



## Levonorgestrel Intrauterine Device and *Escherichia coli* Sepsis

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### Abstract

Intrauterine Devices (IUD) are a reliable form of long acting reversible contraceptive. Currently, approximately 5%-10% of US women use IUDs as their preferred method of contraception. They have been associated with pelvic inflammatory disease when inserted at the time of acute cervicitis. Women with IUDs have been shown to have an increased risk of asymptomatic genitourinary bacterial colonization. In this particular case, a woman with a levonorgestrel IUD presents with nonspecific complaints of abdominal pain and ultimately meets criteria for sepsis. Another source could not be identified and her IUD is removed. The IUD is sent for culture and results are notable for *E. coli*. An endometrial biopsy notes acute and chronic endometritis as well as *E. coli*. This case highlights a unique source of sepsis in women with IUDs.

### Introduction

Sepsis is a life-threatening clinical state that can originate from a variety of sources of infection. Intrauterine devices (IUDs) have been associated with pelvic inflammatory disease (PID) when inserted in a setting of acute cervicitis, but rarely have IUDs been associated with sepsis [1]. In cases of sepsis without an identified origin, if the patient has an IUD, the providers should consider the IUD as a possible source. Providers may be hesitant to consider the IUD as a source when the patient has had the IUD for a number of years, but in this case the patient had the IUD for four years prior to presenting with signs and symptoms of sepsis. The following case is a report of a previously healthy 47-year-old woman presenting with non-specific symptoms and ultimately developing endometritis and sepsis with her levonorgestrel-IUD being identified as the source.

### Case Presentation

Patient is a 47-year-old G5P2032 who presented to the emergency department (ED) with complaints of right lower quadrant and back pain, chills, and emesis. Past medical history was non-contributory. She had a Mirena IUD in place for four years and had not been sexually active in three years. She had no history of sexually transmitted infections.

Upon arrival, she was febrile, tachycardic, tachypneic, and intermittently hypotensive with an elevated lactate and bacteremia, meeting criteria for SIRS.

An abdominal exam by the ER physician noted tenderness in the RLQ but was otherwise unremarkable. She received fluid resuscitation and acetaminophen for fever relief. Blood cultures were collected and a urinalysis did not reveal for concern for infection. Given concern for appendicitis, an abdominal CT was obtained. The abdominal CT was unremarkable and showed that the IUD was positioned correctly in the uterus. Given that her symptoms were most consistent with gastroenteritis and she was able to tolerate oral intake, the patient was discharged home from the emergency department (ED). The next day the blood cultures were found to be positive for gram-negative bacilli and the patient was called to return to the ED. She was admitted to the internal medicine service and started on IV piperacillin-tazobactam.

A source of infection could not be readily identified and considerations included a diverticular disease, urinary tract infection, pelvic inflammatory disease, tubo-ovarian abscess, or endometritis. Her urine culture was negative, tubo-ovarian abscesses were not evident on her pelvic ultrasound, and CT scan she had obtained in the ED did not reveal diverticular disease. Given that no other source could be identified, the Gynecology service was consulted. The gynecology attending performed a pelvic exam, which demonstrated no cervical motion tenderness, adnexal tenderness, or uterine tenderness. Based on the rare possibility that the IUD was the source of sepsis and it was removed and sent for culture. An endometrial biopsy (EMB) was obtained and sent for

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culture. Gonorrhea and chlamydia cultures were collected and found to be negative. The IUD, EMB, and blood cultures grew AmpC-beta lactamase producing *E. coli*. Antibiotics were narrowed to IV ceftriaxone. The patient improved clinically and was transitioned to oral cefdinir and discharged home. On follow-up, she was afebrile and had no complaints. She did not desire any contraception.

## Discussion

Genitourinary infections and sepsis due to modern IUDs are rare. IUDs commonly used today contain either copper (Cu-IUD) or levonorgestrel (LNG-IUD). The Dalkon Shield, famous in the 1980s for its increased spontaneous abortion rate and incidence of PID with rare fatal sepsis, was the last of its kind to produce such an obvious increased risk of infections. Current studies of IUDs and PID specifically show a transient increase in the risk of PID with the risk of PID 6-fold higher in the first month after IUD insertion than it is thereafter [2]. For women at low risk for STIs like the patient presented here, the risk of PID is comparable for IUD users and nonusers [2].

Asymptomatic *Actinomyces* has been associated with use of IUDs. An estimated 7% of women with IUDs *in situ* have pap smears positive for *Actinomyces* [3]. This patient never had *Actinomyces* reported on a pap smear. Longer duration of IUD use has been correlated with the presence of *Actinomyces* and this population presenting with symptomatic pelvic masses should produce a higher suspicion of an *Actinomyces* infection [3-5].

There are other causative agents of sepsis, toxic shock syndrome, hepatic abscesses, and recurrent urinary tract infections associated with IUDs. These include *S. pyogenes*, *N. meningitidis* type Y, *S. milleri* and extended-spectrum beta lactamase (ESBL) producing *E. coli* [6-11]. When compared with nonusers, IUD users are found to have increased incidence of asymptomatic genitourinary colonization with pathogens including ESBL *E. coli*, *Klebsiella*, and *U. urealyticum* [12,13].

As a solid structure, IUDs could provide a surface for bacterial and yeast attachment. One study involving women with and without genitourinary symptoms found *Candida spp* biofilms on the IUDs [14]. Another study involving only symptomatic women found 75% of the removed IUDs had biofilms with species including *E. coli*, *S. epidermidis*, *S. aureus*, *P. aeruginosa*, *N. gonorrhea*, and *Candida spp* [15]. However, these studies cannot determine causality between IUDs and genitourinary infections.

This patient had tolerated an IUD for four years with no recent sexual encounters or genitourinary infections. Symptoms were non-specific and had no obvious inciting event. High clinical suspicion with lack of another source of sepsis led to the removal and culture of the IUD, which ultimately revealed the IUD as the nidus of infection. This case highlights the need to keep in mind the rare pathogenic potential of IUDs.

## Conclusion

Providers should consider IUDs as rare sources of sepsis in patients presenting with an IUD *in situ*. Removal of the foreign body

is critical in controlling the source. A host of different bacteria may have colonized the IUD and therefore culture and directed antibiotic therapy is essential.

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