International Journal of Gynecology and Obstetrics 124 (2014) 45–50

Contents lists available at ScienceDirect

International Journal of Gynecology and Obstetrics

journal homepage: www.elsevier.com/locate/ijgo

CLINICAL ARTICLE

Experience of tubo-ovarian abscess in western Turkey

Kemal Güngördük [a,*], Esra Guzel [a], Osman Asicioğlu [b], Gokhan Yildirim [c], Guler Ataser [a], Cemal Ark [c], Sıdıka S. Gulova [b], Cihangir Uzuncakmak [a]

[a] Department of Obstetrics and Gynecology, Istanbul Training and Research Hospital, Istanbul, Turkey
[b] Department of Obstetrics and Gynecology, Sisli Etfal Training and Research Hospital, Istanbul, Turkey
[c] Department of Obstetrics and Gynecology, Kanuni Sultan Süleyman Training and Research Hospital, Istanbul, Turkey

ARTICLE INFO

Article history:
Received 18 March 2013
Received in revised form 3 July 2013
Accepted 27 September 2013

Keywords:
Abscess size
C-reactive protein
Erythrocyte sedimentation rate
Tubo-ovarian abscess

ABSTRACT

Objective: To investigate the clinical and laboratory parameters, treatments, and complications of patient with tubo-ovarian abscess (TOA). *Methods:* Data for 296 patients diagnosed with TOA (clinically and sonographically) between January 2005 and December 2012 were retrospectively reviewed at 3 tertiary referral hospitals in Turkey. Patients were compared on the basis of TOA size, demographic characteristics, clinical and sonographic presentation, and laboratory findings. *Results:* Seventy-six patients (25.7%) underwent surgery because antibiotic treatment was unsuccessful. The mean abscess size was larger and the mean C-reactive protein (CRP) level and the erythrocyte sedimentation rate (ESR) were higher among patients who required surgery. The ESR had a diagnostic value of 83.6%, and a specificity and sensitivity of 73.7% and 82.7%, respectively, for the need for surgical intervention, based on a cut-off value of 63.0 mm/hour. The CRP level had a diagnostic value of 80.4%, a specificity of 82.3%, and a sensitivity of 65.8% based on a cut-off value of 21.0 mg/L. *Conclusion:* The combined use of the sonographic TOA diameter and laboratory parameters (ESR and CRP level) can aid clinical treatment decisions and improve the prediction of the outcome of medical TOA treatment.

1. Introduction

Tubo-ovarian abscess (TOA) is the term for a variety of infections that involve the fallopian tubes, the ovaries, and possibly the surrounding tissues. A TOA stems most often from pelvic inflammatory disease (PID), particularly in premenopausal women. Hematogenous spread and lymphatic invasion can also lead to a TOA [1]. Less-frequent etiologies include complicated diverticulitis (particularly in postmenopausal women), Crohn disease, and perforated appendicitis, with development of the TOA from direct spread of infectious material [1,2]. A TOA can also develop as an uncommon complication of pelvic surgery such as cesarean delivery, hysterectomy, or tubal ligation [1].

The TOA rate is 10–15% among women hospitalized for PID [3]. Risk factors for the development of a TOA include a history of PID, multiple sexual partners, age 15–25 years, presence of an intrauterine device (IUD), and immunosuppression [1]. A TOA is a polymicrobial infection caused by a mixture of anaerobic, aerobic, and facultative microorganisms. Anaerobic bacteria account for more than half of all infections. Sexually transmitted pathogens are isolated from TOAs on an infrequent basis. The most commonly isolated organisms are *Escherichia coli*, *Bacteroides* spp. (in particular *Bacteroides fragilis*), *Peptostreptococcus* spp., *Peptococcus* spp., and aerobic *Streptococcus* spp. [4,5].

The optimal approach to managing TOAs remains controversial. Treatment classically consists of intravenous antibiotics followed by oral antibiotics. If medical treatment fails, surgery is performed such as laparoscopy or laparotomy with drainage of the abscess, unilateral or bilateral adnexectomy, or hysterectomy. Another approach to treating TOA is image-guided drainage, either catheter drainage or needle aspiration of the abscess contents, combined with antibiotics [1].

