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Comparison of open and endoscopic surgical methods in tuba-ovarian abscess management

Surgical management of tuba-ovarian abscess

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Abstract
Aim: The study aims to compare the effectiveness of laparoscopy and laparotomy in the management of tuba-ovarian abscess (TOA).
Material and Methods: This is a retrospective thesis study analyzing 54 patients who were operated on with the diagnosis of TOA. Medical records of patients aged 21-65 years were scanned and the data were recorded. Patients were divided into two different groups those who underwent laparoscopy (n=21) and those who underwent open surgery (n=33). Abscess size, laterality and length of hospital stay were recorded. Duration of the surgical procedure, whether transfusion was required, postoperative complications, and laboratory findings were also noted.
Results: There was no difference between the age, BMI, gravida, parity, and delivery method of the participants according to the surgery types (p>0.05). The total duration of antibiotic use and the need for changes in antibiotic therapy were longer in patients who underwent abscess drainage by laparotomy. The hysterectomy rate was higher in patients whose TOA was managed by laparotomy (p<0.01). Laparotomy resulted in longer operating times and ileus rates. There was no difference between the two groups in terms of abscess size, duration of preoperative antibiotic use, laterality, need for blood transfusion, pulse, temperature values, salpingectomy, salpingoophorectomy, intestinal or ureteral injury rates, and wound site infections (p>0.05). The type of surgery did not affect the hemoglobin, hematocrit and white blood cell values.
Discussion: Treatment of TOA with laparoscopic surgery was found to be more advantageous than open surgery in terms of hospital stay, operation time and response to antibiotic therapy.

Keywords
Tuba Ovarian Abscess, Laparoscopy, Laparotomy

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This study was approved by the Ethics Committee of Bakırköy Sadi Konuk Research and Training Hospital (Date: 2023-09-16, No:2023-20-13)

Introduction

The female genital system is frequently affected by sexually transmitted infections. If the infection becomes an acute infection of the upper genital tract, which includes any or all of the uterus, fallopian tubes, and ovaries, it is referred to as pelvic inflammatory disease (PID). PID may heal spontaneously or with medical treatment, or it may progress to oophoritis, endometritis, salpingitis, hepatitis, peritonitis and/or tubo-ovarian abscess (TOA). PID may turn into a pus-filled mass that includes the ovaries and tubes and may cause agglutination of the organs in the tubo-ovarian complex. TOA is most commonly seen in patients of reproductive age and generally occurs as a complication of PID [1, 2].

TOA is a disease that requires urgent intervention and has high morbidity and mortality. Medical, surgical, or combined approaches in which both treatments are applied together may be required [3,4]. With current practice, the mortality rate for unruptured abscesses approaches zero. Mortality rates in patients with ruptured abscesses vary between 1.7-3.7 percent [5]. Surgical intervention may be required in patients with ruptured abscesses, signs of peritoneal irritation (acute abdomen), and patients who do not respond to antibiotic treatment.

While the abscess can be drained by laparoscopy or laparotomy, minimally invasive drainage methods such as colpotomy, percutaneous drainage and transvaginal drainage can also be used [6, 7]. However, surgical interventions are advantageous as they allow evaluation of intra-abdominal adhesions and adjacent organs in addition to abscess diagnosis and drainage. This study was planned to compare the effects of laparoscopic and laparotomic surgical treatments in the management of TOA on clinical results, laboratory findings and postoperative results. In addition, it is aimed to contribute ideas to the surgeon in the treatment of TOA by determining the advantages and disadvantages of two different surgical approaches.

Material and Methods

This is a retrospective thesis study analyzing 54 patients who were operated on with the diagnosis of TOA in our hospital between 2018 and 2023. Medical records of patients aged 21-65 years old who were admitted to Deaprtment of Obstetrics and Gynecology, Bakırköy Sadi Konuk Research and Training Hospital were retrospectively scanned and the data were digitally recorded in Excel and SPSS programs. Immunosuppressed patients, patients with malignancy, patients who were found to have no abscess during surgery, and patients with incomplete medical records were excluded from the study. Patients who had the data we requested in the screening performed by entering the words TOA, abscess, pyosalpinx, abscess, tuboovarian abscess from the electronic monitoring system unit were included in the study. Demographic data of the patients such as age, parity, gravida, birth types and numbers, abortion, height, weight, and body mass index were recorded. In addition, history of intrauterine device use, PID, systemic infection, diabetes mellitus and hypertension, which are risk factors for TOA, were questioned. Abscess size and laterality were recorded. Additionally, the patient's vital signs such as fever and pulse at the time of admission were noted. Duration of the surgical procedure, whether transfusion was required, postoperative complications, and laboratory findings were noted. Based on these findings, we divided our patients into two different groups: those who underwent laparoscopy (n=21) and those who underwent open surgery (n=33).

