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Which treatment should we choose for tubo-ovarian abscesses? Results of an 8-year clinical training in a tertiary center

Tytuł skrócony: Treatment of tubo-ovarian abscesses

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ABSTRACT

Objectives: Tubo-ovarian abscess (TOA) is inflammation of the pelvic organs, mainly originating from the lower genital tract and intestinal tract. Treatment options include antibiotic therapy, surgical drainage, and radiologically guided (interventional) drainage. In our study, we aimed to evaluate the treatment method to be chosen and thus to manage patients with tuba ovarian abscesses (TOAs) most accurately.

Material and methods: This is a retrospective cohort study, and patients who applied to a tertiary center diagnosed with tuba ovarian abscess (TOA) were included. TOA size (cm), pre-treatment C-reactive protein (CRP) value, pre-treatment white blood cell (WBC) value, previous operation type, postoperative complication, and antibiotics used were screened.

Results: 305 patients were included in the study, and medical treatment was applied to 140 patients, organ-sparing surgical drainage to 50 patients, and surgical treatment to 115 patients. TOA dimensions measured at the time of diagnosis were significantly lower in patients for whom only medical treatment was sufficient. Pre-treatment CRP levels, WBC levels, and length of stay were significantly lower in patients for whom only medical treatment was sufficient. There was no significant difference between the pre-and post-procedure CRP difference, antibiotics, and hospitalization time.

Conclusions: Preferring minimally invasive treatment in cases requiring invasive treatment reduces the frequency of complications. Treatment of tuba ovarian abscesses (TOA**)** with minimally invasive methods will be more beneficial in terms of patient morbidity.

Keywords: minimally invasive treatment; surgical drainage; tubo-ovarian abscess

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INTRODUCTION

Tubo-ovarian abscess (TOA) is a complicated, inflammatory mass of uterine fallopian tubes, ovaries, and rarely, infection of neighbouring organs. Its typically observed in women of reproductive age, especially following pelvic inflammatory disease (PID) [1]. Infections of pelvic regions commonly originated from the lower genital tract and intestinal tract [2].

The treatment options for TOA are antibiotic therapy, surgical drainage and radiologically guided (interventional) drainage [3]. The determination of treatment depends on the patient's clinical condition, desire for fertility and the clinician's preference [4]. Approximately 50–80% of TOA respond to antibiotic therapy [5–7]. However, surgical treatment is attempted in cases that TOA do not respond to antibiotic treatment or in cases of the ruptured abscess [1, 8].

The recurrence rate of TOA is reported to be higher when patients are only treated with antibiotics [9, 10]. The factors affecting the success of medical treatment are the patient's age, the size of the abscess, elevated white blood cell (WBC) count, body mass index and C-reactive protein (CRP) values [11, 12].

The aim of this study is to designate the predictors of the achievement of TOA treatment in order to enhance the determination of the optimum treatment methods by evaluating the response of patients to the treatment who were treated with different treatment methods and followed-up.

MATERIAL AND METHODS

Patients

Patients who applied to the hospital with pelvic tenderness and purulent vaginal discharge between 2012 and 2020 and were diagnosed with TOA and treated for it were included in the study. Patients with a known history of ovarian or tubal abscess and ovarian or tubal cancer were excluded from the study.

Data collection

The study protocol was approved by the institution’s Ethics Committee (KAEK/2020.07.118). Written and verbal informed consent was obtained from all of the participants before their enrollment in the study. Patients whose information could not be

reached were contacted via phone calls. Demographic characteristics and laboratory findings of patients were obtained from patient records.

Patients' age, parity, intrauterine device (IUD) use history, cesarean section history, TOA size (cm), pre-treatment CRP value, pre-treatment WBC count, previous operation, postoperative complication, antibiotics used, duration of antibiotics use (day) and duration of hospitalization (day) were screened.

Treatments

There were three different management approaches: only medical treatment group, drainage (organ-sparing) plus medical treatment and surgery (in which we could not be organ-preserving) plus medical treatment. While drainage was performed percutaneously, surgical procedures such as bilateral or unilateral oophorectomy with or without hysterectomy, bilateral or unilateral salpigoopherectomy were performed in the case where we could not be organ-sparing.

