

2021

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### Recommended Citation

Serbanescu, Lucian; Badiu, Diana; Popescu, Stere; Busu, Dimitrie; and Costea, Andreea Cristina (2021) "The management of tubo-ovarian abscesses associated with appendicitis," *Journal of Mind and Medical Sciences*: Vol. 8 : Iss. 2 , Article 16.

DOI: 10.22543/7674.82.P280285

Available at: <https://scholar.valpo.edu/jmms/vol8/iss2/16>

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# The management of tubo-ovarian abscesses associated with appendicitis

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## ABSTRACT



A relatively uncommon medical complication, the tubo-ovarian abscess (TOA) can result from ascending pelvic infection in the female genital tract. The paper aims at exploring the characteristics of patients with TOA and at comparing the outcomes of the surgical management with postoperative recovery. A retrospective analysis of 25 cases diagnosed with bilateral, right or left TOA at “St. Apostol Andrei” Emergency Clinical County Hospital Constanta, Romania between January 2019 and December 2020 was performed. The patients’ clinical characteristics, age, environment of origin, socio-economic background, educational level, the means of contraception used, surgical procedures, and postoperative recovery were analyzed. Out of the 25 cases, 40% presented bilateral TOA, 32% right TOA and 28% left TOA and left adnexectomy. In 3 patients (37.5%) with right TOA, appendectomy was also performed. In 72% of the cases, a median pubic-umbilical incision was performed. The remaining 7 patients (28%) with left TOA underwent Pfannenstiel incision. All cases had a favorable postoperative evolution, the patients being discharged 5-9 days after surgery, benefiting from antibiotic therapy 10 days after their discharge. The co-existence of appendicitis and adnexal pathology should raise awareness for adopting a surgical strategy in order to prevent postoperative complications.

**Category:** Original Research Paper

**Received:** March 15, 2021

**Accepted:** July 12, 2021

**Published:** October 10, 2021

**Keywords:**

tubo-ovarian abscess, adnexectomy, pubic-umbilical, appendectomy

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## Introduction

Tubo-ovarian abscesses (TOA) represent an inflammatory disease in which the ovaries or the tubes are involved [1]. The main cause is the upper genital tract infection and, in some cases, involving other organs, such as the bowel or the bladder [2]. When clinical features are associated with the presence of inflammatory markers or radiologic/ ultrasonography findings, the diagnosis can be made. Interestingly, the treatment is basically surgical and it involves total hysterectomy [3]. Therefore, it was seen that the management of TOA has undergone several changes over the last decades on the importance of antibiotics, along with improved drainage and image performances. Some studies revealed a 16 to 95% success rate with conservative treatment, in contrast with the surgical ones [3]. In this context, the surgical management can be achieved, considering the best optimal time,

although potential consequences may include infertility, risk of ectopic pregnancy or pelvic pain [4,5].

Although some authors promoted the conservative treatment indicating only antibiotic therapy, our experience in surgical therapy achieved by the mixed team, revealed an optimal solution for these cases, without negative long-term consequences. With this in mind, the purpose of our paper was to study the clinical characteristics of patients with bilateral, right or left TOA and to compare the outcomes of surgical management with postoperative recovery.

## Materials and Methods

A retrospective study was carried out on patients with TOA symptomatology admitted to “St. Apostol Andrei” Emergency Clinical County Hospital Constanta, Romania from January 2019 to December 2020. The approval of

Ethics Committee from “St. Apostol Andrei” Emergency Clinical County Hospital and the informed consent of patients were obtained.

The study population consisted of all the women who came to the Obstetrics and Gynecology Department with a history of abdominal lump. The patients’ clinical characteristics, age, the environment of origin, the socio-economic background, the educational level, the means of contraception used, surgical procedures, and postoperative recovery were analyzed. The diagnoses were made clinically and by means of ultrasound, including abdominal-pelvic computed tomography. All patients were young, without any comorbidities. The management plan includes the surgical interventions (adnexectomy and appendicectomy) and the length of hospitalization along with antibiotics.

#### Statistical analysis

The patients’ general clinical characteristics were analyzed using descriptive statistics.