Statistical Analysis

SPSS 26 (Statistical Package for the Social Sciences) program was used for statistical analysis of the data. Quantitative variables were presented as mean, standard deviation, median, min and max values, and qualitative variables were presented as frequency and percentage. Whether the data showed a normal distribution or not was determined with the help of Shapiro Wilks test and Box Plot graphics. Student's t-test was used in the analysis of normally distributed data, and repeated measures were used in intra-group evaluations. Chi-Square test, Fisher's Exact test and Fisher Freeman Halton test were used to compare qualitative data. $P<0.05$ was considered statistically significant within the 95% confidence interval.

Ethical Approval

This study was approved by the Ethics Committee of Bakırköy Sadi Konuk Research and Training Hospital (Date: 2023-09-16, No:2023-20-13). Data collection started after receiving approval from the ethics committee approval.

Results

The patients' ages ranged from 25 to 58, with an average of 41.30±7.29 years. The height of the participants ranged from a minimum of 150 cm to a maximum of 175 cm, with an average of 161.98±4.83 cm. The weight of the cases varies between 50 and 83 kg, and the average is 62.87±6.71 kg. BMI values range from 19.8 to 33.2 kg/m2, with an average of 23.99±2.71 kg/m2. When the gravidas of the cases were examined, it was seen that 5.6% did not give birth, 16.7% had 1 pregnancy, 42.6% had 2 pregnancies and 35.2% had 3 or more pregnancies. When their parities were examined, it was seen that 13.0% did not give birth, 24.1% had 1 parity, 35.2% had 2 parities, and 27.8% had 3 or more parities. It was determined that 31.5% of the cases had 1 birth, 20.4% had 2 births, 11.1% had 3 births, and 7.4% had 4 births. Of those diagnosed with TOA, 42.6% (n=23) smoked, 29.6% (n=16) used IUD, 9.3% (n=5) had DM and 9.3% (n=5) had a history of HT. According to the type of surgery, it was determined that 38.9% (n = 21) of the cases had laparotomy and 61.1% (n = 33) had laparoscopic surgery. Table 1 details the demographic data of participants in both surgery groups.

Table 2 details the changes in the parameters evaluated before and after surgical intervention. Abscess sizes varied between 2.5 and 12.2, and 77.8% (n=42) of the cases were unilateral and 22.2% (n=12) were bilateral. The average duration of the patients receiving intravenous antibiotics before surgery was 3.91±2.76 days and the average total duration of intravenous antibiotics was 11.00±5.03. Operation times of the cases participating in the study ranged between 55 and 200 minutes, and the average time was 118.52±37.25 minutes. It was determined that 7.4% of TOA patients had ileus, 5.6% had intestinal damage, 3.7% had ureter damage, and 5.6% had wound infection. When the pathology results were examined, it was seen that 1.9% had endometrioma, 1.9% had granulosa

cell tumor and 96.3% had salpingoophoritis.
There was no difference between the age, BMI, gravida, parity, and delivery method of the cases according to the surgery types (p>0.05). The total duration of antibiotic use and the need for changes in antibiotic therapy were longer in patients who underwent abscess drainage by laparotomy. The hysterectomy rate was higher in patients whose TOA was managed by laparotomy (p<0.01). Laparotomy resulted in longer operating times and ileus rates. There was no difference between the two groups in terms of abscess size, duration of preoperative antibiotic use, laterality, need for blood transfusion, pulse, temperature values, salpingectomy, salpingoophorectomy, intestinal or ureteral injury rates, and wound site infections (p>0.05). The type of surgery did not affect the hemoglobin, hematocrit and white blood cell values on the 1st day after the operation, and on the 1st week after the operation (Table 3).

Discussion

Tuba ovarian abscess is a serious, life-threatening inflammatory disease affecting the female pelvic organs. In this study, we compared patients who underwent laparotomy or laparoscopy due to tuboovarian abscess in terms of antibiotic use, postoperative complications and length of hospital stay, in addition to demographic and laboratory values. Although the age scale of TOA patients is wide, it was observed predominantly in women in the reproductive period. The age range of the cases ranged between 25 and 58 and was found to be compatible with the literature [8]. The number of patients with postmenopausal TOA (7.2%) was also consistent with the literature. Although we cannot establish a clear connection between birth rates, BMI, smoking and TOA, there are studies reporting that high BMI and parity increase the risk of TOA and reduce the response to antibiotics [9]. The fact that 42.6% of TOA patients have a history of smoking suggests that smoking reduces immune resistance and increases the tendency to infection. The detection of IUD in 29.6% of the cases is consistent with the literature rates and supports that IUD poses a risk for TOA. On

