Nigerian Medical Journal
NIGERIA MEDICAL ASSOCIATION
Print ISSN 0300-1652, E-ISSN 2229-774X

Case Report

Septic Arthritis Caused by Carbapenem-Resistant Acinetobacter Baumannii with Paradoxical Minocycline Sensitivity: A Case Report

Ankit Batra[1], Ashok Kumar[2], *Aarushi Batra[3],

[1]Department of Orthopaedic Surgery, School of Medical Sciences & Research, Sharda University, Greater Noida, India, [2]Department of Medicine, Santosh Deemed to be University, Ghaziabad, India, [3]Department of Medicine, Santosh Deemed to be University, Ghaziabad, India

Abstract

Multidrug-resistant (MDR) organisms are emerging as an important cause for septic arthritis and one of the major projected reasons for global mortality. Carbapenem-resistant Acinetobacter baumannii (CRAB) is among the most challenging bacteria due to limited and often toxic treatment options, and with documented infection-related mortality up to 70% in some settings, as compared to an approximate 25% for susceptible isolates. We describe a rare case of septic arthritis from Northern India due to a CRAB isolate that was resistant to nearly all routine and last-line antibiotics. However, paradoxically, it remained susceptible only to minocycline. The case was treated by minocycline therapy along with surgical management, resulting in a marked clinical improvement and recovery of functional joint mobility on follow-up. This case report draws attention to new challenges faced by physicians in the management of septic arthritis with increasing carbapenem resistance, particularly in low- and middle-income settings. It supports the relevance of "older" antibiotics such as minocycline, when guided by a culture and sensitivity-based approach, and underlines the importance of strict antimicrobial stewardship to counteract the rising antimicrobial resistance (AMR) challenge.

Keywords: Minocycline, Acinetobacter baumannii, CRAB, Septic Arthritis, Antimicrobial stewardship, Case Report

***Correspondence** Aarushi Batra, Department of Medicine, Santosh Deemed to be University, Ghaziabad, India, Email: aarushibatra2305@gmail.com, Mailing Address: Santosh Deemed to be University, Pratap Vihar, Ghaziabad, 201009, India

How to Cite: Batra A, Kumar A, Batra A. Septic Arthritis Caused by Carbapenem-Resistant Acinetobacter baumannii with Paradoxical Minocycline Sensitivity: A Case Report. Niger Med J 2025; 67 (1): 2868-2874. https://doi.org/10.71480/nmj.v67i1.1170

Quick Response Code:

Introduction

Septic arthritis is a widely recognized medical emergency that demands urgent intervention to prevent permanent joint damage. Staphylococcus aureus continues to be the leading cause of infection, though multidrug-resistant (MDR) gram-negative bacteria (GNB) are being increasingly implicated, particularly in hospital-acquired infections (HAIs). [1]

Among these pathogens, Acinetobacter baumannii has transitioned from being an opportunistic HAI pathogen to a "critical priority threat" according to the WHO and an "Urgent Threat" per the CDC. [2,3] It is also emerging as an increasingly prevalent pathogen for complicated musculoskeletal and skin-and-soft-tissue infections (SSTIs) worldwide, with the all-cause mortality exceeding 20% in some settings. [4] CRAB represents the most clinically challenging phenotype, with global resistance rates reaching up to 90–95% in regions of Latin America. [5]

India carries one of the highest global burdens of CRAB. According to the 2023 ICMR, Antimicrobial Resistance Research and Surveillance Network (AMRSN) report, carbapenem resistance has reached up to almost 70% in tertiary centres. [6] Recent data from Northern India show resistance to imipenem and meropenem can be as high as 98.4%, underscoring the limited options available to clinicians for managing deep-seated infections. [7]

While historically associated with respiratory samples, recent data from Northern India show A. baumannii in 27.1% of pus samples. This highlights its local emergence in deep-seated bone and joint infections, where options are now often restricted to colistin or minocycline in many cases. [8]

In this case report, we describe the clinical presentation and course of a patient with septic arthritis caused by a CRAB isolate with a focus on its unusual antibiotic sensitivity profile. This highlights the new diagnostic and therapeutic challenges faced by physicians in the management of MDR septic arthritis, particularly in low and middle-income settings, and reinforces the importance of culture-directed therapy to combat AMR.

Case Presentation

Patient information: A 42-year-old man presented with a three-month history of pain and swelling in his right knee associated with discharge of pus for the past two months. He reported no history of trauma, intra-articular injections, prior surgery, or recent hospitalization, raising the possibility of a community-acquired source for this infection. He denied use of antibiotics during and prior to this presentation. His medical history was unremarkable, with no diabetes mellitus, hypertension, tuberculosis, or known immunodeficiency. He reported no substance use and no similar past episodes.

