

Case Report – Polymicrobial Lumbar Vertebral Osteomyelitis

Pien-Ming Leo, Boon-Yong Low

*Department of Orthopaedic Surgery
Changi General Hospital
Singapore*

ABSTRACT

Vertebral osteomyelitis may be the result of tuberculus or pyogenic infection. Worldwide, tuberculus infection is still the cause for the largest proportion of vertebral osteomyelitis, this being more common in third world countries where the incidence of tuberculosis infection is high. Most pyogenic infections that we encounter are monomicrobial infections from hematogenous spread of a known source¹. We herein report a case of lumbar vertebral osteomyelitis with polymicrobial gram negative infection which was treated successfully by percutaneous drainage of the abscess collection and intravenous antibiotics administration. This report further discusses the options and indications available for treatment of vertebral osteomyelitis.

INTRODUCTION

Vertebral osteomyelitis accounts for approximately 1.5 to 4 percent of all cases of osteomyelitis². The diagnosis of vertebral osteomyelitis is often delayed^{3,4} due to the non specific presenting symptoms of the patient which are often ignored by the patient. Often, this is compounded by the fact that the patients may be immunocompromised as a result of a disease condition (e.g. diabetes) or medical therapy (e.g. chemotherapy, steroid use, etc) that may blunt the usual response to infection. We report a case of a 46-year old Chinese gentleman with comorbidities of diabetes mellitus, hypertension and ischaemic heart disease who presented with polymicrobial gram negative pyogenic vertebral osteomyelitis affecting the L5 vertebral body and a left psoas abscess collection. His condition deteriorated soon after admission and he developed septic shock and acute renal failure requiring inotropic support and high dependency monitoring. However, he was adamant against operative debridement and drainage of the abscess and was treated instead with percutaneous drainage together with intravenous antibiotics. His condition improved 6 days

after percutaneous drainage and his renal function recovered. He thereafter completed 6 weeks of intravenous antibiotics and subsequently discharged when his inflammatory markers normalized. While surgery is traditionally considered for this group of patients who have vertebral osteomyelitis complicated with an abscess collection and causing septic shock, our patient managed to do well with conservative management. In addition, while pyogenic osteomyelitis is frequently a monomicrobial infection, our patient had a polymicrobial gram negative infection.

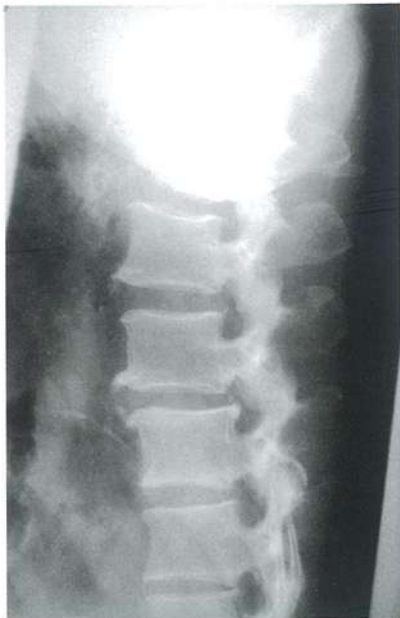
CASE REPORT

A 46-year old Chinese gentleman with co-morbidities of diabetes, hypertension and ischaemic heart disease presented to the orthopaedic department with chief complaints of back pain of 1 month duration associated with recent onset of fever, chills and rigors of 1 day duration. The patient had blunt trauma to the lower back a month ago as a result of an alleged assault and had attributed his backache to a back contusion. The back pain was confined to the lumbar region and initially mechanical in nature but it progressively became more constant with presence of night pain. The patient only came for medical attention when he developed fever, chills and rigors. At presentation, the patient had a temperature of 39.9 degrees Celsius. His other vital parameters were stable with his blood pressure measured at 130/90. Physical examination showed that he had tenderness over the lumbar region of his back as well as pain on extension of his left hip (psoas spasm). He had no sensory or neurological deficits with full power of both lower limbs. His anal tone was good and there was no saddle anaesthesia. Systemic examination of the patient was essentially normal with no evidence of a septic source.

A septic workup was ordered for the patient. Blood cultures were positive for E coli. His chest xray was clear and his urine culture had no significant bacterial growth.

