

Surgical Management of Gonococcal Septic Arthritis: A Case Series and Literature Review

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Learning Point of the Article:

Septic gonococcal arthritis can be managed using molecular testing for diagnosis and prompt surgical management with parenteral antibiotics for treatment.

Abstract

Introduction: Purulent gonococcal septic arthritis (GSA) is a rare but clinically significant manifestation of disseminated gonococcal infection (DGI) with *Neisseria gonorrhoeae* (NG). Presenting distinctly from the arthritis-dermatitis syndrome associated with DGI, GSA poses a unique diagnostic challenge as it presents as monoarthritis or oligoarthritis without systemic features. Current guidelines do not distinguish between these presentations of gonococcal arthritis, and there are no existing recommendations on the surgical management of purulent GSA.

Case Report: We present a single-institution case series of three patients aged 33–51 with five joints confirmed to have GSA by Biofire joint panel polymerase chain reaction (PCR) and were treated with surgical incision and drainage (I&D). In this case series, four of five joints yielded no growth with standard cultures methods, underscoring the diagnostic difficulty of isolating NG. One patient experienced deterioration of symptoms despite broad-spectrum antibiotics. Two patients received intravenous (IV) ceftriaxone for 14 days following I&D, and one received IV ceftriaxone while inpatient, followed by cefixime oral therapy for 21 days after discharge. All patients were co-managed with infectious disease and had clinical improvement with improved range of motion and downtrending inflammatory markers at follow-up.

Conclusion: This case series supports the role of I&D in combination with parenteral antibiotics in treating purulent GSA. Molecular testing, such as Biofire joint panel PCR, is useful in detecting NG due to superior sensitivity in identifying the fastidious organism. Multicenter prospective trials are needed to establish evidence-based surgical guidelines and antibiotic management in the face of emerging resistance.

Keywords: Gonococcal septic arthritis, joint panel polymerase chain reaction, surgical debridement.

Introduction

Purulent gonococcal septic arthritis (GSA) is a rare complication of disseminated *Neisseria gonorrhoeae* infection (DGI) that presents a unique therapeutic and diagnostic challenge.

In 2020, there were 82.4 million new infections of *Neisseria gonorrhoeae* (NG) globally. Disseminated gonococcal infection is rare, occurring in <3% of patients diagnosed with NG [1,2].

Although more historic data suggest a higher incidence in younger patients, a recent case-control study found that age over 40, substance use, and men with only female partners as risks for DGI [3].

There are two patterns of joint involvement in DGI; aseptic arthritis-dermatitis syndrome and isolated septic arthritis. Arthritis-dermatitis syndrome presents with either concomitant or antecedent bacteremic stage with fever and systemic

Author's Photo Gallery



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Access this article online

Website:
www.jocr.co.in

DOI:
<https://doi.org/10.13107/jocr.2026.v16.i06.7558>

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Submitted: 10/03/2026; Review: 09/04/2026; Accepted: May 2026; Published: June 2026

DOI: <https://doi.org/10.13107/jocr.2026.v16.i06.7558>

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symptoms. Joint involvement is typically polyarticular and asymmetric, involving large and small joints. The most common dermatologic manifestations are vesicles or pustules that spare the face. Aspirations of affected joints are typically aseptic [4, 5, 6]. In contrast, purulent GSA is classically a mono- or oligo-arthritis without systemic symptoms that occurs in the knees, ankles, wrist, and elbows. It typically occurs in isolation and without an antecedent bacteremic stage [6]. Tenosynovitis is another common manifestation, and patients may not exhibit urogenital symptoms [7]. In the absence of urogenital symptoms, GSA is difficult to distinguish from other causes of septic arthritis [4, 5].

Although clinically distinct, current guidelines do not distinguish between arthritis-dermatitis syndrome and GSA. Centers for disease control recommends medical management in the acute phase with ceftriaxone monotherapy, while the World Health Organization recommends dual therapy with ceftriaxone and azithromycin in settings where local resistance is unknown [8, 9].

There are limited disease-specific guidelines for patients presenting with GSA. In the 1980s, the literature recommended only medical management for gonococcal arthritis [7, 10, 11]. Since that time, however, increasing antibiotic resistance of NG to both oral and parenteral antibiotics has been well-documented [11, 12, 13, 14]. Concurrently, more recent case reports indicate a trend towards surgical drainage of the infected joint in combination with intravenous (IV) antibiotic administration [15, 16, 17, 18].