Clinical findings: On physical examination, he was afebrile with stable vital signs. The right knee appeared to be swollen and tender, with a 20-degree fixed flexion deformity. A discharging sinus was seen in the right popliteal fossa.

Diagnostic assessment: Initial laboratory findings revealed a total leukocyte count of 22.38 x 10^3/µL, CRP of 240 mg/L, and hemoglobin level at 9.3 g/dL. MRI image of the right knee (T1, T2, and STIR sequences) demonstrated extensive bony destruction with numerous large areas of cortical breach and articular devastation at the distal femur, proximal tibia, and fibula, most suggestive of septic arthritis per radiology read. (Fig. 1) Initial differential diagnosis included chronic osteomyelitis versus septic arthritis.

Purulent material obtained from the sinus tract was sent for culture and sensitivity analysis. Culture revealed growth of *Acinetobacter baumannii* identified using the VITEK 2 automated system. Antimicrobial susceptibility testing (AST) performed according to CLSI guidelines showed resistance to all reported antibiotics, including meropenem, imipenem, piperacillin/tazobactam, ceftazidime, and ciprofloxacin. However, the isolate remained susceptible exclusively to minocycline (Table 1).

Antibiotic	**Result**
Meropenem	Resistant (R)
Imipenem	Resistant (R)
Ciprofloxacin/levofloxacin	Resistant (R)
Amikacin/gentamicin	Resistant (R)
Piperacillin/tazobactam	Resistant (R)
Minocycline	Sensitive (S)
Polymyxin b / colistin	Intermediate (I)

Table 1: Antimicrobial susceptibility profile of *A. baumannii* demonstrating resistance to all reported antibiotics, except minocycline.

Therapeutic Intervention and follow-up: The patient was treated with a six-week course of oral minocycline (100 mg twice daily) and surgical management consisting of open arthrotomy with debridement and drainage of purulent material. The patient was fully compliant and tolerated minocycline without any adverse effects. At the eight-week follow-up patient demonstrated significant clinical recovery with resolution of pain and restoration of functional range of motion. Written informed consent was obtained from the patient for publication of clinical details and associated images. The overall clinical course is summarized in Table 2.

Time Point	Key Clinical Events
3 months before presentation	Onset of right-knee pain and swelling.
2 months before presentation	Development of purulent discharge from a sinus tract.
Initial Presentation	Afebrile; swollen, tender right knee with 20° fixed flexion deformity; discharging sinus in the popliteal fossa.
Laboratory & Imaging Findings	TLC 22.38 × 10^3/µL, CRP 240 mg/L, Hb 9.3 g/dL. MRI showed extensive bony destruction and features of septic arthritis.
Microbiological diagnosis	Sinus tract pus culture grew *Acinetobacter baumannii* (VITEK 2); AST showed resistance to all tested antibiotics except minocycline.
Treatment initiated	Oral minocycline 100 mg twice daily started; open arthrotomy with debridement and drainage performed.
Completion of Therapy (6 weeks)	Completion of minocycline therapy without any observed adverse effects.
Follow-up (8 weeks)	Significant clinical improvement with resolution of pain and restoration of functional joint mobility.

Table 2: Timeline table summarizing key events.

Discussion

This case demonstrates the growing complexity of managing septic arthritis in an era of MDR bacterial infections.

CRAB caused septic arthritis, especially in native joints, is rarely reported in existing literature despite the organism's increasing involvement in musculoskeletal infections in high-AMR areas.

In previous case reports of A. baumannii septic arthritis, treatment failure was common, along with prolonged hospital stay and reliance on nephrotoxic therapeutic agents. [9] In comparison, our patient showed a favourable response to minocycline, an older tetracycline agent that has shown preserved activity against certain CRAB isolates.

The "paradoxical" sensitivity of this isolate may represent old tetracyclines that have been spared due to "selective pressure", which could possibly be driven by inappropriate use of broad-spectrum newer generation antibiotics for self-limiting viral infections. [10,11] Another possible mechanism is minocycline's distinct molecular structure that lets it bypass the well-known efflux pumps (e.g., TetA/B) in bacteria and maintain its high-affinity for ribosomal binding. [12]

Minocycline also has pharmacological properties that are beneficial to musculoskeletal infections. It is lipophilic and penetrates well into synovial fluid and bone. Furthermore, an almost 100% oral bioavailability makes it a safe and economic out-patient-friendly alterative for toxic parenteral drugs. [13]

Conclusion

As AMR continues to narrow our therapeutic window, it is important for clinicians to be aware of these unusual susceptibility patterns where empiric regimens may be ineffective. This case demonstrates that "older" antibiotics such as minocycline in combination with surgical drainage are still viable therapeutic options in the new era of carbapenem resistance. Strengthening of culture and susceptibility-directed antibiotic policy and rigorous global antimicrobial stewardship are essential to face the emerging AMR burden.