Retrospectively his lumbar spine xray showed destruction of anterior part of the superior end plate of the L5 vertebral body (Figures 1 and 2).

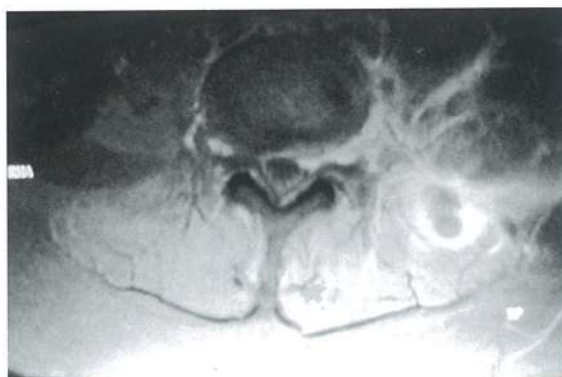
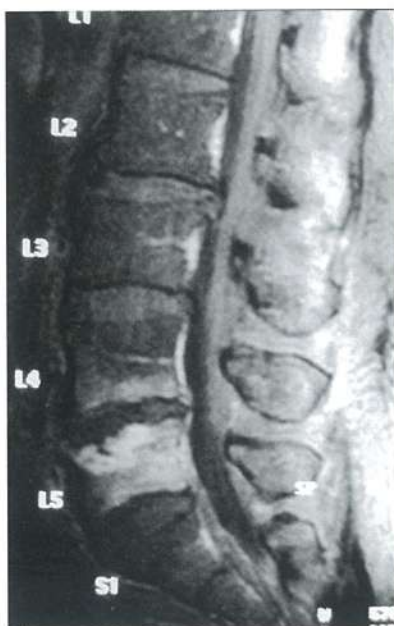
*Correspondence should be sent to:
Dr Pien-Ming Leo
Department of Orthopaedic Surgery,
Changi General Hospital
Singapore 529889
E-mail: sean_leo@hotmail.com*



Figures 1 and 2. Showing loss of lumbar lordosis in the lateral lumbar spine xray and a close up view of the L5 superior end plate.

His total white cell count was raised at 18.8 and the neutrophil count was 85%. Inflammatory markers were both raised with ESR at 125 and CRP at 433.

A MRI was also ordered for him in view of the hematological and biochemical blood picture. This showed a L5 vertebral body osteomyelitis with psoas abscess (Figures 3 and 4).



Figures 3 and 4. Showing L5 involvement on MRI scan and an abscess collection in the left psoas region

He was started empirically on intravenous cloxacillin and penicillin and this was adjusted to intravenous ceftriaxone and oral ciprofloxacin after the blood culture results returned after 48 hours. A percutaneous aspirate of the psoas abscess was also done for him and this yielded 30 ml of brownish fluid which grew both *E coli* as well as *Klebsiella sp.* Both microbes were sensitive to ceftriaxone and ciprofloxacin. Acid fast bacilli staining were negative. Mantoux testing was also negative and tuberculus DNA testing by polymerase chain reaction was also negative. His

clinical condition initially seemed to improve with his fever subsiding. However his total white cell count remained raised at 18 to 20.

Four days after his presentation, the patient suddenly developed hypotension of 80/40 with a tachycardia of 150 beats per minute. He was however afebrile at that time. His total white count was high at 24.3 and the neutrophil count was 86%. His renal function was also noted to be impaired with a creatinine level of 469 from a normal value on admission. There was no neurological deficit associated with the patient's deterioration. A clinical diagnosis of septic shock with acute renal failure was made and the patient was started on inotropic support, hydrated and monitored in the high dependency unit. A repeat MRI showed residual

collection of abscess in the left psoas region. The patient was offered open drainage and debridement but he was adamant against operative treatment and opted for conservative management of percutaneous drainage and continued intravenous antibiotics. This was done for him and a large bore drain was left in situ for about 10 days. Each day it discharged about 100 ml of purulent material.

Over the next 6 days, the patient was successfully weaned off inotropic support and his total white cell count decreased to normal range. His renal function also recovered and the creatinine levels normalized without the need for renal replacement therapy. He was thereafter transferred to the general ward where his drain was removed and he completed 6 weeks of intravenous antibiotics.

His inflammatory markers normalized and he was discharged with oral ciprofloxacin and cefuroxime.

