

CASE REPORT

Combined MRSA Spondylodiscitis Managed Conservatively in a Dialysis Patient: A Case Report

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Abstract

Spinal infections comprise a large spectrum of clinical manifestations with multiple etiologies. Therefore, early detection and management are imperative to reduce morbidity and potential mortality associated with such conditions. Treatment modalities include using antibiotics based on the etiological agent and the neurosurgical team's possible intervention involvement. We present the case of a 52-year-old male patient who presented with lower back pain and was diagnosed with MRSA spondylodiscitis confirmed radiologically with MRI spine on a background of recent admission with MRSA line sepsis that was confirmed microbiologically through blood cultures. The patient was treated conservatively with a prolonged course of antibiotics and was followed up routinely to monitor response to treatment. Our case report describes MRSA spondylodiscitis clinical manifestation, diagnostic tests, treatment plan, and long-term outcome.

Keywords: Epidural Abscess, MRSA, Spinal Infection, Spondylodiscitis, Vancomycin.

Introduction

A rare and severe neurological life-threatening condition called pyogenic spinal infection is an invasion and growth of any pathogen in the vertebral column. Pyogenic spinal infection is also known collectively as spondylodiscitis because it includes discitis and vertebral osteomyelitis. Pyogenic spondylodiscitis is uncommon, yet it represents 3-5% of all cases of osteomyelitis globally.¹ However, epidemiological data regarding pyogenic spondylodiscitis in the Middle East are unknown. Pyogenic spinal infections are commonly caused

by *Staphylococcus aureus*, followed by *Escherichia coli*, a Gram-negative pathogen with a frequency of 11%-25%. Finally, *Mycobacterium tuberculosis* is the most common pathogen globally.² Pyogenic spondylodiscitis begins after inoculating the vertebral column through three distinct pathways; either direct inoculation by penetrating trauma, contiguous spread from nearby soft tissue infection, or hematogenous spread from a distant source of infection.³ Patients with diabetes and underlying immunodeficiency are susceptible to such infection.⁴

One strain of *S. aureus* challenges the treatment of spondylodiscitis in spinal infection surgery called Methicillin Resistant *Staphylococcus aureus* (MRSA). The incidence of MRSA infection in spondylodiscitis ranges from 6-8%.^{5,6}

Patients suffering from spondylodiscitis manifest early symptoms, including fever, back pain, spinal cord or nerve compression, and tenderness over the spine. However, the specific signs of the infection are frequently absent, which results in a delayed and accurate diagnosis. Unfortunately, this delay can result in complications such as abscess formation.⁴ So far, MRI (Magnetic Resonance Imaging) is the best mode of diagnosing the disease⁴, with a reported sensitivity of 91% and specificity of 96%.³ The major contraindication of MRI imaging is the presence of ferromagnetic material in the human body. Nevertheless, other imaging modalities can aid in diagnosing pyogenic spinal infections, such as radionuclide scan with a reported sensitivity of 90-95% yet low specificity.³ The laboratory investigations used with imaging are complete blood counts for leukocytosis, inflammatory markers, e.g., C-reactive protein and procalcitonin levels, erythrocyte sedimentation rate, and blood cultures.

One has to consider other diagnoses in a patient presenting with back pain, such as malignancy, trauma, osteoporosis, degenerative disc disease, etc. Therefore, it is paramount to differentiate mechanical from neuropathic pain as a first step in diagnosing patients presenting with back pain.⁷

Treating infections caused by bacteria are similar across the board; however, with MRSA spondylodiscitis, therapy-using antibiotics is far more challenging than non-MRSA spondylodiscitis.^{5,6} This report aims to present a case of MRSA spondylodiscitis complicated with multiple abscesses treated with Vancomycin.

Case presentation

A 52-year-old male known case of diabetes mellitus type two, hypertension, and end-stage kidney disease on hemodialysis presented with a history of lower back pain that started three months following a fall in June 2019. The pain was progressive and radiated to the groin area and upper side of the thighs. It was

not associated with lower limb weakness, urinary or fecal incontinence, loss of lower limb sensation, or fever. On physical examination, the patient had lower back tenderness and a reduced range of motion upon bending or turning with no pain upon percussion.