## Results

We included 25 patients with different characteristics in this retrospective study. The diagnoses were made clinically and by means of ultrasound and abdominal-pelvic computed tomography.

Out of the 25 cases, 10 patients (40%) had bilateral TOA and bilateral adnexectomy, 8 patients (32%) had right TOA and right adnexectomy and 7 patients (28%) had left TOA and left adnexectomy. In 3 patients (37.5%) with right TOA, appendicectomy was also performed. Out of the 3 patients (12%) aged between 18-25 years, 2 patients used condoms as a means of contraception and 1 patient used combined oral contraceptives (COCs); the 3 patients (12%) aged between 25-30 years used COCs and 14 patients (56%) aged between 30-35 years used intrauterine device (IUD); out of the 5 patients (20%) aged more than 35 years, 1 patient used COCs and 4 patients did not use any means of contraception. In 18 patients (72%) (10 with bilateral TOA, and 8 patients with right TOA), a median pubo-umbilical incision was performed. For the remaining 7 patients (28%) with left TOA, Pfannenstiel incision was made.

According to the geographic distribution, 15 patients (60%) came from urban areas (patients with right and left TOA) and 10 (40%) from rural areas (all patients with bilateral TOA).

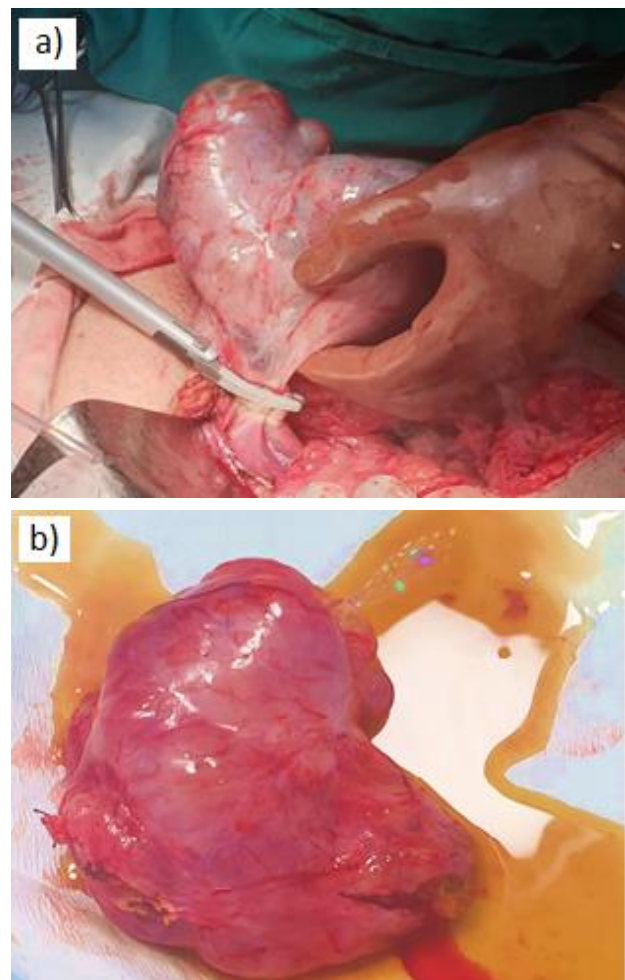
A number of 12 patients were admitted to the emergency department during the COVID-19 pandemic. In these cases, strict regulations to prevent the intrahospital transmission of Sars-Cov-2 infection were followed [5,6]. The patients were tested for COVID-19 upon admission through PCR testing and they were considered possible suspects until a negative result was confirmed. Social distancing, personal protective equipment and frequent

disinfection of the surfaces were respected, taking all the measures required to protect against COVID-19 infection.

Regarding the socio-economic background, the patients were divided as follows: 17 patients (68%) with poor living conditions (patients with bilateral and right TOA), 6 patients (24%) (patients with right and left TOA) with good living conditions and 2 patients (8%) with very good living conditions (patients with left TOA).

