

## Rare presentation of vertebral discitis, osteomyelitis and polyarticular septic arthritis due to disseminated *Neisseria gonorrhoea* infection

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### ABSTRACT

Disseminated *Neisseria gonorrhoea* (*N. Gonorrhoeae*) infection can present with polyarticular involvement. Acute vertebral discitis/osteomyelitis due to this organism infection has been rarely reported. We present a case of vertebral discitis and osteomyelitis due to *N. gonorrhoea* in an immunocompetent host, treated successfully with a prolonged antibiotic course.

### ARTICLE HISTORY

Received 6 October 2019  
Accepted 12 December 2019

### KEYWORDS

Infectious diseases; sexually transmitted infections; *Neisseria Gonorrhoea*; discitis; osteomyelitis

## 1. Background


We present a case of polyarticular septic arthritis in an immunocompetent male with high-risk sexual behaviour in whom the case was initially misdiagnosed as pseudogout. In the era of Human Immunodeficiency virus (HIV) and pre-exposure prophylaxis (PrEP), there has been an increase in cases of sexually transmitted infections (STIs), especially in men who have sex with men (MSM) using PrEP [1]. This case highlights the need of frequent STI monitoring in this patient population and the need for obtaining a detailed sexual history. Our patient had polyarticular septic arthritis with vertebral discitis and osteomyelitis, which is an unusual presentation of disseminated gonorrhoea infection (DGI).

## 2. Case presentation

A 55-year-old MSM with no prior history of diabetes or immunodeficiency initially presented to the hospital with left wrist pain and swelling. This was associated with fatigue, chills, diffuse myalgias and acute onset of low back pain 2 days after onset of wrist swelling and pain. His symptoms did not improve taking over-the-counter pain medications. He initially was seen at a local emergency room and prescribed prednisone, tramadol and cyclobenzaprine for presumed pseudogout, which helped partially. His back pain slightly improved after starting these medications. Two days after starting the above treatment, he presented to our hospital with right wrist, ankle, shoulder and knee swelling. He denied any cough, sore throat, nausea, vomiting, abdominal pain, dysuria,

skin rash or urethral discharge. He was found to have leukocytosis and was admitted for management of suspected septic arthritis. He underwent aspiration of right ankle and right knee joint. Synovial fluid analysis from both joints showed greater than 50,000/ul leucocyte count with polymorphonuclear predominance consistent with infectious arthritis (Table 1). The right knee aspirate cultures and bacterial PCR were positive for *N. gonorrhoea*. Patient underwent irrigation and debridement of right knee, ankle, shoulder and bilateral wrist. A throat swab was sent for GC NAAT (gonorrhoea Nucleic acid amplification testing). This returned positive for *Neisseria gonorrhoeae*. Antimicrobial susceptibility testing was performed on the *N.gonorrhoea* isolated from right knee synovial fluid culture (Table 2). Blood cultures remained negative. GC NAAT testing on urine and rectal/anal swab were negative. Screening tests for HIV, Syphilis, hepatitis B and C were negative. C-reactive protein (CRP) was elevated at 24.45 mg/dL on admission. Few days after admission, he reported worsening of back pain. MRI lumbar spine was obtained which showed L3-L4 discitis and osteomyelitis with associated anterior and right dorsolateral epidural collections consistent with pre- and paravertebral phlegmonous changes with severe constriction of the thecal sac extending from L2-3 to L4-5 level (Figure 1). The case was reported to the local county health department for appropriate contact tracing.

Patient reported 10 male sexual partners in the last year. He reported oral intercourse with a new partner a week prior to hospital admission. He also admitted to unprotected anal intercourse within the last 6 months. He had started HIV PrEP with Emtricitabine-tenofovir

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**Table 1.** Synovial fluid studies from arthrocentesis.

	Ref. Range		
SITE	Unknown	Right knee	Right ankle
CLARITY	Unknown	Turbid	Turbid
COLOR	Unknown	Yellow	Yellow
CRYSTALS/FLUID	Latest Ref Range: No crystals seen	No crystals seen	
FLUID EOSINOPHILS % BKR	Units: %	4	0
FLUID LARGE MONO % BKR	Units: %	0	0
FLUID LINING CELL %	Units: %	0	0
FLUID LYMPH % BKR	Units: %	12	16
FLUID MACROPHAGE %	Units: %	0	0
FLUID MONO %	Units: %	6	9
FLUID NEUTROPHILS %	Units: %	78	75
FLUID OTHER CELL %	Units: %	0	0
FLUID PLASMA CELL %	Units: %	0	0
FLUID RBC COUNT	Units:/mm(3)	33,000	39,000
TOTAL COUNT BODY FLUID DIFFERENTIAL BKR	Unknown	100	100
VOLUME	Units: mLs	35.0	4.0
FLUID, TOTAL NUCLEATED CELLS	Units:/mm(3)	61,519	126,340

disproxil 200–300 mg once daily by mouth 6 months prior to presentation. He reported being screened for sexually transmitted infections every 3 months since then. Patient reported no significant family history. He was a social drinker who denied tobacco and injection drug use.