Following the fall in June 2019, the patient went to the emergency as the patient had a fall and documented fever on presentation. A series of investigations were carried out, such as a CT brain which reported negative for any bleeding and was referred to nephrology for further evaluation. Upon evaluation by a nephrologist, a septic screen was conducted, which included blood and urine culture. The culture came positive for MRSA from the hemodialysis line; thus, he started on Vancomycin 1g IV during his dialysis session and was admitted with the impression of MRSA line sepsis. However, the patient signed against medical advice and received the remaining course of antibiotics with his dialysis session.

In September 2019, he presented with a history of persistent lower back pain that was tender on palpation and reduced range of movement in the lumbar area, restricting his movement from turning side to side and bending. Initially, an X-ray of the lumbar spine was carried out, which showed lytic lesions of L2 and L3 bodies, and a CT of the lumbar spine showed evidence of bony reabsorption of the L4 vertebral end plate. Magnetic resonance imaging (MRI) was done and reported an erosion with irregularity of the superior endplate of L4 affecting the anterior aspect and edema noted in the inferior aspect of the L3 vertebral body and almost the entire L4 vertebral body, an impression of L3-L4 discitis was made (Figure 1A). Due to the recent history of MRSA line sepsis, the patient was treated with Linezolid for presumptive Methicillin-resistant *Staphylococcus aureus* (MRSA) discitis. The MRI scanning could not rule in or rule out infection due to lack of contrast, however; a high possibility of discitis is taken into consideration with recent MRSA infection and started on Linezolid 600mg IV twice daily for one week, and upon discharge, 600mg twice daily orally for five more weeks.

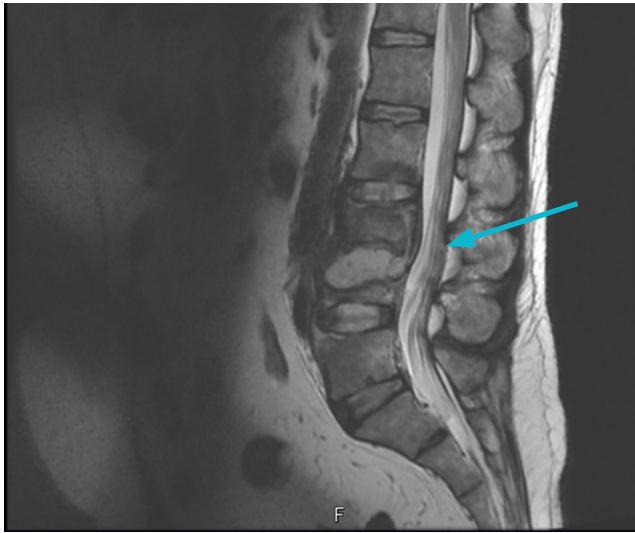


Figure 1A : Spinal Magnetic Resonance Imaging (T2WI Sagittal). Mild amount of fluid at the L3-4 disc with significant erosion of the superior endplate of L4 and more than 70% loss of the L4 vertebral body (blue).

Although the patient completed six weeks of antibiotics course for presumptive MRSA discitis patient's medical condition was not improved. Furthermore, he started having difficulty walking and later needed a wheelchair. MRI was repeated, and compared to the previous MRI, there has been significant interval progression of the severe discitis at L3-4 and L4-5 with significant destruction of the L4 vertebral body and, to a lesser extent, the L3 with collection seen at L3-4 and L4-5 intervertebral disc with the abscesses extending to the anterior aspect of the psoas muscle more on the left side and the erector spinae more on the right side (Figure 2A and Figure 2B). The abscess in the right erector spinae measured 2.8cm with an impression of significant interval progression of the known discitis, which is now complicated by multiple abscesses. Inflammatory marker at this time showed a Procalcitonin test (PCT) of 7.49 ng/ml, C-reactive protein (CRP) 364 mg/L, erythrocyte sedimentation rate (ESR) 88mm/h, and blood culture was positive for MRSA. After discussion with the neurosurgical team, surgical intervention at that time was deemed inapplicable because of the high operative risk associated with his multiple comorbidities and absence of neurological deficit, so the decision was made for conservative medical management with antibiotics. In addition, the interventional radiologist was involved in obtaining a specimen

or an aspirate of the abscess for microbiological analysis; however, with repeated attempts, the radiologist could not obtain a specimen.



