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Recommended Citation

Taylor GM, Erlich AH, Wallace LC, Williams V, Ali RM, and Zygowiec JP. A Tubo-Ovarian Abscess Mimicking an Appendiceal Abscess: A Rare Presentation of *Streptococcus Agalactiae*. *Oxf Med Case Reports* 2019; 2019(8).

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CASE REPORT

A tubo-ovarian abscess mimicking an appendiceal abscess: a rare presentation of *Streptococcus agalactiae*

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Abstract

A tubo-ovarian abscess (TOA) is a relatively rare medical complication that results from an untreated/unrecognized ascending pelvic infection of the female genital tract. In a right-sided TOA, this clinical entity may mimic appendicitis on computed tomography (CT). In addition, both disease processes can present with pelvic pain, leukocytosis and fever. We present the case of a 47-year-old female with mid right-sided abdominal pain that was diagnosed on CT scan with an appendiceal abscess. She underwent CT-guided percutaneous drainage with interventional radiology. On Day 8, a CT limited study involving a contrast injection was performed to evaluate for abscess resolution. The contrast within the drain filled the fallopian tube, endometrial cavity and contralateral fallopian tube. These findings demonstrated that the initial diagnosis actually represented a TOA. To the authors' knowledge, this is the only reported case involving a TOA secondary to *Streptococcus agalactiae* (GBS) mimicking an appendicitis with abscess formation.

INTRODUCTION

A tubo-ovarian abscess (TOA) is a potentially life-threatening inflammatory process and a true obstetrical and gynecological emergency. This disease process progresses from endometritis to salpingitis with eventual formation of an inflammatory mass, which encompasses both the fallopian tube and ovary. Failure to recognize a TOA can result in irreversible ovarian and tubal damage, abscess rupture, peritonitis and septic shock. As such, it requires prompt recognition and treatment.

CASE REPORT

A 47-year-old female with a significant past medical history of dysfunctional uterine bleeding and uterine leiomyomas pre-

sented to the ED with the chief complaint of upper and mid right-sided abdominal pain of 2 weeks duration. The abdominal pain was described as sharp in nature, intermittent and progressing in intensity. Her associated symptoms included anorexia, vomiting and pyrexia up to 101.6°F, which prompted her ED visit. She denied any vaginal discharge, vaginal bleeding or concern for any sexually transmitted diseases. She stated these symptoms felt different than her normal abdominal pain from her uterine leiomyomas. Her last menstrual period finished 1 day ago.

Vitals on arrival: temperature of 100.9°F, blood pressure of 157/93 mmHg, heart rate of 91 beats/min, respiratory rate of 18 breaths/min, weight of 210 lbs. and an oxygen saturation of 98% on room air. On physical exam she appeared mildly uncomfortable. Her abdomen was soft and non-peritoneal, but tender in right upper quadrant and right-sided mid abdomen.

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Received: February 5, 2019. Revised: June 6, 2019. Accepted: June 13, 2019

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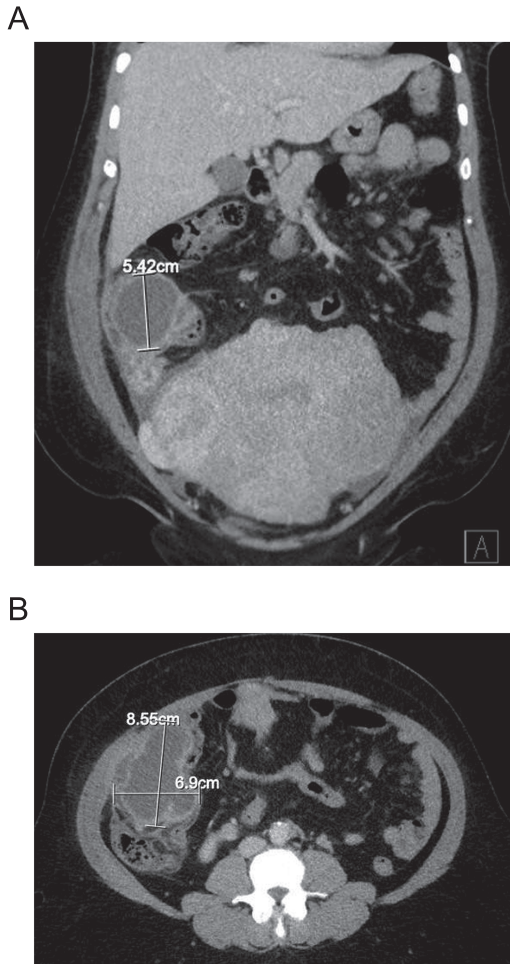


Figure 1: CT of the abdomen/pelvis with IV contrast revealing a heterogenous multi-septated right lower quadrant fluid collection, measuring 6.9x8.5x5.4 cm (transverse, anterior/posterior, craniocaudal), superior to the expected area of the appendix favored to represent a ruptured appendicitis with abscess formation. Additional findings were notable for adjacent inflammatory stranding surrounding the cecum and a grossly enlarged heterogeneous fibroid uterus measuring 20.8x12.3x16.9 cm.

