

Case Report

The significance of *Klebsiella pneumoniae* spondylodiscitis in the Indian context

Shayosree Sarkar*, Seema P. Khetan, Sunanda Zodpey

Department of Microbiology, Government Medical College and Hospital, Nagpur, Maharashtra, India

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*Correspondence:

Dr. Shayosree Sarkar,

E-mail: drshayosree.sarkar@gmail.com

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ABSTRACT

A rare case of spontaneous spondylodiscitis caused by *Klebsiella pneumoniae* in a 37-years-old man who presented with radiating low back pain is described in this case report. Increased erythrocyte sedimentation rate and C-reactive protein level were pertinent laboratory findings. Magnetic resonance imaging revealed a paravertebral epidural collection at the L5–S1 level of the spine suggestive of spondylodiscitis. Repeated spinal surgeries and HBsAg seropositive status were the risk factors in this patient. Pus from the epidural abscess on culture grew *Klebsiella pneumoniae*. He was treated with an intravenous antimicrobial combination of meropenem and levofloxacin which resulted in disappearance of the pain. Extended infusion of meropenem played a key role in the prompt recovery. Two months later, MRI showed substantial improvement of the lesions.

Keywords: Case report, *Klebsiella pneumoniae*, Meropenem, Spondylodiscitis

INTRODUCTION

Spondylodiscitis is an infectious pathology of the spine that is challenging to diagnose in its early stages and can lead to significant morbidity.¹ Spontaneous infectious spondylodiscitis (SIS) is an uncommon cause of low back pain in adults.² The common organisms associated with SIS are *Staphylococcus aureus*, *Staphylococcus epidermidis*, *E. coli*, *Mycobacterium tuberculosis* and fungal agents like *Aspergillus* spp. However there have been reports of *Klebsiella* species associated SIS cases.^{2–5} A recent Asian review warned that multi-drug resistant (MDR) *Klebsiella pneumoniae* is a “clear and present danger” requiring strong surveillance.⁶ *Klebsiella pneumoniae* infections are predominantly associated with respiratory tract infections, but their manifestation in the spine is exceedingly rare. The major risk factors being elderly age groups with chronic diseases such as diabetes mellitus and renal failure, steroid and other immunosuppressive therapies, sickle cell disease, Human Immunodeficiency Virus (HIV) infection, intravenous drug abuse, liver failure/cirrhosis or higher rate of surgery.⁷ Bacteria can access the spine by hematogenous

spread from a distant site of infection (e.g. skin or soft tissue, intravenous catheter) or direct invasion from local spinal procedures. The risk of secondary bacteraemia due to hematogenous spread of such infections can further worsen the prognosis.⁸ Despite improved antibiotic and surgical treatments, hospital stays can average 30–57 days and mortality can be as high as 2–17%.^{9–11} Cases of spondylodiscitis are often mis-diagnosed as spinal tuberculosis or other fungal infections, resulting in non-standardized treatments and an increased rate of morbidity. This study aims to establish the significance of early diagnosis and treatment of *Klebsiella pneumoniae* infection in a case of spondylodiscitis.

CASE REPORT

We report the case of a HBsAg seropositive 37-years-old male, who presented with lower back pain radiating to the lower limbs. A known case of L5–S1 prolapsed intervertebral disc and post-laminectomy. In the event of re-evaluation of the new onset low back pain, MRI showed paravertebral epidural collection at the L5–S1 vertebral level, suggestive of spondylodiscitis. Initially, diagnosed

as a presumptive case of spinal tuberculosis at a local hospital and was treated with anti-tuberculosis medications. As the treatment failed to alleviate his symptoms, he was admitted for re-exploration. Specimen from the epidural abscess was sent for routine microbial culture and GeneXpert for *Mycobacterium tuberculosis*. The initial culture reports showed the growth of *Klebsiella pneumoniae* but GeneXpert for tuberculosis bacilli came negative. A brief course of meropenem was initiated following the results of antimicrobial susceptibility testing. Within 30 days from the date of surgery, the patient developed febrile spikes and purulent discharge at the surgical site. Persistence of symptoms led to re-exploration and repeat culture of the abscess from the surgical site. Standard microbiological procedure was followed for processing the pus from the epidural abscess.¹² Lactose-fermenting, non-motile gram-negative bacilli was identified to the species level as *Klebsiella*

