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Routine Surgical Drainage in Tubo-ovarian Abscess: Single Center Experience with Fifty Patients

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Abstract

Backround: Current data concerning the role of routine surgical drainage on patient outcomes and surrogate markers of infection in patients with tubo-ovarian abscess (TOA) is limited. The present retrospective study purposed to identify the impact of routine surgical drainage on patients' outcomes and postoperative leukocyte count, CRP level and procalcitonin level which might improve our understanding on the role of surgical drainage on infectious process in patients with TOA.

Materials and Methods: Fifty patients admitted to our institute (tertiary center) with TOA and underwent surgical abscess drainage were enrolled in this retrospective analysis. Demographic data, laboratory measurements during hospitalization, antibiotherapy and operation details were obtained from institutional electronic database. Perioperative complications were also derived from the institutional database.

Results: The most common microorganisms isolated from the abscess fluid cultures were Klebsiella pneumonia (20%), *Enterobacter aerogenes* (16 %) and *Escherichia coli* (16 %). The mean time from admission to antibiotherapy was 0.6 ± 0.2 days and time from admission to surgery was 3.2 ± 2.8 days. Time from admission to surgical drainage was 3.2 ± 2.8 days. Compared to admission values, the post-surgery (at 48th hour) leukocyte count (15.3 ± 7.1 x103/mm3 vs. 12.4 ± 5.2 x103/mm3, $p < 0.001$), CRP (48.4 ± 35.3 mg/L vs. 9.8 ± 3.5 mg/L, $p < 0.001$) and procalcitonin levels (2.2 ± 1.8 µg/L vs. 1.1 ± 0.8 µg/L, $p < 0.001$) were significantly lower. The overall complication rate was 8 %.

Conclusions: Routine TOA drainage leads to a significant decline in levels of infectious markers such as leukocyte count, CRP and procalcitonin levels, within 48 hours of the surgery. Routine surgical abscess drainage appears as a safe and effective way of treating patients with TOA.

Key words: *Tubo-ovarian abscess, surgical drainage, C-reactive protein, procalcitonin.*

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Introduction

Tubo-ovarian abscess (TOA) is an infectious mass of the adnexa and is a late complication of un-treated pelvic inflammatory disease. Although the clinical presentation is widely variable, adnexal mass, fever, elevated white blood cell count and lower abdominal-pelvic pain are almost always accompany a TOA (1, 2). Previous data has shown that about 20 % of cases hospitalized for pelvic inflammatory disease were found to have a TOA (3-6). Therefore the etiology and the underlying conditions are frequently similar to that of the pelvic inflammatory disease.

Besides detailed physical examination and laboratory measurements including leukocyte count, erythrocyte sedimentation rate and C-reactive protein (CRP), imaging studies with either ultrasound or contrast enhanced computed tomography (CT) of the pelvis aid the diagnosis of TOA (7, 8). Although CT is somewhat superior to ultrasound concerning sensitivity, its low-cost and lack of exposure to ionizing radiation made ultrasonography the ideal imaging method for TOA diagnosis. Conservative management with antimicrobial agents is the first line treatment in TOA and surgery is reserved for cases resistant to antimicrobial treatment or for those with suspected TOA rupture (9, 10).

Despite new imaging techniques and improvement in antibiotherapy, due to the potentially lethal nature of TOA, many gynecologists do not hesitate to schedule their patients for early surgical drainage. However, data concerning the role of routine surgical drainage on patient outcomes and surrogate markers of infection is limited (11).

The present retrospective study purposed to identify the impact of routine surgical drainage on patients outcomes and postoperative leukocyte count, CRP level and procalcitonin level which might improve our understanding on the role of surgical drainage on infectious process in patients with TOA.

Materials and methods

Fifty patients admitted to our institute (tertiary center) with TOA and underwent surgical abscess drainage between January 2017 and February 2019 were enrolled in this retrospective data analysis. All procedures performed were in accordance with the ethical standards of the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Clinical diagnosis of TOA was confirmed by ultrasonography on admission. Demographic data, laboratory measurements during hospitalization, antibiotherapy and operation details were obtained from institutional electronic database. Perioperative complications were also derived from the institutional database. Impact of the surgical drainage on the change in leukocyte count, C-reactive protein (CRP), and procalcitonin from admission to the postoperative period was the primary outcome measure.

Statistical analysis

All statistical analyses were performed using the Statistical Package for Social Sciences (SPSS) version 15.0 (SPPS, Chicago, IL). Continuous variables were presents as means ± standard deviation and the categorical variables were presented as numbers and percentages. Shapiro-Wilk test was used to determine whether or not the variables were distributed normally. Change in CRP and procalcitonin from admission to the postoperative period was analyzed using paired samples t-test. A p-value < 0.05 was considered to indicate statistical significance.

