign, and free fluid). Intervention time was defined as the time between admitting time for our emergency service and starting time of the surgery.

SPSS 15.0 for Windows program was used for statistical analysis. Descriptive statistics were calculated; number and percentage

for categorical variables; mean, median and standard deviation for numerical variables. The Student's t-test was used when the numerical variables were compared with the normal distribution condition in the independent groups, and the Mann-Whitney U test was used when the data were not provided. Comparisons of ratios of independent groups were tested by Chi-Square analysis. Monte Carlo simulation was applied when the conditions were not met. A statistical significance level of alpha was accepted as $p < 0.05$.

Our study is suitable for World Medical Association Declaration of Helsinki "Ethical Principles for Medical Research Involving Human Subjects" principles.

Results

Mean age was 33.6 ± 13.8 (Table 1). Five patients were adolescents. In our patient group, there were 5 patients in the age group of 11-18 (median age, 16). Mean gravida was 2.4 ± 2.7 and mean parity was 1.6 ± 1.9 . Ten patients (28%) had previously undergone abdominal surgery. Three patients were pregnant in the first trimester. The pain was the main symptom (61% abdominal and 39% pelvic). The most common finding concomitant to pain was abdomi-

Table 1. Demographic and clinical features of cases

		n	Mean±SD/(min-max)	
Demographic data	Age		33.6±13.8/11-69	
	Gravidity		2.4±2.7/0-12	
	Parity		1.6±1.9/0-8	
			n (%)	
	Pregnant		3 (8)	
Menopausal status	Premenopause		30 (83)	
	Postmenopause		6 (17)	
History of surgery	None		26 (72)	
	*C/S		5 (14)	
	Appendectomy		1	
	Cholecystectomy		1	
	*L/S		1	
	Gastric surgery		1	
	*TAH+USO		1	
Signs and symptoms	Pain	Abdominal	22 (61)	
		Pelvic	14 (39)	
	Nausea	11	10 (91)	
	Vomiting	11	7 (64)	
	Tenderness	33	33 (100)	
	Defense	28	7 (25)	
	Rebound	28	6 (21)	
				Mean±SD/(min-max)
	Laboratory	Leucocyte (x109/L)		11.0±3.3/4.4-16.9
		Hb (g/dL)		11.1±1.7/6.9-13.6
Hct (%)			33.5±4.8/22.2-40.5	

*C/S: Cesarean section; L/S: Laparoscopy; TAH+USO: total abdominal hysterectomy with unilateral salpingo-oophorectomy; N: Number

		n	n (%)
Sonography	Method	Transvaginal	26 (72)
		Abdominal	10 (28)
			Mean±SD/(min-max)
	Maximum ovarian distance (mm)		92.3±37.4/29-200
			n (%)
Appearance	Method	Solid	18 (50)
		Cystic	13 (36)
		Mixed	5 (14)
Hyperechogenicity	Method	Diffuse	18 (78)
		Partial	4 (22)
Displacement	Method	Cul-de-sac (Douglas)	11 (73)
		Antero-superior to uterus	3 (27)
Pearl sign		26	3 (11.5)
Ring sign		27	9 (33)
Whirlpool sign		3	2 (67)
Free fluid		36	27 (75)
Doppler	Method	Normal	18 (39)
		No flow	6 (33)
		Decreased flow	5 (28)

		Mean±SD/(min-max)	
Intervention	Time (hour)	48.7±64.4/3-240	
		n (%)	
Type	Method	Urgent	27 (75)
		Elective	9 (25)
Surgery	Method	*L/T	33 (92)
		*L/S	3 (8)
		*USO	29 (81)
		*TAH+ BSO	4 (11)
Intraoperative findings	Side	Oophorectomy	3 (8)
		Right	24 (67)
	Color	Left	12 (33)
		Black	27 (75)
	Dark brown	9 (25)	
		Mean±SD/(min-max)	
	Twisting number	2.7±1.5/1-6	
		n (%)	
Pathology	Hemorrhagic infarct		35 (97)
	Necrosis		13 (36)
	Concomitant mass	Mature cystic teratoma	4 (11)
		Mucinous cystadenoma	3 (8)
		Serous cystadenoma	3 (8)
		Endometrioma	1
		Fibroepithelial tumor	1

*USO: unilateral salpingo-oophorectomy, TAH+BSO: total abdominal hysterectomy with bilateral salpingo-oophorectomy; L/T: laparotomy; L/S: laparoscopy

nal tenderness. 58% of patients had leukocytosis (our laboratory normal range, $4.23-10.2 \times 10^9/L$). Sonography had been applied to all of the patients (Table 2). In addition, 18 patients had Doppler sonography. Findings after a re-examination of existing sonographic images were ovarian enlargement, solid mass, diffuse hyperechogenic appearance, whirlpool sign, ring sign, pearl sign, abnormal ovarian localization, and free fluid. In Doppler sonography, 39% of cases revealed normal and 61% revealed abnormal (no flow/decreased flow) findings.