Despite this evolving practice pattern, surgical drainage is not universally recommended for GSA, because it has traditionally not associated with the same rapid articular cartilage damage compared to other bacterial septic arthritis [6]. Notably, older literature predating the widespread use of antibiotics reported higher rates of joint destruction associated with GSA [7, 19]. One series of 101 cases of GSA split between pre- and post-sulfonamide era found “residual disability” decreased from 49% to 33% after the invention of antibiotics, suggesting that medical treatment mitigates, but in isolation may not entirely eliminate, joint damage.

In this report, we describe the management of five NG polymerase chain reaction (PCR)-positive joints in three patients treated with open incision and drainage (I&D) in conjunction with a 2-week course of parenteral antibiotic therapy. This study represents a single-institution case series. Attempts were made to contact patients to obtain informed consent for inclusion; however, they were unable to be reached. As no identifiable patient information was included, the study met criteria for exemption from institutional review board (IRB) approval in accordance with institutional policy.

Case Report

Patient A is a 51-year-old male with no past medical history who presented to our institution’s emergency department with 1 week of right wrist swelling and right shoulder pain. He denied any fevers. C-reactive protein (CRP) and erythrocyte sedimentation rate (ESR) were elevated at 72.9 and 79, respectively. The patient initially underwent 24 h of medical management with IV Toradol and broad-spectrum antibiotics with Vancomycin and Unasyn. He noted improvement at the initial evaluation; however, by the next day, he experienced decreased range of motion in the right wrist, increased pain in the right wrist, and CRP had increased to 94. Magnetic resonance imaging of the right wrist demonstrated a midcarpal effusion. Aspiration of the right wrist yielded 1.5 cc of a cloudy fluid. The aspiration demonstrated a white blood cell (WBC) count of 28,865 with 90% polymorphic neutrophils (PMNs) and negative for monosodium urate crystals. Biofire joint panel was positive for NG, but fluid cultures grew no organisms. Blood cultures were taken at that time and remained without growth. Infectious disease was consulted and recommended surgical I&D of the affected joint along with 1 day of doxycycline and 2g of IV ceftriaxone daily for 14 days postoperatively. In addition, the patient underwent an interventional radiology-guided aspiration of the right shoulder joint due to persistent shoulder pain. The aspiration resulted in a WBC count of 42,090 with 83% PMNs. Biofire joint panel was positive for NG, but cultures were negative for NG. Additional screening for sexually transmitted infections (STIs) was negative. Following surgical I&D of both affected joints, the patient’s inflammatory markers and WBC count down trended and joint pain improved. He was discharged with a peripherally inserted central catheter (PICC) for administration of IV ceftriaxone for an additional 14 days after his last I&D. The patient was seen 2 weeks post-operatively following the I&D of his right shoulder and noted no issues. He was discharged from the clinic and recommended to follow-up on an as-needed basis.

Patient B is a 33-year-old male with no past medical history who presented to our institution’s emergency department for 1 week of left knee pain and swelling. He was seen at an urgent care and prescribed a course of oral steroids for presumed gout, which did not improve his symptoms. The patient then presented with a large ballotable knee effusion and restricted range of motion; however, he was ambulatory on the affected extremity. Examination revealed no pain with the short arc range of motion of the knee. In the emergency department, WBC count was 17.6, CRP was 112.8, the ESR was 57, and the patient was afebrile. Empiric ceftriaxone was administered while in the emergency department. The patient underwent a bedside right knee aspiration. Aspiration analysis demonstrated a WBC



count of 100,260 with 94% PMNs. The aspiration was negative for monosodium urate crystals. Biofire joint panel was positive for NG, but cultures were negative at 5 days. In addition, urine testing PCR for NG was negative. Following aspiration results the patient was placed on ceftriaxone and azithromycin. The patient underwent left knee arthrotomy and synovectomy. Intraoperative cultures were taken. Infectious disease was consulted following surgery and recommended PICC line placement for daily 2 g IV ceftriaxone for an additional 14 days. Further STI screening was negative for *Chlamydia trachomatis*. His inflammatory markers and WBC count began down trending after surgical intervention. Intraoperative cultures were finalized with no growth. The patient was seen at 10 days and 2 months postoperatively. At his last visit, he had no pain in the left knee, full knee range of motion, and was fully ambulatory. He was discharged from clinic and recommended to follow-up on an as-needed basis.