Figure 2A : Spinal Magnetic Resonance Imaging (T2WI Sagittal). Showing significant destruction of the L4 vertebral body

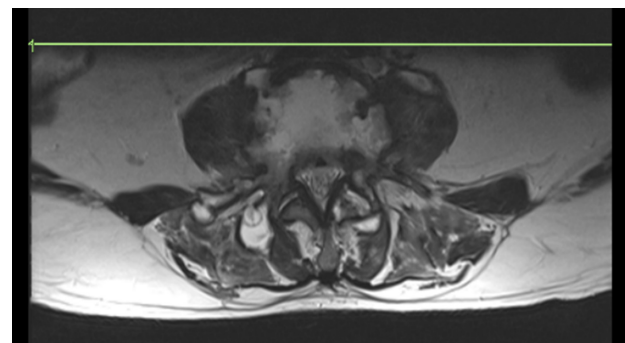


Figure 2B : Spinal Magnetic Resonance Imaging (T2WI Axial). Showing complication by multiple abscesses (yellow).

The patient underwent close follow-up while receiving intravenous Vancomycin 1g with dialysis sessions as per kidney dialysis unit protocol, with close monitoring of Vancomycin level (targeting a Pre-Vancomycin trough level between 15-20 ug/ml). The patient was getting dialyzed three times per week; thus, an optimum way to complete the preferred course of antibiotics is to administer the dose with every dialysis session for a prolonged period. After six months of antibiotics treatment, the patient's medical condition improved significantly, and he started to walk without support with a full range of back movement. Moreover, the inflammatory markers normalized as follows: (PCT 0.21 ng/ml, CRP 10.17 mg/L, ESR 41mm/1hr) and repeated

blood cultures were negative. MRI repeated at this point showed a significant improvement compared to the prior MRI, with complete resolution of the previously noted psoas and paraspinal collections, with multilevel degenerative changes with no definite active infection (Figure 3). The patient was asymptomatic on the follow-up visits, with no active complaints. The patient was evaluated regularly during his dialysis session and followed up in the outpatient clinic with the infectious disease physician once every three months to monitor his response to treatment and any clinical improvement in mobility.

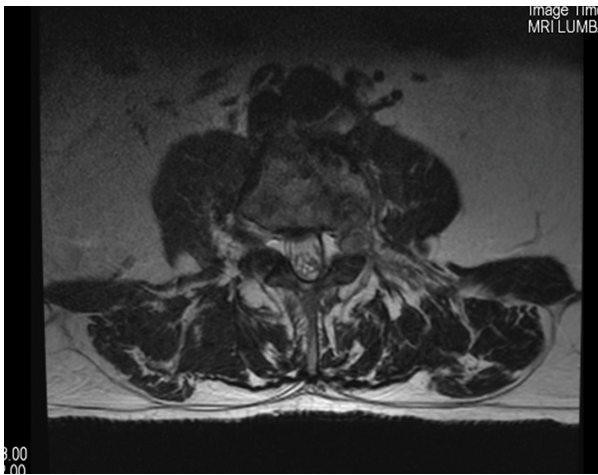


Figure 3 : Spinal Magnetic Resonance Imaging (Axial T2WI). The previously abscess are not currently appreciated.

Discussion

S. aureus is a gram-positive pathogen that cause various clinical diseases, including bloodstream infection, pneumonia, bones, and joint infections. This paper will delimit its discussion only on the complications of vertebral discitis and vertebral osteomyelitis by *S. aureus*.