She had no tenderness with palpation of McBurney's point or any tenderness with palpation over the left or right adnexa. Laboratory evaluation was remarkable for a neutrophil predominant white blood cell count of 13.8 (3.5–10 bil/L) and a hemoglobin of 7.4 (13.5–17 g/dL) with the patient's baseline hemoglobin of 7.5. Her urine human chorionic gonadotropin (hCG) and quantitative hCG were negative. Given the negative pregnancy test, no gynecological complaints and no lower quadrant tenderness, the decision was made to proceed with a computed tomography (CT) of the abdomen/pelvis with intravenous (IV) contrast, as opposed to performing a transvaginal ultrasound. CT (Fig. 1) revealed a heterogenous multi-septated right lower quadrant fluid collection, measuring 6.9x8.5x5.4 cm (transverse, anterior/posterior, craniocaudal), superior to the expected area of the appendix favored to represent a ruptured appendicitis with abscess formation. Additional findings were notable for adjacent inflammatory stranding surrounding the cecum and a grossly enlarged heterogeneous fibroid uterus measuring 20.8x12.3x16.9 cm. Blood cultures were obtained, general surgery and IR were consulted and the patient was started

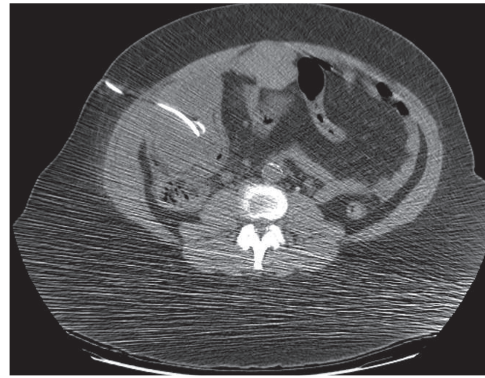


Figure 2: A CT-guided percutaneous catheter can be seen located within the abscess.

on IV piperacillin/tazobactam. She subsequently underwent placement of a CT-guided percutaneous pigtail catheter (Fig. 2) with resulting drainage of 100 cc of purulent material. By Day 2, the patient was rapidly improving, afebrile, with an improving leukocytosis. An additional 150 cc of purulent material was obtained from the drain. Her wound aerobic culture grew *Streptococcus agalactiae* (GBS). As a result, piperacillin/tazobactam was discontinued and she was started on IV vancomycin.

By Day 8, the patient remained asymptomatic, was tolerating two meals a day and requested to return home. A peripherally inserted central catheter line was placed for continued outpatient antibiotic therapy. A CT limited study involving 30 cc of Isovue-370 contrast was injected into the right lower quadrant drain by IR to evaluate for resolution of the abscess. The previously noted right lower quadrant fluid collection had resolved; however, it was noted that the contrast in the right lower quadrant drain filled the fallopian tube, extending into the uterus, endometrial cavity and contralateral fallopian tube (Fig. 3). These findings demonstrated that the initial suspected appendiceal abscess actually represented a TOA.

The obstetrics and gynecological service were then consulted. A pelvic exam was performed revealing dark clotted blood within the posterior vaginal vault consistent with the patient's recent menses. Overall, her pelvic exam including a bimanual exam was unremarkable. A subsequent pelvic and transvaginal ultrasound revealed a similar appearance of the known multiple uterine leiomyomas. Of note, the ovaries were unable to be identified and the known abscess and pigtail catheter could also not be visualized, likely secondary to obscuration and superior displacement from the multiple uterine leiomyomas. Further testing for sexually transmitted diseases was unremarkable. On Day 9, the drain was removed, and she was discharged in stable condition on IV vancomycin 1000 mg q 12 hours for 14 days. The patient was subsequently lost to follow-up.

DISCUSSION

A TOA is classified as either primary or secondary. A primary TOA is the result of either a sexually transmitted organism or endogenous flora that ascend from the genital tract. The infection further spreads into the fallopian tubes, leading to an inflammatory response [2]. A secondary TOA occurs from the extension of inflammation of adjacent organs (such as appendicitis, diverticulitis, colitis and pelvic malignancy) [3].