Emergency surgery was performed in 75% of the patients (Table 3). The mean surgical intervention time was 49 hours. The type of surgery was 92% laparotomy (L/T) and 8% laparoscopy (L/S). The surgical procedure was adnexectomy (salpingo-oophorectomy or oophorectomy) in 89% of patients. Ovarian torsion had been detected during the operation with the indication of leiomyoma in 11% of the patients. The torsion had been formed in 67% right ovary and 33% left. The average number of twisting of the ovarian pedicle was approximately 3. The color of the torsioned ovary was 75% black and 25% dark brown. One-third of the cases had cysts or tumoral masses in their ovaries; teratoma was the most common of these. The most common histopathological finding in the torsioned ovaries was hemorrhagic infarct.

Statistically, the twisting number of ovarian pedicle was significantly higher in cases with abnormal Doppler findings (mean, 3.5) than normal ones (mean, 2; $p < 0.026$). The intervention time in the dark-brown ovaries was significantly longer than black ovaries ($p < 0.042$). The mean intervention time of elective surgery cases (mean, 124 hours) was significantly longer than urgent cases (mean, 12 hours) ($p < 0.001$). In urgently operated patients, twisted ovaries were black ($p < 0.026$). The twisting number of black ovaries (mean, 3) was significantly higher than dark-brown ovaries (mean, 1.6) ($p < 0.009$). In urgently operated patients, the twisting number mean, 3) was significantly higher than elective cases (mean, 1.8) ($p < 0.038$). Apart from these, other parameters showed no statistically significant result.

Discussion

Ovarian torsion is mostly seen in reproductive ages but it can also be seen in all age groups. Overall, 15% of patients are in the adolescent group, and the mean age is 14 (6). Approximately 14% of our patients were adolescents (mean age, 16), and 8% of our cases were pregnant and were in their first trimester. Ovarian torsion is challenging to diagnose and can be skipped. The main symptom is acute-onset abdominal or pelvic pain (1-7). Pain can also be intermittent. Along with pain, 49%-85% nausea/vomiting (1-7) and 16%-52% peritoneal irritation findings (1, 3, 5) can be observed. Leukocytosis is seen in 16%-63% of the cases (1, 3, 5-7). However, these clinical signs and symptoms are non-specific. Ectopic pregnancy, pelvic inflammatory disease, acute appendicitis, diverticulitis, ovarian cyst rupture, and renal colic should be considered in the differential diagnosis. The predisposing factors of ovarian torsion are cysts or tumors, ovarian enlargement, prolonged pedicle, and hypermobility (1-3, 5, 6). The most seen neoplasia is teratoma (10%-22%) (1-3, 5, 6). In our series, the ratio of teratoma was 11%.

Because clinical signs are non-specific, it is important to diagnose Doppler and sonographic findings. The sonographic findings of ovarian torsion were ovarian enlargement ($>5\text{cm}$) and increased

echogenicity as a result of venous congestion, edema (especially dense ground-glass appearance), pearl sign, ring sign, whirlpool sign, displacement of an ovary (anterior-superior to the uterus or cul-de-sac), free fluid (periovarian and/or in cul-de-sac) (1-12). The classical Doppler findings of ovarian torsion is the absence of arterial blood flow (2, 6, 8-11). It should be considered that Doppler sonography can be normal in almost 60% of the cases (2, 6, 7, 10). Especially, whirlpool sign and the absence of arterial flow are significant for preoperative ovarian viability because the presence of those findings indicate hemorrhagic infarct or necrosis (2, 8-10). Our sonographic and Doppler findings are consistent with those reported in the literature.

Early diagnosis results in early intervention. Intervention time is very important for the preservation of ovarian function. The mean time between the onset of symptoms or admitting to the emergency room and to surgery is 8-54 hours (1, 3, 5, 6, 13, 14). A long intervention time of up to 150-210 days has also been reported (1). The reason for late intervention are diagnostic difficulties, intermittent torsion, and coexisting adnexal pathology. In our cases, mean intervention time was approximately 49 hours; in urgent cases, 16 hours. Our longest intervention time was 240 hours. Traditionally, intraoperative blue-black or black appearance of the ovary (signs of nonviability), the risk of thromboembolism after detorsion, and possibility of malignancy were the main reasons for adnexectomy (6, 15). However, macroscopic appearance of the torsioned ovary does not completely indicate the degree of ischemia/necrosis (4, 6, 14-16). In our cases, only 37% of intraoperative black ovaries had necrosis. The risk of thromboembolism due to ovarian detorsion was 0-0.2% (13-15). Malignancy risks of torsioned ovaries were 1%-1.8% (6, 15). For these reasons, if the conditions are appropriate (technical competence, experience, and the ability of the surgeon), laparoscopic detorsion should be preferred rather than a radical approach, especially in young patients (2, 4, 6, 13-16). Conversely, laparotomic interventions in the majority of our cases was because of surgeons and teams with different experiences and skills.

Conclusion

To maximize the chance of right diagnosis, a carefully investigation of acute abdominopelvic pain and combination of sonographic and Doppler findings with clinical features is required. An early surgical intervention will preserve ovarian viability and fertility capacity. Factors that limited our work were retrospectivity, working with an isolated group of an uncommon disease, and different approaches of different surgeons.

Ethics Committee Approval: Authors declared that the research was conducted according to the principles of the World Medical Association Declaration of Helsinki "Ethical Principles for Medical Research Involving Human Subjects", (amended in October 2013).

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Hasta Onamı: Retrospektif bir çalışma olması nedeniyle hastalardan onam alınmamıştır.

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