Results

Demographic and clinical features of the study population are presented in Table 1. The mean age, body mass index, gravidity and parity of the participants were 36.8 ± 14 years, 30.1 ± 4.1 kg/m2, 2.8 ± 1.4, and 2.1 ± 1.1, respectively. Seventeen (34%) of the participants were nullipar and 33 (66%) were multipar. The mean fewer on presentation was 37.9 ± 1.1 ºC degrees and lower abdominal pain was present in 84 % of the patients. The most common microorganisms isolated from the abscess fluid cultures were *Klebsiella pneumonia* (20%), *Enterobacter aerogenes* (16 %) and *Escherichia coli* (16 %).

Table 1. Patient characteristics and admission laboratory measurements.

Patient characteristics and admission laboratory measurements	**Mean (Min-Max)**
Age, years	36.8 ± 14 (19-89)
Gravidity, n	2.8 ± 1.4 (0-6)
Parity, n	2.1 ± 1.1 (0-5)
BMI, kg/m^2	30.1 ± 4.1 (23-42)
Ultrasonographic size, cm	5.8 ± 1.2 (3-9)
Fever, ºC	37.9 ± 1.1 (36- 40)
Lower abdominal pain, n	42 (84 %)
C-reactive protein, mg/L	48 ± 35 (2-560)
Procalcitonine, µg/L	2.2 ± 1.8 (0-12.6)
Leukocyte count, $x10^3/mm^3$	15.3 ± 7.1 (1.7-35.9)

The mean time from admission to antibiotherapy was 0.6 ± 0.2 days and time from admission to surgery was 3.2 ± 2.8 days. Time from admission to surgical drainage was 3.2 ± 2.8 days. The length of hospital stay was 10.3 ± 7.8 days. During their hospitalizations 29 (58 %) patients received gentamicin + clindamycin based antibiotic regimen and 21 (42 %) patients received cephalosporin + metronidazole based antibiotic regimen. The overall complication rate was 8 % consisting of severe bleeding in 4 subjects (8 %), gut injury in 1 subject (2 %) and bladder injury in 1 subject (2 %) which were treated with blood transfusions and primary suturing (Table 2). No mortality occurred during the in-hospital course.

Compared to admission values, the post-surgery (at 48th hour) leukocyte count (15.3 ± 7.1 vs. 12.4 x103/mm3 ± 5.2 x103/mm3, $p < 0.001$), CRP (48.4 ± 35.3 mg/L vs. 9.8 ± 3.5 mg/L, $p < 0.001$) and procalcitonin levels (2.2 ± 1.8 µg/L vs. 1.1 ± 0.8 µg/L, $p < 0.001$) were significantly lower (Table 3).

Table 2. Clinical features, timing of surgery and postoperative complications.

	Mean (Min-Max)
Culture results	
Escherichia coli, n %	8 (16 %)
Pseudomonas spp, n %	3 (6 %)
Streptococcus agalactiae, n %	6 (12 %)
Klebsiella pneumonia, n %	10 (20 %)
Enterobacter aerogenes, n %	8(16 %)
Staphylococcus aureus, n %	6 (12 %)
Other microorganisms, n %	9 (18 %)
Time from hospitalization to antibiotic treatment, days	0.6 ± 0.2 (0-2)
Length of antibiotherapy, days	9.1 ± 4.4 (3-21)
Antibiotic regimen	
Gentamicin + clindamycin, n %	29 (58 %)
Cephalosporin+metronidazole, n %	21 (42 %)
Time from hositalization to surgery, days	3.2 ± 2.8 (1-11)
Type of surgery	
Abscess drainage (Laparoscopic), n %	11 (22 %)
Abscess drainage (Open), n %	39 (78 %)
Length of stay, days	10.3 ± 7.8 (2-52)
Total complication rate	4 (8%)
Bleeding requires transfusion	2 (4 %)
Gut injury	1 (2 %)
Bladder injury	1 (2 %)

Table 3. Laboratory measurements prior to and 48 hours after surgical drainage.

	On Admission	**Postoperative 24th hour**	**P value**
Leukocyte count, x10^3/mm^3	15.3 ± 7.1	12.4 ± 5.2	< 0.001
C-reactive protein, mg/L	48.4 ± 35.3	9.8 ± 3.5	< 0.001
Procalcitonine, µg/L	2.2 ± 1.8	1.1 ± 0.8	< 0.001

Discussion

Tubo-ovarian abscess is rare but potentially lethal complication of pelvic inflammatory disease. Although both antibiotherapy and surgery are valid options in treatment of TOA, evidence regarding the efficacy of routine surgical drainage is not clear. This study, which is a retrospective analysis of 50 patients with TOA, demonstrates that abscess drainage with either laparoscopic or open technique leads to a significant decline in levels of infectious markers such as leukocyte count, CRP and procalcitonin levels, within 48 hours of the surgery. Routine surgical abscess drainage appears as a safe and effective way of treating patients with TOA.