pneumoniae by VITEK 2 (BioMérieux) compact microbiology analyser. Antimicrobial susceptibility was determined by VITEK 2 antimicrobial susceptibility testing (AST) card, according to Clinical and Laboratory Standards Institute (CLSI) recommendations as shown in table 1.¹³ MDR strain of *Klebsiella pneumoniae*, co-producing ESBL and MBL was reported. Hence, this was a case of spondylodiscitis associated with MDR *Klebsiella pneumoniae* infection. The patient's symptoms significantly improved following a combined antimicrobial therapy with injectable levofloxacin and extended infusion of meropenem. The injectable antibiotics were continued for 14 days and then de-escalated to oral therapy at the time of discharge. Follow-up lumbar MRI indicated the complete resolution of vertebral and paravertebral abscesses. To our knowledge this is the first case of spondylodiscitis associated with *Klebsiella pneumoniae* reported from central India.

Table 1: Drug susceptibility of the detected bacteria.

Drug	Minimum inhibitory concentration (µg/ml)	Susceptibility
Amoxicillin/Clavulanic acid	≥32	Resistant
Piperacillin/Tazobactam	≥128	Resistant
Cefuroxime	≥64	Resistant
Ceftriaxone	≥64	Resistant
Cefepime	≥32	Resistant
Ertapenem	≥8	Resistant
Imipenem	8	Resistant
Meropenem	≥16	Resistant
Gentamicin	≥16	Resistant
Ciprofloxacin	≥4	Resistant
Colistin	≤0.5	Intermediate

*Susceptibility of each drug was determined as per the CLSI.

DISCUSSION

This case report underscores the critical importance of recognizing *Klebsiella pneumoniae* as an increasingly relevant pathogen in spondylodiscitis, particularly within the Indian healthcare landscape. In recent years, there has been a rise in incidence of spondylodiscitis. Most cases follow interventional spinal treatment.¹⁴ As tuberculosis traditionally remains a predominant cause of spinal infections in India, the causative agent of spondylodiscitis is often mis-diagnosed. Previous surgical history or presentation of atypical features that might not align with classic tuberculosis, necessitates a heightened degree of clinical suspicion of other causative organisms like MDR *Klebsiella pneumoniae* in the differential diagnosis for spondylodiscitis.

The unique challenges posed by *Klebsiella pneumoniae* are multifaceted. It is a significant contributor to hospital-acquired infections (HAIs) and often associated with patients who have undergone recent spinal surgery, as seen in our patient. A major concern is the alarming prevalence of MDR *Klebsiella pneumoniae* strains in India, particularly those producing carbapenemases like MBL. In

this case, the isolated strain of *Klebsiella pneumoniae* was a co-producer of ESBL and MBL, therefore making it difficult to treat. The increasing prevalence of drug-resistant strains highlights the urgent need for robust infection control measures, early and accurate microbiological diagnosis, judicious antibiotic stewardship and continued research to establish optimal, evidence-based treatment protocols for *Klebsiella pneumoniae* spondylodiscitis in this region. Long-term infusions of β-lactam antibiotics like meropenem achieve the target pharmacodynamic efficacy more effectively than short infusions.¹⁵

CONCLUSION

Altering the mode of administration of meropenem from bolus to extended infusion and prolonging the duration of antimicrobial therapy ensured complete resolution of the infection. Cultures of specimen from the surgical site was repeated until no further growth of *Klebsiella pneumoniae* was noted. Given the high rates of drug resistance in *Klebsiella pneumoniae*, close monitoring of clinical and radiological response (via MRI) is crucial. Long-term follow-up is necessary to ensure complete eradication and

prevent recurrence, especially considering the capabilities of *Klebsiella pneumoniae*, which can contribute to treatment failures.

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