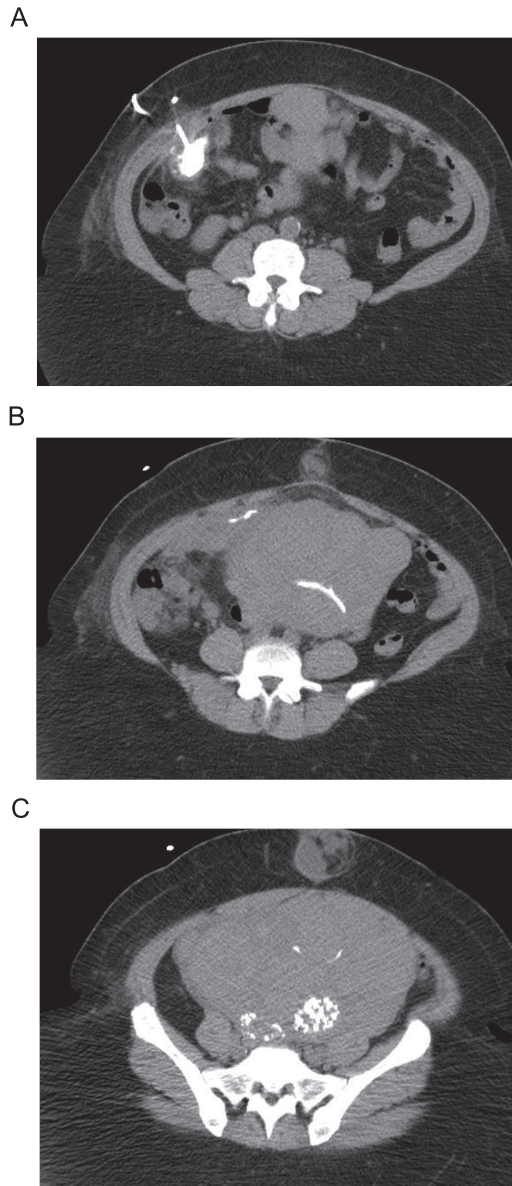


Figure 3: CT limited study with contrast injection through the drain revealing contrast filling the right fallopian tube, extending into the uterus, endometrial cavity and contralateral fallopian tube.

The clinical presentation is vast and often overlaps with other disease processes. Typical symptoms of a TOA can include lower abdominal pain, urinary symptoms, fever, mucopurulent vaginal discharge, irregular vaginal bleeding, adnexal/cervical tenderness, dyspareunia/dysuria, lower back pain and change in bowel movements. A ruptured TOA can present with peritonitis and septic shock [2]. The differential remains broad. Gastrointestinal diseases like infectious enterocolitis, Crohn's disease, cecal diverticulitis, mesenteric adenitis, Meckel's diverticulitis, omental infarcts and epiploic appendagitis can all present with similar abdominal pain [5]. In addition, genitourinary diseases including ureterolithiasis and pyelonephritis can present with similar symptoms. Among gynecological processes, the differential includes a hemorrhagic cyst, ovarian torsion, ectopic pregnancy and pelvic inflammatory disease (PID) [5].

Risk factors for developing a TOA include, but not limited to the following:

- History of prior PID (TOA occurs in ~15–20% of cases of PID)
- Presence of an intrauterine device
- Multiple sexual partners
- Age between 15–25
- Low socioeconomic status
- Adjacent infection from the bowel (diverticulitis), urinary tract (pyelonephritis), appendix or from pelvic malignancy [2].

The most common pathogens/organisms are sexually transmitted and include *Neisseria gonorrhoeae* or *Chlamydia trachomatis* (<50% of all PID cases will test positive for *N. gonorrhoeae* or *C. trachomatis*) These organisms damage the endocervical canal and its mucosal barrier. However, vaginal flora including anaerobes, *Gardnerella vaginalis*, *Haemophilus influenza*, GBS and enteric gram-negative rods have been associated with the development of PID, and hence a TOA [6]. Approximately 30–40% of cases are polymicrobial in nature [1]. While GBS may be common vaginal flora, very few will present as a pathogen.