Medical treatment was preferred in patients who were hemodynamically stable and responsive to intravenous antibiotic therapy, had no signs of abscess rupture, no suspicious ultrasonographic appearance and did not accept surgery or drainage method. Combined treatments with a broad spectrum of treatment were preferred as medical treatment.

Surgical treatment was preferred in hemodynamically unstable patients with suspected sepsis or abscess rupture, abscesses with suspicious ultrasonographic appearance and patients who did not respond to medical treatment alone.

The decision for drainage (percutaneous or surgical) or surgical treatment that we could not be organ-sparing was made according to the patient's clinical condition, the location of the TOA, the technical feasibility of the drainage, the surgeon's preference and the patient's approval of the procedure to be applied. All demographic and clinical characteristics were compared between the different management groups.

The patients who underwent surgery were also divided into two groups: those in whom only drainage was performed and those in whom damaged organ was surgically removed. The groups were compared in terms of demographic and clinical characteristics.

Statistical analysis

The collected data were analyzed with SPSS version 22.0 (IBM Corp., Armonk, NY, USA). The normality of the demographic data was assessed with the Shapiro-Wilk test. Demographic data were summarised as the median and interquartile range for non-normally

distributed data and as the mean and standard deviation for normally distributed data. Specific statistical tests were stated in each table. A p-value of less than 0.05 was considered significant.

RESULTS

A total of 350 patients who met the eligibility criteria were included in the study while thirty-nine patients were excluded due to technical problems during data collection. As a result, 305 patients were included in the final analysis.

Demographic characteristics of patients who were hospitalized and treated for TOA are given in Table 1. Abscess size, pre-treatment CRP and WBC levels and length of hospital stay were significantly lower in patients who received medical treatment only compared to those who required surgical treatment ($p < 0.001$). In addition, Table 2 demonstrates that there was no significant difference between drainage and organ-sparing surgical methods in terms of these parameters. While complications did not develop in 50 patients who underwent drainage, wound infection was observed in one patient (0.9%) and incisional hernia in 2 patients (1.7%). Table 2 also shows that there was no significant difference between drainage (organ-sparing surgery) and non-organ-preserving methods regarding these parameters.

When the patients who were grouped according to only drainage or removal of the damaged organ were compared, the amount of CRP level change before and after treatment, the duration of antibiotics use, the time from the initiation of antibiotics to the invasive procedure and the length of hospital stay were found to be similar in both groups (Tab. 3).

In addition, when the selected surgical methods were evaluated separately as minimally invasive (laparoscopy, percutaneous drainage) and laparotomy, there was no significant difference in the amount of CRP level change before and after treatment, the duration of antibiotics use, the time from initiation of antibiotics to the invasive procedure and the length of stay in the patient (Tab. 4). The interventional procedures and the distribution of the procedures are presented in Figure 1.

DISCUSSION

We aimed in this study to evaluate the response of 305 patients who were followed-up and treated for TOA by different treatment methods to determine the most effective management method of TOA patients. Depending on our results, TOA dimensions measured at the time of diagnosis were found to be significantly lower in patients for whom only medical treatment was sufficient. Pre-treatment CRP levels, WBC count and length of

hospital stay were significantly lower in patients for whom only medical treatment was sufficient. There was no significant difference regarding pre-and post-procedure CRP level change, antibiotics use and hospitalization duration between the patients who underwent interventional procedures and those who did not have organ preservation. In terms of laparoscopy and laparotomy, there was no significant difference in all these parameters.

Goje et al. [13], in a systematic review of 975 patients, observed that the application of image-guided drainage had a higher success rate in reducing complications and length of hospital stay compared to laparoscopic drainage and medical treatment alone. In this study, hospitalization time was observed to be the shortest only for those who received medical treatment.