### 3. Differential diagnosis

Differential diagnosis included infectious, crystal-induced and inflammatory arthritis. Gouty arthritis is usually monoarticular but can present with polyarticular involvement mostly in patients with longstanding history of gout. Our patient reported no prior history of gout. Pseudogout also typically presents with monoarticular involvement, typically in elderly patients with radiographic evidence of cartilage calcification. Synovial fluid study in both gout and pseudogout may show leucocyte count of >100,000 cells/ul similar to infectious arthritis but is expected to have negative and positively birefringent crystals, respectively. In the absence of crystals, with no history of gout and with no specific findings of calcification, both were thought to be less likely. Inflammatory arthritis such as psoriatic arthritis and rheumatoid arthritis were thought to be less likely due to significantly elevated white count in synovial fluid and absence of related symptoms. Reactive arthritis is a rare cause of inflammatory arthritis that can occur following genitourinary and gastrointestinal infections. The typical triad of conjunctivitis, arthritis and urethritis does not occur in all patients. It usually occurs 2–3 weeks following initial infection, also does not usually cause very high leukocyte count in synovial fluid. With patients' reported chills and

high leukocyte count in synovial fluid and concerning high-risk sexual behaviour, gonococcal arthritis was thought to be most likely etiology.

### 4. Treatment

Patient was diagnosed with disseminated *Neisseria gonorrhoeae* infection with septic arthritis of multiple joints. He was started on Ceftriaxone 2 g every 24 h intravenously (IV) on admission. Given high-risk sexual behavior, he was treated empirically for *Chlamydia trachomatis* infection with Azithromycin soon after admission pending testing results. He was continued on Emtricitabine-tenofovir disproxil 200–300 mg once-daily PO for HIV PrEP. Neurosurgery team was consulted for L3-L4 discitis and osteomyelitis with associated epidural collection, who felt no surgical intervention was needed in the absence of any neurological deficits. No current guidelines on duration of treatment for gonococcal osteomyelitis exist. Our patient was treated with a prolonged 8-week course of IV ceftriaxone due to multiple joints' involvement in addition to co-existing significant MRI findings for discitis/vertebral osteomyelitis and significantly elevated CRP levels.

### 5. Outcome and follow-up

A follow-up MRI in 8 weeks showed changes of evolving spondylodiscitis at the L3-L4 level (Figure 2). Overall, there were improvements in epidural phlegmon/abscess with improved visualization of the thecal sac. CRP level had been normalized by the end of 8 weeks.

### 6. Discussion

With introduction of PrEP, we are seeing a decrease in HIV transmission, but with less use of barrier methods, we are seeing a rise in sexually transmitted diseases in high-risk group [1]. Gonorrhoea is one of

**Table 2.** Antimicrobial susceptibility testing result.

Antibiotic	MIC (mcg/ml)	Interpretation
Cefixime	≤0.12	SUSCEPTIBLE
Ceftriaxone	≤0.06	SUSCEPTIBLE
Ciprofloxacin	>0.5	RESISTANT
Tetracycline	1	INTERMEDIATE



**Figure 1.** Sagittal section of lumbar spine showing discitis and osteomyelitis at L3-L4 levels.



**Figure 2.** Sagittal section of lumbar spine showing improvement in discitis and osteomyelitis at L3-L4 level.

the most common sexually transmitted infections and is a known cause of polyarticular arthritis of acute onset. In 2017, a total of 555,608 cases of gonorrhea were reported in the USA [2].

DGI may have one of the two presentations, arthritis-dermatitis syndrome or purulent arthritis, though in most cases symptoms overlap. Arthritis-dermatitis form frequently presents with painless

pustular skin rash, tenosynovitis and polyarthralgia without frank arthritis in the presence of fever, chills and malaise. Patients with arthritis dermatitis syndrome are more likely to have positive blood culture. On the other end of the spectrum, it can also present as purulent arthritis without any skin lesions or fever; these patients are more likely to have positive synovial culture with negative blood cultures.