Similar to the pelvic inflammatory diseases, tubo-ovarian abscess is frequently a disease of the reproductive age (12). Post-menopausal TOA is extremely rare. In this study, the mean age of the women with TOA was 36.8 ± 14 which is consistent with the previous reports. In addition, multiparity is another risk factor for development of TOA. A retrospective

study conducted in Northern Taiwan revealed that the risk for further development of TOA was significantly higher in multiparous compared to that of the nulliparous (13). Our findings support the previous data, as majority of our patients population was consisting of multiparous women.

Fever and lower abdominal pain are the most common presenting symptoms and signs of patients with TOA. Lower abdominal pain exists in almost 90 % of patients present with TOA. In our study, the prevalence of lower abdominal pain at presentation was 84 % which is close to the abdominal pain rate reported in previous research. The mean body temperature of the patients with TOA in our study was 37.9 ± 1.1. Therefore, we suggest that in addition to a comprehensive and detailed physical examination, an imaging modality such as ultrasonography or contrast enhanced CT should be utilized in patients presenting with lower abdominal pain and fever, to diagnose TOA.

Traditional information concerning the causative microorganisms for pelvic inflammatory disease indicate Escherichia coli, Bacteroides fragilis and other Bacteroides species as the most common causative agents for TOA (14). However, the most common causative microorganisms isolated from the abscess fluid cultures in our study were Klebsiella pneumonia, Enterobacter aerogenes and Escherichia coli. We consider that causative microorganism might be variable due to the underlying condition which leads to the development o TOA.

Mainly two antibiotic regimens, gentamicin + clindamycin based antibiotic regimen and cephalosporin + metronidazole based antibiotic regimen were employed in this study. However, since we have scheduled all patients with TOA for surgical abscess drainage, we cannot provide information concerning the association between patient outcomes and its relation with antimicrobial treatment alone. Nevertheless, patients undergoing surgical drainage received the proper antimicrobial agents throughout their hospitalizations. Patients enrolled in this study underwent routine surgical drainage at a mean duration of 3.2 ± 2.8 days after hospitalization. Surgical drainage of TOA led to a significant decline in preoperative leukocyte count, CRP and procalcitonin levels which are traditionally used to monitor the severity of the infection and response to treatment (6, 15, 16). The overall complication rate which was recorded as 8 % in our study is lower than the reported complication rate in several previous studies which showed a complication rate up to 40 % (12, 17). In addition, the length of hospital stay which was 10.3 ± 7.8 days in our study was lower compared to the hospital stay reported in previous studies (18, 19).

With this background in mind, given the low response rate to antibiotics in patients with TOA, we speculate that routine surgical drainage is a safe, rapid and reliable technique in treatment of patients with TOA. The overall complication rate with surgical drainage is low and response to surgery indicated by postoperative decline in leukocyte count, CRP and procalcitonin levels is satisfying. Therefore, surgical drainage of the abscess in patients presenting with a TOA might be preferred as the first line treatment in addition to the simultaneous initiation of the proper antimicrobial agents.

The present study has some limitations to be discussed. First, the retrospective nature of this study limits to provide information concerning the treatment with antimicrobial agents alone. In our institute, the established treatment policy for patients presenting with a TOA is scheduling the patients to surgical drainage as soon as possible. Therefore, we could not provide information regarding the efficacy of the treatment with antimicrobial agents alone. Second, CT and ultrasound guided drainage of the TOA is popular in many centers (20-

22). However, CT or ultrasound guided TOA drainage is reserved for patients who are unable to undergo laparoscopic or open drainage, thus, only a minority of patients undergo CT or ultrasound guided TOA drainage which makes us unable to conclude on the efficacy of these techniques.

Conclusion

Tubo-ovarian abscess is a rare but potentially lethal complication of pelvic inflammatory disease. Timing and indications of surgery varies between gynecologists. Although, treatment with antibiotics is recommended as the first line treatment by some authors, it is well known that many of the patients receiving antibiotics require surgical treatment despite adequate antimicrobial regimens. Our findings show that routine surgical drainage provides a significant decline in surrogate markers of infection with an acceptable rate of complications. Hence, we suggest that surgical drainage of the abscess in patients presenting with a TOA might be preferred as the first line treatment in addition to the simultaneous initiation of the proper antimicrobial agents.

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