The initial imaging modality for evaluation of pelvic structures in females with pelvic pain should be a transvaginal ultrasound [10]. Lee et al. [8] found that the sensitivity of ultrasound to diagnose TOA was slightly lower than reported in their emergency medicine literature review and that a transvaginal ultrasound alone may not be sufficient to rule out TOA. However, for the majority of patients, a TOA is usually detected on ultrasound. In those with a non-diagnostic ultrasound, a subsequent CT is then performed. Differentiating a right-sided TOA from acute appendicitis, especially when complicated by an abscess, can be a diagnostic challenge, both for the ED physician and the radiologist [7]. One retrospective study over a 6-year period evaluated 80 patients with appendicitis and 48 patients with a right-sided TOA. Experienced radiologists reviewed CT examinations without any prior knowledge of the original report. In addition, an independent senior gynecologist, not aware of the initial CT interpretation reviewed medical files of those patients with a TOA [7]. Overall, 92% of cases were correctly identified (acute appendicitis=96.3% and a TOA=85%), 3% incorrectly identified and 5% remained equivocal. In the ED setting, right lower quadrant abdominal pain in a female patient may require both a CT and a transvaginal ultrasound, if either is non-diagnostic. Depending on the clinical scenario, gynecologic complaints like pelvic pain could lead the clinician to first perform a pelvic exam and transvaginal ultrasound. In the case of our patient, she had extensive multiple large uterine leiomyomas encompassing up to 21 cm in length that likely displaced the normal pelvic organs. Given this displacement, she did not present with adnexal tenderness, tenderness over McBurney's point or pelvic pain, rather, tenderness that was more proximal. In addition, without any gynecological complaints and a negative pregnancy test, the decision was made to proceed first with a CT of the abdomen/pelvis.

Although difficult, there are radiographic clues and general features that can help in establishing the diagnosis of a TOA. Ultrasonographic findings for a TOA include thickened and dilated fallopian tube(s), inflamed ovaries, complex pelvic fluid collections and abnormal vascularity. The fallopian tube will often be distended and serpiginous with layering internal echogenic debris secondary to a distal obstruction [9]. This can create an incomplete septated appearance as the distended tube folds on itself. Additionally, the ovary will likely be enlarged, inflamed and edematous with an increased number and size

of the follicles. Early CT findings are subtle with inflammatory changes better seen than on ultrasound. Early subtle findings include thickening/enhancement of the uterosacral ligament, tubal thickening (salpingitis), enlarged enhancing ovaries (oophoritis) and abnormal enhancement and fluid within the uterine cavity (endometritis). In our patient, her pelvic structures could not be identified secondary to the complex nature of her uterine leiomyomas.

Furthermore, ureteral obstruction and resulting hydronephrosis can result from mechanical compression or functional obstruction from reactive inflammation. Secondary inflammation can also lead to reactive ileus/obstruction, bowel wall thickening or even appendiceal inflammation [11, 12, 13]. CT features of a thickened cecal wall, pericecal stranding and an abnormal appendix favor acute appendicitis [7]. A TOA, of course, can still mimic appendicitis by causing reactive inflammation of the neighboring appendix and cecum.

It is vital that a TOA be differentiated from acute appendicitis as an incorrect diagnosis can delay proper management. Currently, recommendations for the initial treatment of an unruptured TOA include antibiotics, image-guided percutaneous drainage and conservative surgery. Antibiotic coverage should include coverage for *N. gonorrhoeae*, *C. trachomatis* and anaerobes. Premenopausal patients with a TOA <9 cm and are hemodynamically stable are good candidates for antibiotic treatment alone. However, those with a suspected ruptured TOA, sepsis, life-threatening peritonitis and/or postmenopausal women should be considered for surgery [4]. All patients should be admitted to the hospital as failure to respond to antibiotics up to 72 hours is an indication for further intervention [4]. Image-guided drainage of a TOA should be considered in patients who do not respond to antibiotic therapy or who would need immediate salpingo-oophorectomy. Levenson et al. [14] reported that in some cases, a TOA was an unexpected finding, rather it be contrast filling a fallopian tube during fluoroscopic tube injection or finding adnexal involvement during surgery.

This relatively rare obstetrical and gynecological emergency requires a high index of clinical suspicion, a detailed history and physical and appropriate imaging. In the presence of sepsis secondary to a ruptured TOA, the mortality rate ranges from 5–10%, becoming a true obstetrical and gynecological emergency [15]. Given our patient's unusual clinical presentation and physical exam, a TOA was further down on the differential, and after the results of her CT, no longer on the differential. Distinguishing acute appendicitis from a right-sided TOA, especially when an abscess has formed, can be a diagnostic challenge for both the ED physician and the radiologist, let alone in the additional presence of large uterine leiomyomas, as we have demonstrated in this case report. To the authors' knowledge, only one other case in the medical literature involving GBS as the underlying pathogen for a TOA has been reported [6]. However, this is the only reported case involving a TOA secondary to GBS mimicking an appendicitis with abscess formation.

ACKNOWLEDGEMENTS

None.

CONFLICT OF INTEREST STATEMENT

The authors declare that they have no competing interests.

FUNDING

No honorarium, grant or funding was received to produce this manuscript.

AUTHORS' CONTRIBUTIONS

All authors contributed significantly to the literature review, manuscript draft and editing.

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Not required.

CONSENT FOR PUBLICATION

Informed patient consent was obtained.

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