In a study of 50 patients, Zhu et al. [14] compared the patients who underwent medical treatment and early surgical treatment. Although they thought that immediate surgery was more beneficial for recovery of the patients, no statistically significant difference was found in the length of hospital stay. We also did not detect any significant effect of immediate decision for surgery on hospitalization duration. In contrast to our findings, in the study of Chu L. et al. [15], when 64 patients who underwent medical treatment and early laparoscopy were compared, a shorter hospital stay, a lower period with body temperature of ≥ 38°C and less blood loss were observed in patients who underwent early laparoscopy.

In this study, when minimally invasive surgery and laparotomy were compared, no significant difference was found between the time before the procedure and the hospitalization period after the procedure. This result allows us to decide on the choice of operation according to the surgeon's preference and the patient's clinic. Similarly, Sezgin et al. [16] found no significant difference in terms of postoperative complications when they grouped the patients according to laparoscopy and laparotomy, but the operation time was shorter in the laparoscopy group.

In addition to these, when the patients who applied minimally invasive methods were compared with the patients who underwent laparotomy, no significant difference was found in terms of the time before the invasive method and the hospitalization period after the procedure.

Abscess size was found to be another important predictor for management option. Fox C.R. et al. [17], in their study on 77 patients, found that an abscess size greater than 5 cm was an important factor affecting the need for additional treatment. Evaluation for drainage has been recommended in cases where medical treatment has failed. In our study, abscess size was found to be significantly lower in patients who received medical treatment. It could be

interpreted as the reason for preference of medical treatment primarily in small-sized abscesses.

Although our study has some limitations due to retrospective design, this study specifically evaluates and compares the impact of different treatment approaches in a large sample size with TOA. Cultures were not taken from the patients which could be accepted as another limitation. Further studies are needed to confirm our observations.

CONCLUSIONS

It was found that lower CRP and WBC level and abscess size at the beginning of treatment increased the chance of success of medical treatment. While there was no difference between surgical techniques and methods, it was determined that minimally invasive approach and only drainage, if possible, reduced the incidence of complications. This result, on the other hand, guides the literature and future studies by showing that the treatment of TOA by preferring minimally invasive methods may be more beneficial in terms of reducing patient morbidity.

Article information and declarations

Data availability statement

The data used to support the findings of this study are available from the corresponding author upon request.

Ethics statement

Ethics committee of the University of Health Sciences Turkey, Istanbul Kanuni Sultan Suleyman Training and Research Hospital approved the study protocol according to the principles outlined by the Declaration of Helsinki (KAEK/2020.07.118).

Author contributions

Ayşegül Bestel, Osman Samet Günkaya and Hale Göksever Çelik contributed to the conception and design of the study, acquisition of data, analysis and interpretation of data, and drafting the article; Yasemin Ballıca and Şeyma Çolak Yüksel contributed to acquisition of data; and Merve Aldıkactioglu Talmac, Zeynep Gedik Ozkose and Burak Elmas contributed to the conception and design of the study. All authors revised the article critically for important intellectual content, gave final approval of the version to be submitted.

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Conclict of interest

The authors have declared that there are no conflicts of interest.

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Table 1. Demographic and clinical characteristics of the patients

	All (n = 305)	**Medical treatment (n = 140)**	**Drainage (organ-sparing) and medical (n = 50)**	**Surgery (non-organ preserving) Surgery and medical (n = 115)**	**p**
Age (year)					0.170[a]
Mean ± SD	37.7 ± 8.2	37.4 ± 8.9	36.3 ± 7.5	38.8 ± 7.3	
(min–max)	(18–59)	(19–59)	(18–57)	(18–57)	
Parity					0.126[b]
Nulliparous	38 (12.5%)	24 (17.1%)	6 (12%)	8 (7%)	
Primiparous	54 (17.7%)	27 (19.3%)	8 (16%)	19 (16.5%)	
Multiparous	213 (69.8%)	89 (63.6%)	36 (72%)	88 (76.5%)	
Intrauterin device					0.603[b]
Yes	124 (40.7%)	61 (43.6%)	20 (40%)	43 (37.4%)	
No	181 (59.3%)	79 (56.4%)	30 (60%)	72 (62.6%)	
History of cesarean section					0.714[b]
Yes	70 (23%)	35 (25%)	10 (20%)	25 (21.7%)	
No	235 (77%)	105 (75%)	40 (80%)	90 (78.3%)	