There have been reported complications of endocarditis, meningitis, perihepatitis and osteomyelitis with DGI. Dissemination of infection is reported in 0.5–3% of cases [3]. As per the retrospective study by belkacem et al., there has been an increase in the incidence of DGI in recent years with joint involvement being seen more frequently. Osteomyelitis is usually seen as a complication following septic arthritis. Cases of isolated osteomyelitis without septic arthritis have been reported as well [4–8]. It is important that physicians be aware of potential complications so that it is recognized, and appropriate therapy is promptly instituted. Complications have mostly been reported when the diagnosis is delayed [9]. Our patient had a delay in diagnosis, initially diagnosed with pseudogout, likely due to incomplete history concerning for high-risk sexual behavior that led to missed diagnosis of gonococcal arthritis. He also received prednisone, which increased the risk for dissemination of infection. This rare sequela of disseminated infection can lead to permanent injury if not caught early. Taking a good sexual history is the key to making an accurate diagnosis and preventing delay of correct diagnosis. Physicians should be aware of clinical presentations of DGI, keep high index of suspicion based on high-risk sexual behavior history and start treatment as soon as possible.

*Neisseria gonorrhoeae* is a fastidious bacteria with high false-negative results on regular culture. The microbiology lab should be alerted if infection by this organism is suspected so that specialized media (Thayer-Martin agar) can be set up for detection. In our patient, after NAAT testing was positive for *Neisseria*, microbiology lab was alerted and knee aspirate sample was cultured on both blood agar culture and Thayer-Martin media. Though blood and synovial fluid cultures are the gold standard test, yield of these tests results remains low. Multiple sample collection from different sites including rectal, intra-articular, pharyngeal is therefore recommended. Nucleic acid amplification testing (NAAT) is now commonly used to make diagnosis. The test can detect both chlamydia and gonorrhoea in the same specimen. It can be used with wide range of specimens, e.g. urine, endocervical swab, pharyngeal swab, rectal swab. Clinicians need to keep in mind that most reported cases of disseminated infection do not have typical urogenital symptoms but that should not deter them from obtaining a detailed sexual history. As per CDC recommendation, all patients diagnosed with gonorrhoea should be tested

for chlamydia, syphilis and HIV [9,10]. Obtaining pharyngeal and rectal samples for NAAT testing should be considered in patients with suggestive sexual practices [11].

Risk factors for gonorrhoea infection include inconsistent barrier contraception use, multiple sexual partners, prior history of sexually transmitted infection, exchanging sex for money or drugs. Gonococcal infection has been noted to be particularly high in MSM with history of substance abuse, particularly crystal methamphetamine use [12]. All pregnant women less than 25 years of age should be routinely screened for gonorrhoea infection. CDC also recommends repeated testing in treated patients in 3 months to diagnose reinfection.

CDC recommends treatment of septic arthritis or arthritis-dermatitis syndrome due to disseminated gonorrhoea infection with ceftriaxone and azithromycin. Limited information is available with no recent studies being published for treatment and duration of treatment of DGI [13,14]. There have been shifts in resistance pattern. In 2007, there was the emergence of fluoroquinolone-resistant gonorrhoea. Dual therapy with cephalosporin and azithromycin or doxycycline was recommended in 2010 by CDC. In later years, there were reported cases of increasing minimum inhibitory concentration (MIC) of cefixime and other oral cephalosporins. Also, the isolates with higher MIC for cefixime were noted to have tetracycline resistance. This emergence of resistance has severely limited our treatment options and is likely to result in more reported cases of disseminated infection [15–17]. Cephalosporin resistance in *Neisseria gonorrhoeae* has been reported sporadically in various case reports from countries around the world. In 2017, Lefebvre et al. reported the first case of ceftriaxone-resistant strain in an asymptomatic female with penA60-allele in Canada. This gene allele was identical to the first identified ceftriaxone-resistant strain isolated in Japan [18,19]. Initially, the cases of ceftriaxone-resistant strains were sporadic in Asian countries, but now there is evidence of international transmission of the strain raising need for a world-wide initiative to increase awareness, report resistance and to strengthen surveillance [20].

This case showcases a rare finding of DGI involving multiple joints, discitis and vertebral osteomyelitis. It reflects the need for obtaining detailed social and sexual history to avoid missing the diagnosis which can lead to increased morbidity. While this is based on just one rare case of discitis/vertebral osteomyelitis, we propose a prolonged treatment (6–8 weeks) with IV ceftriaxone for such an infection in the future.

## 7. Learning points

1. Disseminated gonorrhoea infection frequently presents with pustular skin rash with asymmetric polyarthralgia, tenosynovitis or polyarticular septic

arthritis, and vertebral osteomyelitis can occur as a complication.

2. Healthcare workers can expect to see more cases of disseminated gonorrhoea infection with the introduction of PreP and less use of barrier contraception.

3. Taking a detailed sexual history is very important to prevent misdiagnosis in cases with polyarticular inflammatory arthritis.

4. Dissemination can occur from an oropharyngeal site alone without concomitant genital or rectal involvement.

## Disclosure statement

No potential conflict of interest was reported by the authors.

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