The present study was performed to retrospectively investigate the clinical and laboratory characteristics, treatments, and complications of patients with TOA. Additionally, the study addressed the following questions. Is TOA size associated with the outcome of antimicrobial therapy, the need for surgery, or the rate of surgical complications? Are clinical and laboratory risk factors for TOA associated with the need for surgical intervention following a failed response to antibiotic therapy? Is menopausal status associated with the outcome of antimicrobial therapy?

2. Materials and methods

A retrospective study was conducted between January 1, 2005, and December 31, 2012, at the Departments of Obstetrics and Gynecology at Istanbul Training and Research Hospital, Sisli Etfal Training and Research Hospital, and Kanuni Sultan Suleyman Training and Research Hospital. These hospitals serve as tertiary referral centers in Istanbul, Turkey. We reviewed all 296 cases of TOA. The study

* Corresponding author at: Department of Obstetrics and Gynecology, Istanbul Training and Research Hospital, Kasap İlyas Mah. Org. Abdurrahman Nafiz Gürman Cd, Fatih, Istanbul 34098, Turkey. Tel.: +90 505 492 17 66; fax: +90 212 632 0060.
E-mail address: maidenkemal@yahoo.com (K. Güngördük).

0020-7292/$ – see front matter.
http://dx.doi.org/10.1016/j.ijgo.2013.07.017

was approved by the local ethics committee, and all women gave written informed consent.

The diagnosis of TOA was based on classical PID findings, including abdominal pain, cervical and adnexal tenderness on vaginal examination, and 1 or more of the following minor criteria: fever (38 °C or more); leukocyte count of more than 10 000/mL; erythrocyte sedimentation rate (ESR) of more than 15 mm/hour [6]; and presence of a sonographic mass (a complex cystic mass with irregular walls, partitions, internal echoes, and no peristalsis) [1]. If the ultrasound examination was inconclusive, the patient underwent computed tomography or magnetic resonance imaging. Women who did not have an inflammatory mass were excluded.

On admission (prior to therapy), blood samples were taken for the measurement of ESR, serum leukocyte concentration, and C-reactive protein (CRP) level. Intrauterine devices were removed 24–48 hours after treatment initiation.

The patients were initially treated with clindamycin and gentamicin or with ceftriaxone and metronidazole. The antibiotics were administered intravenously for at least 4 days; intravenous administration was continued for 48 hours after normalization of the body temperature and improvement of the clinical condition. Subsequently, intravenous therapy was replaced with oral administration of 100 mg doxycycline every 12 hours until day 14 of treatment.

Failure of treatment response was defined as the persistence of fever after 72 hours of treatment with antibiotics or the presence of positive peritoneal signs after 48 hours of treatment. Patients with treatment failure received surgical intervention (drainage only, unilateral or bilateral salpingo-oophorectomy, or total or subtotal abdominal hysterectomy with bilateral salpingo-oophorectomy, performed via laparotomy or laparoscopy).

The following demographic and clinical data were collected via medical record review: age, parity, menopausal status (non-menopausal vs menopausal), sonographic presentation, PID risk factors, antibiotic therapy, surgical treatment, presence of complications, laboratory results, and length of hospital stay.

MedCalc version 9.3 (MedCalc Software, Ostend, Belgium) was used for the statistical analysis. The normality of the distribution of continuous variables was assessed with the Kolmogorov–Smirnov test. The χ^2 test was used to analyze categorical variables, the t test was used for normally distributed variables, and the Mann–Whitney U test was used for abnormally distributed variables. Relative risks (RRs) with 95% confidence intervals (CIs) were calculated. $P < 0.05$ was considered to indicate statistical significance. A receiver operating characteristic (ROC) curve was used to evaluate cut-off, sensitivity, and specificity values.

3. Results

In total, 296 women fulfilled the strict criteria for TOA and were treated at a study hospital between 2005 and 2012. The mean age of the study group was 34.5 ± 10.3 years and the mean gravidity was 4.1 ± 1.7 (Table 1). The mean TOA size was 6.4 ± 2.9 cm.

Seventy-six (25.7%) patients underwent surgical treatment because of failed antibiotic therapy. Of these, 7 (9.2%) patients had surgical complications (Table 2). The mean abscess size was larger among patients who required surgical treatment (8.7 ± 3.5 cm versus 5.6 ± 2.2 cm, $P < 0.001$) (Table 3). Moreover, on admission, fever was more common and the CRP level and the ESR were higher among patients who required surgical treatment. The mean white blood cell (WBC) count was similar between the groups.