Authors' Declaration

All authors have read and approved the final manuscript. The authors meet the criteria for authorship as defined by the journal and affirm that the manuscript represents honest and original work. The authors declare no conflicts of interest.

Ethical Approval

This case report did not require ethical approval in accordance with the policies of our institutions.

Informed Consent Statement

Written informed consent was obtained from the patient for publication of the clinical details and associated images.

References

1. Aggarwal R, Mahajan P, Pandiya S, Bajaj A, Verma SK, Yadav P, et al. Antibiotic resistance: a global crisis, problems and solutions. Critical Reviews in Microbiology [Internet]. 2024 Feb 21;50(5):896–921. Available from: https://doi.org/10.1080/1040841x.2024.2313024

2. Miller WR, Arias CA. ESKAPE pathogens: antimicrobial resistance, epidemiology, clinical impact, and therapeutics. Nature Reviews Microbiology [Internet]. 2024 Jun 3;22(10):598–616. Available from: https://doi.org/10.1038/s41579-024-01054-w

3. Centers for Disease Control and Prevention. CARBAPENEM-RESISTANT ACINETOBACTER [Internet]. 2019. Available from: https://www.cdc.gov/antimicrobial-resistance/media/pdfs/acinetobacter-508.pdf

4. Boutzoukas A, Doi Y. The global epidemiology of carbapenem-resistant Acinetobacter baumannii. JAC-Antimicrobial Resistance [Internet]. 2025 Jul 2;7(4):dlaf134. Available from: https://doi.org/10.1093/jacamr/dlaf134

5. Ma C, McClean S. Mapping Global Prevalence of Acinetobacter baumannii and Recent Vaccine Development to Tackle It. Vaccines [Internet]. 2021 May 31;9(6):570. Available from: https://doi.org/10.3390/vaccines9060570

6. National Programme on AMR Containment, National Centre for Disease Control (NCDC), Directorate General of Health services, Ministry of Health & Family Welfare, Ministry of Health and Family Welfare. National Antimicrobial Surveillance Network (NARS-Net) annual report [Internet]. 2023. Available from: https://ncdc.mohfw.gov.in/wp-content/uploads/2024/03/1257263841692628161.pdf

7. Jorwal A, Sharma S, Bairwa K, Sharma R, Rajni E. Silent crisis in the intensive care unit: Current antimicrobial resistance landscape in an Indian hospital. Journal of Postgraduate Medicine [Internet]. 2025 Jul 1;71(3):122–7. Available from: https://doi.org/10.4103/jpgm.jpgm_396_25

8. Goel V, Bansal J, Pal N, Singh K, Manocha H, Sahni AK. Trends of carbapenem resistance in Acinetobacter baumannii, Pseudomonas aeruginosa and Enterobacterales in a tertiary care hospital. IP International Journal of Medical Microbiology and Tropical Diseases [Internet]. 2025 May 15;11(2):214–8. Available from: https://doi.org/10.18231/j.ijmmtd.2025.034

9. Duan X, Yang L, Xia P. Septic arthritis of the knee caused by antibiotic-resistant Acinetobacter baumannii in a gout patient: a rare case report. Archives of Orthopaedic and Trauma Surgery [Internet]. 2009 Aug 25;130(3):381–4. Available from: https://doi.org/10.1007/s00402-009-0958-x

10. Saleem Z, Moore CE, Kalungia AC, Schellack N, Ogunleye O, Chigome A, et al. Status and implications of the knowledge, attitudes and practices towards AWaRe antibiotic use, resistance and stewardship among low- and middle-income countries. JAC-Antimicrobial Resistance [Internet]. 2025 Mar 4;7(2):dlaf033. Available from: https://doi.org/10.1093/jacamr/dlaf033

11. Murray JL, Leung DT, Hanson OR, Ahmed SM, Pavia AT, Khan AI, et al. Drivers of inappropriate use of antimicrobials in South Asia: A systematic review of qualitative literature. PLOS Global Public Health [Internet]. 2024 Apr 4;4(4):e0002507. Available from: https://doi.org/10.1371/journal.pgph.0002507

12. Lashinsky JN, Henig O, Pogue JM, Kaye KS. Minocycline for the Treatment of Multidrug and Extensively Drug-Resistant A. baumannii: A Review. Infectious Diseases and Therapy [Internet]. 2017 Mar 29;6(2):199–211. Available from: https://doi.org/10.1007/s40121-017-0153-2

13. Cartau T, Michon J, Verdon R, Baldolli A. Oral tetracyclines for bone and joint infections: what do we know? Journal of Bone and Joint Infection [Internet]. 2025 Apr 8;10(2):143–54. Available from: https://doi.org/10.5194/jbji-10-143-2025