Vertebral osteomyelitis, spondylodiscitis, is a vertebral and intervertebral infection. Vertebral discitis, on the other hand, is an infection limited to intervertebral disc space. Both infections are widely identified as caused by *S. aureus* and other infectious etiologies such as *Escherichia coli*, *Mycobacterium tuberculosis*, and, more recently, brucellosis in the Middle East. Immunocompromised individuals and those on renal replacement therapy are most susceptible to such infections.^{6,8} Almost fifty percent of those infections are caused by the MRSA strain of *S. aureus*.⁹

Studies also indicate that infection with *Staphylococcus* species commonly affects the spinal segments, such as the lumbar and the lumbosacral; this, together with the paraspinal and psoas muscle infections.⁹

Staphylococcus infection could further spread and cause the development of secondary epidural abscesses, paravertebral muscle abscesses, psoas muscle abscesses (PMA's) and the prevertebral collection.¹⁰

High index of suspicion in early signs and symptoms of the infection can help in early detection and treatment. Inflammatory markers, blood cultures, and MRIs are the most critical investigations in these cases to confirm the diagnosis.^{4-6,8,9}

The initial presentation of the patient's MRSA spondylodiscitis included back pain and tenderness that was started on Linezolid for six weeks, keeping with the guidelines for treating pyogenic spinal infections. Unfortunately, there was no clinical improvement in the patient's condition, which affected the patient's mobility; this has led to the consideration of changing antibiotics to vancomycin with every dialysis session, as the patient requires a prolonged course of intravenous vancomycin. In addition, the patient was counseled regarding treatment failure, which was anticipated as the patient is immunocompromised and deferring from surgical intervention carries a high risk of relapse.

A study by Po-Yu *et al.*⁹ found that early medical treatment following confirmation of the diagnosis was effective and yielded desirable results among 70% of the sufferers.

Vancomycin, a glycopeptide antibiotic, is one effective medication that treats methicillin-resistant *S. aureus* infections. Although it works effectively in treating bacterial spinal epidural abscess^{9,11}, it has been recommended in some studies that Vancomycin and a combination of other antibiotics can be used for highly effective treatment outcomes.^{6,11}

When used as a monotherapy, Vancomycin showed excellent results. Evidence to back this up was presented by Takahiro *et al.* and Po-Yu, *et al.* in managing surgery-related post-operative

complications in pressure sores, wound infections, and other complications.^{5,9}

A recent meta-analysis was conducted to evaluate the efficacy of the use of linezolid over vancomycin. Theoretically, the effectiveness of linezolid should be better than vancomycin.¹² However, further randomized controlled trials with a larger sample size should be conducted to evaluate this conclusion.¹²

The optimum duration of antimicrobial therapy is six weeks, irrespective of the culture results, established in a recent study that six weeks of antibiotics is not inferior to twelve weeks of antibiotics.^{13,14}

Deferring from surgical intervention carries a high risk of treatment failure, especially in those with neurological deficits, advanced age above 65, and concurrent diabetes.¹⁵ In essence, antimicrobial therapy driven by evidence-based data and surgical intervention yields a better outcome which has been frequently reported in the literature.

Conclusion

Management of MRSA spinal infection is challenging because delay in treatment is detrimental, and patients are usually unstable with the possibility of impending neurological compromise. Therefore, surgical treatment is vital in some cases, combined with antibiotics.

In our case, the neurosurgical team decided that no surgical intervention was possible because of the high operative risk associated with his multiple comorbidities and absence of neurological deficit; hence medical treatment with antibiotics was commenced, although a high rate of failure was expected because of the complexity of the infection. The duration of treatment was difficult to determine, so it was guided by the clinical status of the patient and the follow-up radiological evaluation.

Conflict of interest

The authors declare no conflict of interest.

Ethical approval

The case report was approved by the Head of Research and Ethics Committee at Bahrain Defense Force Hospital, Kingdom of Bahrain.

Informed consent

An informed consent was obtained from the patient to use information and photography.

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