Furthermore, dividing patients according to their educational level, the results were as follows: 5 patients (20%) without secondary education (primary classes with bilateral TOA), 13 patients (52%) with secondary education (high school) (being patients with bilateral and right TOA) and 7 patients (28%) with higher education (all patients with left TOA).

From the 8 cases (32%) of right TOA, 3 underwent associated appendicectomy. The mixed team of surgeons and gynecologists considered that it was necessary to perform appendicectomy. The intraoperative adhesions were large adherences in 13 patients, medium adherences in 7 patients and numerous adherences in 5 patients with the involvement of the omentum, intestinal loops, appendix and the abdominal wall.



**Figure 1** (a, b). Tubo-ovarian abscess with distorted anatomy of the fallopian tube; a) intraoperative aspect; b) resection piece, purulent liquid content evacuation.

All cases had a favorable postoperative evolution, the patients being discharged 5-9 days after surgery, undergoing antibiotic therapy for 10 days after discharge.

All patients benefited from a "case cooling" with antibiotic therapy (triple therapy: cephalosporin, gentamicin and metronidazole), for 24-72 hours, depending on each case. As a clinical picture, all cases presented pelvic-abdominal pain and leukocytosis, 14 patients with low-grade fever, 3 patients with fever, 5 patients with nausea and vomiting and 3 patients with diarrhea. A comprehensive preoperative anesthetic and surgical evaluation was performed, and associated comorbidities were compensated -if necessary- under medical treatment, respecting the therapeutic principles of safe surgery [7].

## Discussions

Although TOA represents the outcome of an upper genital tract infection, the infection could rapidly spread into the fallopian tube, which could result in an inflammatory response [8]. The main risk factors for TOA are any history of pelvic inflammatory disease, the presence of an IUD, multiple sexual partners, age over 25 years, low economic status, pyelonephritis or appendicitis [9].

Recent studies have shown that the use of a copper IUD for a period of more than 5 years could represent a major risk factor [10,11]. In our study, the bilateral TOA can incriminate the use of IUD (all 10 patients with bilateral TOA and 4 patients with right TOA).

The most appropriate method for TOA diagnostic purposes is transvaginal ultrasound [12]. Some studies [13] found that the sensitivity of ultrasound was much lower than reported in the literature reviews, and that this technique may not be enough for the final diagnosis. Therefore, in some special cases, a secondary technique such as computed tomography can be initiated. To this regard, when a right-TOA should be differentiated from acute appendicitis, it can represent a challenge for both the obstetrician and the surgeon [14]. A computed tomography feature of appendicitis can show a thickened cecal wall, and an abnormal appendix. Therefore, TOA can mimic appendicitis involving the inflammation of the appendix [15].

Our retrospective study over a 1-year period evaluated 25 patients with bilateral, right and left TOA, out of which 3 also had appendicitis. Appendectomy was performed on the patient with right TOA, and a median pubo-umbilical incision was made. Moreover, patients had urinary tract infection, especially with *E. coli* from cervical cultures in appendectomized patients compared to non-appendectomized patients. Moreover, it seems that the evolution of the abscess was faster in these patients, which

led to surgery, having an extensive loco-regional evolution together with the debility of the immune system.

For the beginning, a mixed intravenous antibiotic which should cover the common pathogens is intended. The most important treatment should be based on the ability to penetrate the affected areas and remain active in both the abscess cavity and inflamed or necrotized appendix [16]. The use of clindamycin, metronidazole and cefoxitin showed a better penetration into cavities [17]. In our study, we used triple therapy based on cephalosporin, gentamicin and metronidazole for 24-72 hours. Another study [18] showed the efficacy of a single-agent broad spectrum such as cefoxitin in conjunction with doxycycline on 119 women with TOA. McNeeley and co. [19] showed that when clindamycin and gentamycin were used, the efficacy was only 47%.

For the better understanding of the female tract infections, two principles are important. The first is represented by the fact that the pathogens causing genital tract infections come from the vaginal or cervical microflora. The second principle supports the fact that the polymicrobial etiology is the cause of pelvic infections [19].