Patient C is a 48-year-old female with a relevant social history of homelessness and polysubstance use who presented to the emergency department for 5 days of progressive left knee pain and left shoulder pain. She was unable to ambulate due to her left knee pain. She denied any subjective fevers. She was found to have pain with a short arc range of motion of the left knee and left shoulder. She had a WBC count of 13.9, CRP of >200, and an ESR of 97. While in the emergency department, she received one dose of cefepime and doxycycline. Left knee aspiration showed a WBC count of 15,080 with 88% PMNs, and Biofire joint panel was positive for NG. Aspirate cultures were positive for negative beta-lactamase NG on day 3. No other susceptibility testing was available. The patient was taken to the operating room for a left knee arthrotomy and debridement. A left shoulder aspiration was performed intraoperatively. Based on the turbid appearance of the fluid, the decision was made to proceed with a concomitant left shoulder arthrotomy and debridement. The WBC count of the left shoulder aspirate resulted to be 103,720 with 96% PMNs, and Biofire joint panel was positive for NG. Intraoperative cultures were held for 2 weeks and resulted with no growth. Infectious Disease recommended ceftriaxone 2 g IV daily while in hospital and doxycycline until proven negative for *C. trachomatis*. All other STI screening was found to be negative, and inflammatory markers decreased following surgical intervention. The patient was switched to cefixime 400 mg PO BID for an additional 2 weeks. At her 3-week post-operative visit, she had active and passive left shoulder abduction and flexion to 30° and 160°, respectively. Left knee range of motion was 0–120°. She was counseled to increase the activity of her shoulder and discharged from the clinic to follow-up on an as-needed basis. The patient followed up at 5 weeks postoperatively with an infectious disease. At that time, her active left shoulder range of

motion had improved to 100° of flexion and 110° of abduction. She was prescribed an additional 7-day course of cefixime 400 mg BID PO for reported scant drainage from her shoulder incision and discharged from the clinic to follow-up on an as-needed basis.

Discussion

GSA remains a rare but important manifestation of NG infection. Management of GSA is often complicated by the increasing prevalence of antimicrobial resistance and limitations in diagnostic testing. In this case series, negative NG cultures were obtained for four out of five joints. This highlights a well-recognized limitation of culture-based methods, as *N. gonorrhoeae* is a fastidious organism with stringent growth requirements [20], and prior antibiotic exposure may further reduce culture yield [14]. Molecular diagnostics, such as the BioFire joint panel system, offer superior sensitivity and specificity and should be considered the gold standard for detection in suspected disseminated gonococcal infections [6, 21]. Adoption of rapid molecular testing facilitates rapid diagnosis and decreases time to treatment.

One patient from our case series with delayed diagnosis of GSA was administered 24 h of antibiotics with vancomycin and ampicillin/sulbactam (Unasyn) and developed worsening symptoms in the absence of surgical drainage. Although beta-lactam/beta-lactamase inhibitor combinations, such as ampicillin/sulbactam, show acceptable bioavailability in the joint, in 1991, penicillinase-producing NG appeared to be resistant to this combination [22,23]. In addition, bacterial cultures were negative, precluding susceptibility testing. The failure of this common broad-spectrum coverage regimen to appropriately treat the patient's GSA supports the use of joint aspirate PCR for rapid detection, given its resistance to common broad-spectrum antibiotics.

At present, consensus on GSA does not include surgical drainage. In addition, recommendations in the literature do not clearly delineate treatment differences between arthritis-dermatitis syndrome and acute septic arthritis secondary to NG. Finally, the landscape of NG resistance has changed considerably in recent decades. Resistance to fluoroquinolones, including ciprofloxacin, has become widespread, and decreased susceptibility to extended-spectrum cephalosporins has been reported globally [24,25]. Per a case series of 58 patients with GSA, non-surgical management may leave patients with an elevated risk of residual joint pain [26]. Older literature spanning the pre-antibiotic era additionally suggests an improved, but non-zero risk of "residual disability" with antibiotic treatment alone [19].

