

Staphylococcus aureus as Pelvic Inflammatory Disease and Tubo-Ovarian Abscess Pathogen

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Abstract

Tubo-ovarian abscess is typically the end result of pelvic inflammatory disease. Although most are associated with recent or concomitant sexually transmitted infections, cases of non-sexual tubo-ovarian abscesses are documented. However, most cases occur with pathogens typically associated with lower genital tract infections, such as *Escherichia coli*. We present a unique case of a non-sexual tubo-ovarian abscess with an intrauterine device *in utero* caused by *Staphylococcus aureus* presenting as an acute surgical abdomen. Our case highlights that not all tubo-ovarian abscesses are linked to a sexually transmitted infection and may occur after potential introduction of bacteria into the upper genital tract resulting from intrauterine device placement.

Keywords: Benign disease; Ovary and fallopian tubes; Infections; Gynecologic imaging; Tubo-ovarian abscess

Introduction

According to the Centers for Disease Control and Prevention (CDC), pelvic inflammatory disease (PID) has a self-reported lifetime prevalence of 4.4% in women who are or have been sexually active [1]. While PID has traditionally been associated with sexually transmitted infections such as *Neisseria gonorrhoeae* (*N. gonorrhoeae*) and *Chlamydia trachomatis* (*C. trachomatis*), there are cases of non-sexual PID resulting in tubo-ovarian abscess (TOA) formation seen in clinical practice and in published literature [2]. According to the CDC, the proportion of PID cases attributed to *N. gonorrhoeae* and *C. trachomatis* is decreasing, with a higher odds ratio of infections being linked to vaginal flora [1]. Risk factors for the development of non-sexual

PID have included douching and recent uterine instrumentation such as intrauterine device (IUD) placement, although the risk of disease has previously been described as being limited to the first few weeks after IUD insertion. Our case of a non-sexual TOA caused by *Staphylococcus aureus* emphasizes the importance of considering the possibility of atypical genital tract pathogens in the case of large TOAs.

Case Report

Investigations

A 27-year-old woman (gravida 1, para 1) presented to the emergency department with abdominal pain over the previous 2 days. She denied fever, vaginal discharge, history of prior sexually transmitted infections, and bowel or bladder symptoms. Her last menstrual cycle was 2 years prior when a levonorgestrel intrauterine system (LNG-IUS) was placed. She was sexually active with the same partner for over 2 years. She was diagnosed with systemic lupus erythematosus (SLE) and juvenile rheumatoid arthritis at age 16 but was without disease flare for over 1 year. She was not on any medications.

Her temperature was 37.5 °C on presentation, blood pressure of 110/50 mm Hg, and pulse of 99 beats per minute. Initial complete blood count showed leukocytosis at $11.7 \times 10^9/L$. A urine pregnancy test was negative. A physical exam revealed cervical motion tenderness, uterine tenderness, and adnexal tenderness; the abdomen was rigid with rebound/guarding. No cervicovaginal discharge was noted.

Diagnosis

Transvaginal ultrasound revealed a $7.2 \times 5.6 \times 6.3$ cm left adnexal complex mass. Vascular Doppler flow to the adnexa revealed hypervascularity. The IUD was visualized *in utero*. Due to suspicion of either acute adnexal torsion or cystic mass rupture, the patient was taken for surgical evaluation. Due to the size of the mass, a Pfannenstiel laparotomy was performed. A highly edematous and suppurative left adnexa was noted. At the infundibular portion of the fallopian tube, tubal rupture was noted with purulent drainage into the posterior *cul-de-sac*. A left salpingo-oophorectomy was performed, and the pelvis was copiously irrigated. The specimen was sent for anaerobic and aerobic culture. Pathological study of the excised adnexa

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confirmed acute suppurative salpingitis with peri-ovarian abscess. Adnexa culture identified *Staphylococcus aureus* pan-sensitive to antibiotic testing. Admission vaginal nucleic acid swabs were negative for *N. gonorrhoeae* and *C. trachomatis*. Vaginitis DNA-polymerase chain reaction testing was also negative for *Gardnerella*, *Candida*, and *Trichomonas*.

Treatment

She was started on intravenous cefoxitin and metronidazole as well as oral doxycycline postoperatively. The LNG-IUS was left *in utero*. We elected for surgical management rather than a trial of empiric antibiotics initially due to the size of the mass (7 cm) and concern for mass rupture or torsion. Surgical intervention in the form of laparotomy was proposed to and accepted by the patient. Informed consent preoperatively addressed the possibility of abscess drainage at time of surgery and/or possible salpingo-oophorectomy. Intraoperatively, consideration was given to drainage of the abscess. However, the surgical team considered the possibility of provoking uncontrollable bleeding with abscess puncture and drainage due to severe inflammatory nature of the agglutinated abscessed tissue. This was also the reason why transcutaneous computed tomography (CT) or ultrasound-guided needle drainage was not pursued, although others have published success rates with that option [3, 4]. As stated by Kairys et al, “To date, no large-scale randomized controlled trials have been performed to help clarify the precise role of imaging-guided drainage procedures in the management of TOAs; therefore, at this time, the choice of surgery versus imaging-guided drainage should remain individualized and based on local expertise.” [5].