The areas under the ROC curves for CRP level, ESR, and WBC count (Fig. 1A–C) were 0.73, 0.87, and 0.58, respectively. The ROC analysis indicated the usefulness of CRP level, ESR, and leukocyte count to predict the outcome of TOA treatment with antibiotics (Table 4).

Of the 296 patients, 213 (72%) had a TOA of 7 cm or less in size, and 83 (28.0%) had a TOA of more than 7 cm. The demographic and clinical characteristics of these 2 groups were similar (Table 5). However, the mean CRP level and the ESR were higher among women with a TOA size of more than 7 cm than among those with a smaller abscess ($P < 0.001$ for both comparisons). The mean WBC counts were similar ($P = 0.81$). The need for surgery and the rate of surgery-related complications were higher among women with a TOA size of more than 7 cm ($P = 0.001$ and $P = 0.03$, respectively). The mean duration of hospital stay in the 2 groups was significantly different (8.0 ± 2.9 days among women with a TOA size of 7 cm or less vs 12.8 ± 3.8 days among women with a TOA size of more than 7 cm; $P < 0.001$).

The estimated area under the ROC curve for TOA size (Fig. 1D) was 0.77. According to the ROC analysis, the TOA size cut-off value for surgery was 6.5 cm. The sensitivity and specificity values for predicting the outcome of surgery using this cut-off point are shown in Table 4.

Twenty-five (8.4%) patients were postmenopausal. Mean TOA size, CRP level, and ESR were similar between the non-menopausal and the postmenopausal groups (Table 6). The need for surgery was more

Table 1
History and sociodemographic characteristics of the study population (n = 296).[a]

Characteristic	Value
Age, y	34.5 ± 10.3
BMI[b]	27.9 ± 3.0
Tobacco use	112 (37.8)
Alcohol use	22 (7.4)
Gravidity	4.1 ± 1.7
Parity	2.4 ± 1.3
Menopause	25 (8.4)
Diabetes mellitus	16 (5.4)
Use of IUD	59 (19.9)
History of tubal ligation	13 (4.3)
Previous pelvic surgery	99 (33.4)
Condom use	121 (40.9)
History of curettage	33 (11.1)
TOA >7 cm	83 (28.0)
TOA diameter, cm	6.4 ± 2.9
TOA location	
Right-sided	110 (37.2)
Left-sided	105 (35.5)
Bilateral	81 (27.4)
CRP level, mg/L	19.0 ± 14.6
ESR, mm/h	49.8 ± 34.6
WBC count	16 195.09 ± 6072.06
Fever (38 °C or more)	73 (24.7)
Antibiotic regimen	
Gentamicin + clindamycin	215 (72.6)
Cephalosporin+metronidazole	
81 (27.4)	
Requirement of surgery	76 (25.7)
Surgery-related complication	7 (9.2)
Length of hospital stay, d	9.1 ± 3.6

Abbreviations: BMI, body mass index; CRP, C-reactive protein; ESR, erythrocyte sedimentation rate; IUD, intrauterine device; TOA, tubo-ovarian abscess; WBC, white blood cell.
[a] Values are given as mean ± SD or number (percentage).
[b] Calculated as weight in kilograms divided by the square of height in meters.

Table 2
Surgery type and complications among women with tubo-ovarian abscess.[a]

Parameter	Laparotomy (n = 48)	Laparoscopy (n = 28)
Surgery type		
Drainage only	9 (18.8)	16 (57.1)
Unilateral salpingo-oophorectomy	17 (35.4)	8 (28.6)
BSO	3 (6.3)	3 (10.7)
Subtotal hysterectomy + BSO	5 (10.4)	0 (0.0)
Total hysterectomy + BSO	14 (29.2)	1 (3.6)
Complications		
Bladder injury	3 (6.3)	2 (7.1)
Rectosigmoid injury	1 (2.1)	0 (0.0)
Ureteral injury	0 (0.0)	2 (7.1)

Abbreviation: BSO, bilateral salpingo-oophorectomy.
[a] Values are given as number (percentage).