Our institution's standard of care for GSA involves prompt

surgical drainage of the affected joint in combination with IV ceftriaxone and doxycycline for potential co-infection with *C. trachomatis*. This is in accordance with treatment dogma for other bacterial infections of native joints, where the presence of culture-positive organisms, elevated synovial fluid WBC count, or a higher percentage of polymorphonuclear leukocytes indicates the need for surgical intervention [27]. Antibiotic therapy is continued for 2 weeks following the date of surgical intervention, with de-escalation from IV ceftriaxone considered only in cases where culture growth permits susceptibility testing. This approach aligns with current centers for disease control and prevention guidelines and provides coverage against both NG and potential co-infection with *C. trachomatis*, while ensuring adequate treatment duration for septic arthritis [8]. All patients in our series achieved good outcomes following timely surgical intervention combined with targeted antimicrobial therapy.

This study has several important limitations. First, the small sample size and single-institution design limit the generalizability of our findings and preclude any definitive conclusions regarding the superiority of surgical and medical management over medical therapy alone. Second, the retrospective nature of this case series introduces potential selection and treatment bias, as all patients were managed according to our institution's existing practice pattern favoring early surgical drainage. There was no comparison cohort treated with antibiotics alone, limiting our ability to directly assess relative outcomes between treatment strategies. In addition, follow-up duration was relatively short and inconsistent across patients, preventing assessment of long-term functional outcomes, recurrence rates, or radiographic progression of joint damage. Microbiologic data were also limited, as four of five joints had negative cultures, precluding antimicrobial susceptibility testing and resistance profiling. Finally, reliance on PCR-based diagnostics, while highly sensitive, may detect non-viable organisms and does not provide susceptibility data, which may affect treatment tailoring in regions with high antimicrobial resistance. Larger, multicenter prospective studies with standardized follow-up and comparative treatment arms are needed to better define the optimal management strategy for GSA.

GSA remains an uncommon but clinically significant

manifestation of disseminated NG infection. Diagnosis may be challenging given frequently negative cultures and the absence of genitourinary symptoms, underscoring the value of molecular diagnostic testing in suspected cases. In this small case series, prompt surgical drainage combined with targeted antimicrobial therapy was associated with favorable short-term clinical outcomes. While our experience suggests that operative intervention in conjunction with medical management in patients with purulent GSA is effective, definitive treatment recommendations cannot be drawn from these data alone. Further prospective, comparative studies are needed to clarify the role of surgical management in the setting of evolving antimicrobial resistance.

While historical guidelines favored exclusive medical management for gonococcal septic arthritis, the fastidious nature of *Neisseria gonorrhoeae* and its evolving global resistance patterns necessitate a modern diagnostic approach and aggressive treatment strategy. Given that standard synovial cultures yielded zero growth in 80% of the joints in this series, rapid molecular testing via BioFire joint panel PCR should be considered the diagnostic gold standard to prevent critical delays in treatment. Furthermore, the clinical deterioration of our patient on empiric ampicillin/sulbactam (Unasyn) highlights that relying on broad-spectrum antibiotics alone is increasingly unreliable without definitive source control. Our institutional standard supports prompt surgical incision and drainage combined with a two-week course of parenteral ceftriaxone and doxycycline, a combined approach that achieved excellent short-term functional recovery. Ultimately, long-term prospective trials assessing functional outcomes and secondary osteoarthritis rates using this aggressive treatment approach remain necessary.

Clinical Message

Purulent gonococcal septic arthritis frequently presents as an isolated, culture-negative monoarthritis lacking systemic symptoms, making the routine utilization of rapid molecular testing vital to prevent critical diagnostic delays and empiric treatment failures. In an era of rapidly evolving antimicrobial resistance, this case series underscores the necessity of combining prompt surgical incision and drainage with targeted parenteral antibiotics to optimize functional joint outcomes and prevent long-term articular disability.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given the consent for his/ her images and other clinical information to be reported in the journal. The patient understands that his/ her names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Conflict of interest: Nil **Source of support:** None



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Conflict of Interest: Nil

Source of Support: Nil

Consent: The authors confirm that informed consent was obtained from the patient for publication of this article

How to Cite this Article

Yang K, Huang B, Wirth A, Roehr C. Surgical Management of Gonococcal Septic Arthritis: A Case Series and Literature Review. *Journal of Orthopaedic Case Reports* 2026 June;16(06): 589-593.