Ovarian conservation was not possible as severe tubal-ovarian agglutination existed. Unilateral salpingo-oophorectomy was elected with the goal of reducing the possibility of abscess recurrence with the potential requirement of future surgery. Published data have validated unilateral salpingo-oophorectomy as a reasonable and appropriate intraoperative intervention for unilateral TOA based on the patient’s clinical presentation, appearance of the mass, and surgeon expertise and clinical judgement [6].

Follow-up and outcomes

The patient remained afebrile after surgery and was discharged home on postoperative day 3 to continue a 14-day course of oral doxycycline. We allowed the LNG-IUS to remain *in utero*. This is in accord with published guidelines published by the CDC, which allow for the administration of antibiotics for TOAs with an IUD *in utero* with possible removal of the device if symptoms fail to resolve after 48 - 72 h. Our patient had clinical improvement after adnexal removal.

Discussion

Risk factors for PID/TOA include multiple sexual partners,

presence of IUDs, history of PID and immunosuppression [7]. The relationship between the use of an IUD and PID has been studied over the past 50 years [8]. Although the CDC states there is a small increased risk of PID associated with IUD use, the risk is “confined to the first three weeks after IUD insertion” [9]. However, case reports of non-sexually transmitted TOAs have been published in long-term IUD wearers raising the question whether those with IUDs remain at risk for indolent pelvic infections [10].

Nonetheless, published data are reassuring that, after the first 20 days from insertion, the number of new PID cases occurring per year in IUD users remains at a fairly constant low level (1.4 per 1,000 woman-years) [10]. Additionally, studies have suggested that the LNG-IUS may protect against upper genital tract infection by thickening cervical mucus [11].

TOAs are polymicrobial, with pathogens similar to those found in patients with uncomplicated PID [12]. Although *N. gonorrhoeae* and *C. trachomatis* may be detected on nucleic acid amplification testing of vaginal or cervical swabs in affected individuals, they are uncommonly cultured from TOAs. However, nucleic acid amplification tests of TOA aspirated material may be more effective for their identification [13].

Atypical pathogens related to TOAs have been reported. Actinomycosis is a rare cause of TOA and usually is found in women using IUDs. Eighty percent of cases of IUD-associated pelvic actinomycosis occur in women with IUDs *in situ* for at least 3 years [14]. Rare cases of TOAs caused by *Clostridium septicum* [12] and *Candida* have also been published [15]. *Staphylococcus aureus* is most commonly associated with dermal infections, such as impetigo, folliculitis or skin abscess. In gynecology, *Staphylococcus aureus* is remembered as the causative agent of toxic shock syndrome linked to women using “highly absorbent” tampons in the 1980s. However, its role and participation in PID/TOA is not well documented. A search of PubMed, MEDLINE, and Google Scholar using the keywords “Staph”, “*Staphylococcus aureus*”, “pelvic inflammatory disease”, and “tubal abscess” revealed only one other publication of *Staphylococcus aureus*-induced TOA [16]. In that case report, the authors describe a 40-year-old woman who presented with a right adnexal mass. Laparotomy revealed a large TOA due to *Staphylococcus aureus*. The only significant past medical history was a Cesarean section and bilateral tubal ligation 10 years prior to admission. The authors concluded, “The tubo-ovarian abscess, due to this unusual organism, may have developed insidiously over a 10-year period”.

We are unable to explain the inoculation of *Staphylococcus aureus* into the upper genital tract in this case, since typical risk factors were not present, and IUD insertion occurred 2 years prior to presentation. It is possible that the introduction of the bacteria occurred at device insertion with slow insidious disease progression until the time of acute presentation. It is possible that infection with a typical sexually transmitted infection had occurred but was no longer able to be detectable in cervicovaginal secretions due to the spontaneous resolution of lower tract infection. Theoretically, this would have facilitated upper tract infection. Similarly, the possibility of hematogenous spread from another site is a possibility; however,

no open wounds or sores were noted on the patient's physical examination. Lastly, the patient's SLE condition and immunocompromised state may have played a factor, although no recent disease activity flare was reported.

Learning points

Not all cases of PID/TOA are related to sexually transmitted infections. Additionally, the value of definitive surgical management in cases of acute/severe clinical manifestations of the disease is not only diagnostic but curative in cases of large suspected TOAs. Our case documents a rare etiological pathogen for upper female genital tract disease, *Staphylococcus aureus*. Healthcare providers should consider the possibility of atypical genital tract pathogens in cases of large TOAs or those presenting with signs/symptoms of severe disease.

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Financial Disclosure

None to declare.

Conflict of Interest

None to declare.

Informed Consent

Verbal informed consent was obtained from the patient by HC during the hospitalization for submission as a case report to a peer review journal.

Author Contributions

Hector Chapa, M.D. wrote 75% of the manuscript. Carley Hagar wrote 25% of the manuscript and performed the supporting literature search for cited references. Estefany Rueda Chavez assisted with proofreading, final editing, formatting, and editing in preparation for manuscript submission.

Data Availability

Any inquiries regarding supporting data availability of this study should be directed to the corresponding author. All patient information is located within the treating facility's secure

electronic medical record. The data supporting the findings of this study are available from the corresponding author upon reasonable request.

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