The content of TOA is represented mostly by the anaerobic, aerobic and facultative flora. Anaerobic flora is isolated in approximately 50% of the cases. Other microorganisms include *E. coli*, *Bacteroides fragilis*, *Bacteroides* species, and peptococci [20].

The abdominal examination commonly elicits lower abdominal tenderness with or without guarding. The vaginal examination often demonstrates mucopurulent cervico-vaginal discharge, cervical motion tenderness, and adnexal tenderness and, sometimes, the suspicion of an adnexal mass, which is difficult to ascertain when the pain usually precludes an adequate bimanual examination.

Regarding the socio-economic background and the educational level, the higher level of patients with bilateral TOA was from rural areas and had poor living conditions. It is important that TOA should be well differentiated from appendicitis, considering the fact that an incorrect diagnosis can change the whole management. Nowadays, the recommendations for the initial treatment of TOA are represented by antibiotics which should cover *N. gonorrhoeae*, or anaerobes, drainage and conservative surgery, such as adnexectomy. Cytokines IL-6 and IL-1 $\beta$ , have been connected with the elevated Hep expression secondary to inflammation in a wide variety of pathological conditions [21]. These are pro-inflammatory cytokines, which play an important role in the pathogenesis of PID in patients [22]. There is evidence that IL-1 $\beta$  action is mediated by nucleotide-binding domain-like receptor protein 3 (NLRP3) inflammasomes [23-25].

Conservative medical management could be attempted, but the failure rate of antibiotic therapy remains higher in patients with a larger abscess, exceeding 5.5 cm

[26]. The laparoscopic approach may be used, and besides the well-known advantages of the minimal invasive approach – it involves less pain, early recovery, shorter hospital stays and decreased wound related complications [27], along with the advantage of organ-preserving surgery, extremely important in women at a childbearing age [28,29]. However, surgeries for tubo-ovarian abscesses can be very complicated because of the extensive intrapelvic adhesions and surrounding necrotic and inflamed tissues [30]. In these cases, an open surgery approach may be more adequate.

Moreover, when the size of TOA is larger, the patients are more likely to be readmitted to the hospital in the first 6 months, representing an important factor for the hospital stay. In fact, it is considered that every cm in the size of TOA will lead to approximately a 6% increase in the duration of hospitalization [31]. In our study, all patients had a favorable postoperative evolution, all being discharged 5-9 days after surgery, benefiting from antibiotic therapy for 10 days after discharge. Some studies incriminate the low socio-economic and educational level of patients as an etiological factor of TOA [32].

Within our group, the distribution of patients was homogeneous, not describing any change in the incidence depending on the socio-economic or educational level. The incidence was higher in patients between 30-35 years of age carrying an IUD. We mainly chose the pubo-subumbilical incision line, because these interventions are often difficult, both due to the important adhesion syndrome and the multitude of organs that can participate in the formation of the abscess block.

In all cases, we encountered adhesion syndrome; in about 5 of the cases (20%) it was important along with the involvement of the omentum, intestinal loops, appendix and abdominal wall. Careful adhesiolysis, followed by surgical sanction, abundant lavage and drainage were basic elements in approaching and solving these complex cases, due to the consistency of the tissues involved.

Adnexectomy was always necessary, because in these cases there is an important disorganization of the ovarian and tubal architecture, practically no longer being able to make a clear identification of the different structures. About 11 of the 25 patients had a history of pelvic inflammatory disease, which represents the most important etiological factor in the occurrence of TOA.

## Conclusions

The surgical therapy of TOA frequently also involves appendicectomy. The condition often involves the participation of neighboring organs in the formation of the abscessed block, the mixed team of surgeons and gynecologists being the solution for the mixed therapy of these cases.

Therefore, our study aims at warning against the existence of an appendix along with adnexal pathology, especially TOA and the need for the early implementation of the possible surgical strategy in order to prevent postoperative complications.

## Conflict of interest disclosure

There are no known conflicts of interest in the publication of this article. The manuscript was read and approved by all authors.

## Compliance with ethical standards

Any aspect of the work covered in this manuscript has been conducted with the ethical approval of all relevant bodies and that such approvals are acknowledged within the manuscript.

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