



## Case report

# Renal actinomycosis with muscular invasion post-nephrostomy tube placement

Haley M. Fulton<sup>\*</sup>, Rhett M. Shirley

Prisma Health Upstate, 701 Grove Road Greenville, SC 29605, USA

## ARTICLE INFO

## Keywords:

Actinomyces  
Perinephric abscess  
Muscular invasion  
Post-nephrostomy complications

## ABSTRACT

Perinephric abscesses are a rare complication of nephrostomy tube placement. There are several aerobic bacteria that are common culprits of abscess formation. Here we describe a novel report of a perinephric abscess due to *Actinomyces odontolyticus*. We describe the presentation of illness, imaging and clinical findings, and the prolonged treatment course needed for this medically complex patient.

## Introduction

Perinephric abscesses are a result of liquefactive necrosis between the renal capsule and Gerota's fascia, rarely extending past Gerota's fascia. Predisposing factors include disease processes which increase the incidence of urinary tract infections (UTIs) as over 75 % of perinephric abscesses are due to complications of UTIs [1]. Infections originating outside the urinary tract can cause perinephric abscesses from trauma, direct spread, or hematogenous spread.

Gram negative enteric bacilli and polymicrobial infections are the main causes of perinephric abscesses [1]. *Escherichia coli*, *Staphylococcus aureus*, and *Klebsiella pneumonia* are the primary bacteria isolated with *Escherichia coli* being the pathogen in over 51 % of perinephric abscesses [1]. Here we report a case of perinephric abscess caused by *Actinomyces odontolyticus*.

Actinomycosis is an endogenous infection caused by the *Actinomyces* genus, most commonly *Actinomyces israelii* [2]. *Actinomyces* species are found on mucosal surfaces primarily in the mouth, gastrointestinal, and genitourinary tract [3]. Disruption of the mucosa can allow colonization by *Actinomyces* and subsequent formation of masses of branching filamentous bacteria [3]. However, *Actinomyces* does not usually penetrate healthy mucosa and instead becomes pathogenic in the presence of necrotic tissue.

Actinomycoses are rare and indolent infections that have the capacity to invade tissue planes, form tumor-like masses, and cause necrosis. Between 75 % and 95 % of actinomycoses are polymicrobial. Most coinfections occur in the presence of other anaerobic bacteria with coagulase negative staphylococci being a notable exception [3].

The majority of cases of abdominal actinomycosis have been consequences of instrumentation or in the setting of another intra-abdominal infection [5]. However, abdominal actinomycosis only accounts for a minority of actinomycosis as most are orocervicofacial in nature. Here we report a unique presentation of perinephric abscess due to *Actinomyces odontolyticus*.

## Case

A 65 year-old woman presented to care with progressively severe right-sided back pain over the prior 2 weeks. She had a complex medical and surgical history including chronic abdominal pain, ulcerative colitis, and interstitial cystitis requiring cystectomy and urostomy 20 years prior. This was complicated by need for colectomy and colostomy at that time. She had extensive pelvic surgery 3 months prior to presentation consisting of lysis of pelvic adhesions, revision of urostomy, and rectal stump resection. Her recovery was complicated by an enterocutaneous fistula as well as fistulization of urine from the ileal conduit, which necessitated placement of bilateral nephrostomy tubes. The length of that hospitalization was 52 days due to her complex post-operative course, and nephrostomy tubes were removed at a follow-up appointment within a week of discharge.

As to the present illness, on arrival at the emergency department her chief complaint was worsening right flank pain accompanied by diffuse abdominal pain. She also endorsed nausea and vomiting. She had been to her primary care provider approximately two weeks prior and was found to have leukocytosis with 18,000 wbc/mcl and was given an unknown antibiotic which she was unable to tolerate it due to persistent

<sup>\*</sup> Corresponding author.

E-mail addresses: [hfulton@email.sc.edu](mailto:hfulton@email.sc.edu) (H.M. Fulton), [rhett.shirley@prismahealth.org](mailto:rhett.shirley@prismahealth.org) (R.M. Shirley).

<https://doi.org/10.1016/j.idcr.2022.e01586>

Received 10 May 2022; Accepted 25 July 2022

Available online 26 July 2022

2214-2509/© 2022 Published by Elsevier Ltd. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

vomiting.

Vital signs in the ED were all within normal range. On physical exam her abdomen was soft and nondistended with diffuse tenderness to palpation and diffuse guarding. No rebound tenderness was present but she had right flank tenderness. Output from the urostomy and colostomy was noted and the sites appeared clean and intact.