[a]One way ANOVA test; [b]Chi-square test

Table 2. Comparison of the patients regarding clinical characteristics

	Medical (n = 140)	**Drainage (organ-sparing) and medical (n = 50)**	**Surgery (non-organ preserving) (n = 115)**	**p**
Size of the TOA [cm]				< 0.0001[a-b]
Mean ± SD	5.0 ± 1.3	6.2 ± 1.8	5.8 ± 1.4	
(min–max)	(2.0–9.0)	(3.0–11.5)	(3.0–10.0)	
Pretreatment CRP				< 0.008[a-b]
Mean ± SD	183.6 ± 113.0	234.9 ± 146.2	222.3 ± 117.0	
(min–max)	(11–552)	(29–677)	(15–558)	
Pretreatment WBC				< 0.0001[a-b]
Mean ± SD	13,942.9 ± 5,164.0	17,810.6 ± 5,719.2	17,051 ± 6,885.1	
(min–max)	(1,800–26,470)	(5,800–31,800)	(4,500 ± 36,800)	
Hospitalization period (day)				< 0.0001[a-c]
Mean ± SD	7.0 ± 2.9	10.9 ± 4.3	10.8 ± 4.4	
(min–max)	(2–16)	(4–23)	(3–24)	

CRP — C-reactive protein; TOA — tubo-ovarian abscess; WBC — white blood cell; [a]One Way ANOVA test; [b]Post-hoc analize TUKEY test; [c]Games-Howell test

Table 3. Comparison of the patients regarding C-reactive protein (CRP) level and duration of hospital stay

	Drainage (organ-sparing) (percutaneous or surgical) (n = 50)	**Surgery (non-organ preserving) (n = 115)**	**p**
CRP level (median ± IQR)	69 ± 105	71 ± 120	0.754[a]
Antibiotic duration (day) (median ± IQR)	10 ± 6	10 ± 7	0.980[a]
Duration of time between admission and invasive procedure (day) (median ± IQR)	4 ± 6	4 ± 5	0.837[a]
Duration of stay after procedure (day) (median ± IQR)	6 ± 4	6 ± 3	0.662[a]

[a]Mann Whitney U test; IQR — interquartile range

Table 4. Comparison of the patients who underwent minimally invasive (percutaneous drainage and laparoscopy) and laparotomy regarding C-reactive protein (CRP) level and duration of hospital stay

	Minimally invasive (percutaneous drainage and laparoscopy) (n = 31)	**Laparotomy (n = 134)**	**p**
CRP (median ± IQR)	68 ± 89	71 ± 125	0.819[a]
Antibiotic duration (day) (median ± IQR)	10 ± 7	10 ± 7	0.570[a]
Duration of time between admission and invasive procedure (day) (median ± IQR)	4 ± 6	4 ± 5	0.359[a]
Duration of stay after procedure (day) (median ± IQR)	6 ± 4	6 ± 3	0.811[a]

IQR — interquartile range; [a]Mann Whitney U test

FIGURES
Figure 1. The flow-chart of the study population

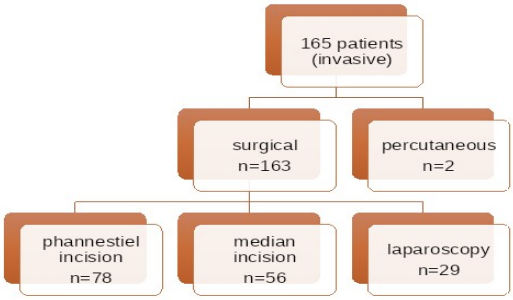

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Figure 1. The flow-chart of the study population

165 patients (invasive)

Surgical n = 163 Percutaneous n = 2

Phannestiel incision n = 78 Median incision n = 56 Laparoscopy n = 29