Table 1. Demographical characteristics

Demographic characteristics of patients with TOA		
Age (yrs)	Mean±SD	41,30±7,29
	Median (Min-Max)	42 (25-58)
Height (cm)	Mean±SD	161,98±4,83
	Median (Min-Max)	161 (150-175)
Weight (kg)	Mean±SD	62,87±6,71
	Median (Min-Max)	61 (50-83)
BMI (kg/m2)	Mean±SD	23,99±2,71
	Median (Min-Max)	23,3 (19,8-33,2)
Gravidy	No	3 (5,6)
	1	9 (16,7)
	2	23 (42,6)
	≥3	19 (35,2)
Parity	No	7 (13,0)
	1	13 (24,1)
	2	19 (35,2)
	≥3	15 (27,8)
Vaginal birth	No	16 (29,6)
	1	17 (31,5)
	2	11 (20,4)
	3	6 (11,1)
	4	4 (7,4)
C/S	No	37 (69,8)
	1	5 (9,4)
	2	8 (15,1)
	3	3 (5,7)
Abortion	No	44 (81,5)
	1	8 (14,8)
	2	2 (3,7)
Comorbidity	Smoking	23 (42,6)
	IUD	16 (29,6)
	DM	5 (9,3)
	HT	5 (9,3)
Surgical types	Laparoscopy	21 (38,9)
	Laparotomy	33 (61,1)

•Multiple comorbidities

Table 2. Distribution of pre-, per- and postoperative characteristics of TOA patients

		n (%)
Abscess size (cm)	Mean±SD	7,17±2,46
	Median (Min-Max)	6,75 (2,5-12,2)
Bilaterality	No	42 (77,8)
	Yes	12 (22,2)
Preoperative antibiotherapy	Mean±SD	3,91±2,76
	Median (Min-Max)	3 (1-12)
Total AB	Mean±SD	11,00±5,03
	Median (Min-Max)	10 (3-27)
Need for transfusion	No	40 (74,1)
	Yes	14 (25,9)
Change in antibiotherapy	No	40 (74,1)
	Yes	14 (25,9)
Pulse	Mean±SD	91,31±10,24
	Median (Min-Max)	91 (63-120)
Fewer (C°)	Mean±SD	37,25±0,67
	Median (Min-Max)	37 (36-38,5)
Salpingectomy	No	37 (68,5)
	Yes	17 (31,5)
Salpingo-oopherectomy	No	24 (44,4)
	Yes	30 (55,6)
Hysterectomy	No	43 (79,6)
	Yes	11 (20,4)
Time in operation (dk)	Mean±SD	118,52±37,25
	Median (Min-Max)	110 (55-200)
Bladder injury	No	54 (100)
Intestinal injury	No	51 (94,4)
	Yes	3 (5,6)
Ileus	No	50 (92,6)
	Yes	4 (7,4)
Ureter injury	No	52 (96,3)
	Yes	2 (3,7)
Wound infection	No	51 (94,4)
	Yes	3 (5,6)
Pulmonary embolism	No	54 (100)
Final pathology	Endometrioma	1 (1,9)
	Granulosa cell tumor	1 (1,9)
	Salpingo-oophoritis	52 (96,3)

Table 3. Comparison of the characteristics of the cases according to the type of surgery

		Surgery Type		p
		Laparotomy (n=21)	Laparoscopy (n=33)	
Abscess size (mm)	Mean±SD	7,43±2,41	7,00±2,52	a0,541
	Median (Min-Max)	7,2 (4-12,2)	6 (2,5-12)	
Lateralite (uni/bilateral)	No	15 (71,4)	27 (81,8)	d0,504
	Yes	6 (28,6)	6 (18,2)	
Preoperative antibiotic use	Mean±SD	4,33±3,26	3,64±2,41	a0,371
	Median (Min-Max)	3 (1-12)	3 (1-10)	
Total antibiotic use time	Mean±SD	14,14±5,50	9,00±3,53	a0,001**
	Median (Min-Max)	14 (7-27)	9 (3-20)	
Need for transfusion	No	15 (71,4)	25 (75,8)	c0,723
	Yes	6 (28,6)	8 (24,2)	
Antibiotic change	No	12 (57,1)	28 (84,8)	c0,024*
	Yes	9 (42,9)	5 (15,2)	
Pulse	Mean±SD	93,14±12,53	90,15±8,49	a0,300
	Median (Min-Max)	92 (63-120)	90 (70-108)	
Fever (C°)	Mean±SD	37,16±0,71	37,31±0,66	a0,440
	Median (Min-Max)	37 (36-38,1)	37,4 (36-38,5)	
Salpingectomy	No	17 (81,0)	20 (60,6)	c0,117
	Yes	4 (19,0)	13 (39,4)	
Salpingo-ooferectomy	No	6 (28,6)	18 (54,5)	c0,061
	Yes	15 (71,4)	15 (45,5)	
Hysterectomy	No	12 (57,1)	31 (93,9)	d0,002**
	Yes	9 (42,9)	2 (6,1)	
Operation time (dk)	Mean±SD	138,33±34,9	105,91±33,39	a0,001**
	Median (Min-Max)	125 (90-200)	100 (55-190)	
Intestine injury	No	18 (85,7)	33 (100)	d0,054
	Yes	3 (14,3)	0 (0)	
Ileus	No	17 (81,0)	33 (100)	d0,019*
	Yes	4 (19,0)	0 (0)	
Ureter injury	No	20 (95,2)	32 (97,0)	d1,000
	Yes	1 (4,8)	1 (3,0)	
Wound infection	No	18 (85,7)	33 (100)	d0,054
	Yes	3 (14,3)	0 (0)	