Initial laboratory testing revealed leukocytosis (22,000 wbc/mcL) with 88 % neutrophils, elevated lactate (3.0 mmol/ L), and significantly elevated procalcitonin (11.11 ng/ mL). CT scan of the abdomen and pelvis revealed an enlarged fluid collection posterior to the liver measuring 6 × 10 cm and extending into the paraspinous musculature within 1.5 cm of the skin surface with a thin enhancing rim concerning for abscess (Fig. 1). She had a CT scan five weeks prior during a similar presentation to the emergency department with abdominal pain (Fig. 2). She was presumed to have gastritis after a “normal CT scan” and was discharged from the emergency department with antibiotics. On second presentation, vancomycin and meropenem were empirically started and percutaneous drainage of the fluid collection was performed. Initial gram stain revealed multiple organisms. Anaerobic culture had moderate growth of *Actinomyces odontolyticus* while aerobic culture grew moderate to heavy *Enterococcus faecalis*. Notably, the urine culture grew *Enterobacter cloacae* and there was no growth from blood cultures.

She had a history of anaphylactic reaction to piperacillin/tazobactam, and when the cultures resulted, the antibiotic regimen was adjusted to IV ceftriaxone for 2 months in combination with IV vancomycin for 4 weeks. This was followed by six months of oral doxycycline. The retroperitoneal drain placed at the time the cultures were collected remained in place for seven weeks, at which time there was no daily output and repeat CT scan showed resolution of the right perinephric fluid collection.

## Discussion

Nephrostomy tube placement has an infection risk estimated to be around 3.5 %, with sepsis occurring in about 1 % [4]. Risk factors for development of infectious complications are advanced age, diabetes mellitus, bladder dysfunction, presence of a previous urinary catheter, uretero-intestinal anastomosis, manipulation of the catheter, bacteriuria, and presence of stones [5]. Nephrostomy tubes are placed through



Fig. 1. Cross-section of axial CT scan showing abscess penetration into psoas muscle.



Fig. 2. Axial image from CT scan done at first presentation. Peri-nephric fluid collection of right kidney seen at that time.

a percutaneous access, thus there is a potential for seeding of skin flora into the perirenal space or kidney [5]. However, the most common causes of bacterial infections associated with percutaneous nephrostomy (PCN) are gram negative bacteria including *E. coli*, *Proteus*, and *Klebsiella* [6].

Perinephric abscesses, however, are most commonly associated with *Enterobacteriales* isolates [7]. Introduction of bacteria into the perirenal space can otherwise occur via direct extension from intrarenal infection, vesicoureteral reflux, obstruction, or surgery of the urinary tract or abdomen. The main risk factor our patient had for perinephric abscess formation was recent surgery involving the urinary tract and abdomen and resulting surgical complications of enterocutaneous and urocutaneous fistula formation.

Anaerobic bacteria are less commonly involved in perinephric abscesses and actinomyces infection is particularly rare [3]. However, anaerobes are isolated more often when patients had obstruction leading to extravasation of urine, necrotic tumor, renal transplant, and perforation of the colon [7]. Although this patient did not have obstruction causing extravasation, she did have urinary leakage from an ileal conduit.

*Actinomyces spp* can colonize the urogenital epithelium but can only penetrate damaged epithelium. Unlike *Enterococcus faecalis*, which also grew from the perinephric abscess, *Actinomyces spp* has the unique ability to invade across tissue planes. In this case, the infection penetrated out of the retroperitoneum.

This case presentation is very unique as we are only aware of two other reports of *Actinomyces* causing perinephric abscesses. In both of those cases the isolates were *Actinomyces israelii* while our patient was infected with *Actinomyces odontolyticus*. Additionally, the extent of invasion into the paraspinal musculature is unique to this case.

## Author contribution

**Haley Fulton:** Writing and background research. **Rhett Shirley:** Writing – editing & writing.

## Consent

Written informed consent was obtained from the patient for

publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

### Ethical approval

None

### Conflict of interest

We have no conflicts of interest to disclose currently.

### References

- [1] Okafor C.N., Onyeaso E.E.. Perinephric Abscess. [Updated 2020 Aug 29]. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2021 Jan-. Available from: (<https://www.ncbi.nlm.nih.gov/books/NBK536936/>).
- [2] Bearrick, et al.; Journal of Endourology Case Reports 2017, 3.1 <http://online.liebertpub.com/doi/10.1089/cren.2017.0048>.
- [3] Könönen E, Wade WG. Actinomyces and related organisms in human infections. Clin Microbiol Rev 2015. <https://doi.org/10.1128/CMR.00100-14>.
- [4] Siddiq DM, Darouiche RO. Infectious complications associated with percutaneous nephrostomy catheters: do we know enough? Int J Artif Organs 2012;35(10): 898–907. <https://doi.org/10.5301/ijao.5000146>.
- [5] Huang SY, Philip A, Richter MD, Gupta S, Lessne ML, Kim CY. Prevention and management of infectious complications of percutaneous interventions. Semin Interv Radiol 2015;32(2):78–88. <https://doi.org/10.1055/s-0035-1549372>. PMID: 26038616; PMCID: PMC4447878.
- [6] McDermott VG, Schuster MG, Smith TP. Antibiotic prophylaxis in vascular and interventional radiology. AJR Am J Roentgenol 1997;169(1):31–8.
- [7] Brook I. Urinary tract and genito-urinary suppurative infections due to anaerobic bacteria. Int J Urol 2004;11(3):133–41. <https://doi.org/10.1111/j.1442-2042.2003.00756.x>.