aStudent-t Test
cPearson Chi-Square Test
dFisher Exact Test
**p<0,01,*p<0,05

the other hand, IUD use and history of hypertension and DM did not affect the operation option.

Abscess sizes of the cases ranged between 2.5 and 12.2. We recommended surgery to patients with a TOA of 7 cm or more if there was no shrinkage after antibiotic treatment. However, we did not observe a relationship between abscess size and the surgical procedure to be performed. Although TOA was bilateral in 22% of the participants, laterality did not have a significant impact on the choice of surgical method. We did not observe any significant difference between open and laparoscopic methods in terms of duration of preoperative antibiotic use and vital signs such as fever and pulse. The age, BMI values, gravida, parity, type of birth, number of abortions and comorbidities of the cases did not differ between the surgical groups. The average duration of total antibiotic use was 9 days in TOA patients who underwent laparoscopic surgery and 14.14 days in open surgery. Consistent with the literature, short-term antibiotic use in the L/S group required short-term hospitalization [10]. The need for more antibiotic changes in the laparotomy group can be considered an important finding. Although there was no difference in surgical complications between laparoscopy and laparotomy, ileus was more common in those who underwent laparotomy in our study. Although the rates of other postoperative complications (intestinal damage, ureteral injury, wound infection) are consistent with previous studies, the frequent occurrence of ileus in the laparotomy group is different from the literature data [11].

Clinical studies recommend TAH+BSO as a comprehensive treatment method in TOA patients who have completed parity [3, 7]. However, this strategy increases the duration of surgery and complications. Some studies have revealed unilateral salpingo-oophorectomy as a more reasonable treatment option [12]. In our cohort, 55.6% of the patients underwent salpingo-oophorectomy, and the length of hospital stay and amount of bleeding were similar. We determined that hysterectomy increases complication rates. In patients who have completed parity or are postmenopausal, TAH+BSO is still a reasonable option. In relatively young patients, unilateral salpingo-oophorectomy can be performed by leaving the intact tube and ovary. We found the salpingectomy and salpingoophorectomy rates to be similar in both groups. The only difference in surgical procedures was in hysterectomy rates. While hysterectomy was required in 9 cases during L/S, it was required in 2 cases during open surgery. Although the literature reports that the need for blood transfusion is less in laparoscopy [6, 7], we found HB, HTC values and transfusion rates to be similar between the two groups. The decrease in WBC and CRP values measured on postoperative days 1 and 7 was similar to the two groups. However, the literature stated that the decreases in WBC and CRP on days 1 and 7 were faster in laparoscopy [8]. This may be due to differences in patient population and surgeon experience. In the current study, we found granulosa cell tumor of the ovary in only 1 of 54 patients (1.85%). In a study conducted in Athens, concurrent gynecological malignancy was detected in 8 cases with postmenopausal TOA [13, 14]. We detected malignancy in one of 5 patients with postmenopausal TOA. In light of these data, pathology results should be followed closely, keeping in mind that there may be malignancy in postmenopausal TOA patients [13, 14].

Conclusion

The study has some limitations. Despite the limitations such as being retrospective, small number of patients and being single-centered, the abundance of demographic and laboratory data evaluated makes our study important. Treatment of TOA with endoscopic surgery was found to be more advantageous than open surgery in terms of hospital stay, operation time and response to antibiotic therapy. Abscess size appeared to be unrelated to the choice of surgery types. When performed based on the surgeon's experience, laparoscopic management of TOA has been found to be advantageous in many respects over open surgery.

Scientific Responsibility Statement The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.

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Animal and Human Rights Statement
All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or compareable ethical standards.

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Conflict of Interest
The authors declare that there is no conflict of interest.

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