He was closely followed up in the specialist outpatient clinic over the next 3 months and he showed progressive improvement of his back pain. His inflammatory markers also decreased to the normal range. Functionally, he was able to carry out his activities of daily living with no problems.

DISCUSSION

Back pain being a common presenting complaint in patients with osteomyelitis is non-specific and often

associated with delayed or incorrect initial diagnosis. Joughig has indicated that up to 41% of patients with vertebral osteomyelitis may have been incorrectly diagnosed at presentation⁵. Similarly, our patient delayed seeking medical attention for his back pain for a month attributing it to trauma sustained during that time. The presence of diabetes mellitus is a known risk factor in development of vertebral osteomyelitis. These factors, together with the presence of fever on presentation prompted us to evaluate the back pain with caution.

Plain xray changes of the lumbar sacral spine were not obvious and may be easily missed. However, MRI scan in this case yielded important diagnostic information for the treatment of the patient. Indeed, the advent of magnetic resonance imaging has proved a major milestone; with its high sensitivity and specificity, it is an essential part of the diagnostic work-up⁶. MRI is able to show changes sooner than either nuclear bone scintigraphy or plain xray and is a superior diagnostic tool in dealing with vertebral osteomyelitis.

While incidence of tuberculosis has generally been on the downward trend in developed countries over the last few decades, the emergence of multi-resistance strains has seen a new resurgence of tuberculosis in recent years^{7,8}. It is important to exclude tuberculosis infection as the source of any vertebral infection. In our case, the patient did not have any history of tuberculosis infection and his chest xray was clear. In addition, initial testing for AFB bacilli from the psoas collection aspirate was negative.

However, despite appropriate intravenous antibiotics administration and apparent initial improvement, our patient's clinical condition deteriorated suddenly. This prompted us to order a tuberculosis DNA testing by PCR in order to exclude the possibility of missing a tuberculous infection which have been known to be notoriously difficult to diagnose.

Although atypical pyogenic infections have been known to occur in vertebral osteomyelitis especially in immunocompromised patients, it is also uncommon that polymicrobial infections are responsible for vertebral infections¹. In addition, no primary source of infection was identified in our patient. While gram positive staph aureus is the most common pathogen responsible for vertebral osteomyelitis, our patient had 2 gram negative bacilli

cultured from the abscess aspirate. The gram negative endotoxaemia was also the likely cause of the patient's septic shock and renal failure which was quickly reversed after the remaining pus was drained.

The principles of surgical treatment of pyogenic vertebral osteomyelitis are debridement, drainage of any abscesses, spinal decompression and stabilization. Arnold and co-workers have recommended the use of surgical debridement with posterior stabilization in patients with pyogenic osteomyelitis that are unresponsive to initial intravenous antibiotics⁹. Surgical debridement and drainage was strongly indicated in this case as it allows thorough excision of all infected tissue thereby treating the likely source of the gram negative sepsis. In addition, it allows unhealthy vertebral bone to be removed and the remaining vertebral column to be stabilized to prevent future kyphosis. The disadvantages associated with percutaneous drainage are the inability to excise the infected bone nidus and difficulty associated with treatment of the loculation. However, following percutaneous drainage, our patient's clinical condition improved remarkably. This could be attributed to the short time span between percutaneous drainage and the initial percutaneous aspirate. As such, the abscess cavity may not have time to mature and form septa. The pus may also be more effluent and easier to drain. The vertebral bone may also still be vascular hence allowing the antibiotics to act on the affected area.

SUMMARY

A high index of suspicion is required in diagnosing vertebral osteomyelitis especially in patients who are immunocompromised. MRI offers good specificity and sensitivity in the diagnosis of vertebral osteomyelitis and can detect changes early. Hence it is a useful diagnostic tool to aid in early diagnosis of this condition. Though clinically well, immunocompromised patients with vertebral osteomyelitis still need to be treated aggressively and monitored closely as sudden deterioration may occur. Besides uncommon infectious agents, polymicrobial infectious agents may also be the cause of vertebral osteomyelitis in immunocompromised patients. Early and rapid treatment of our patient with non-surgical options can produce successful outcome.

REFERENCES

1. Sapico FL, Montgomerie JZ. Vertebral osteomyelitis. *Infect Dis Clin North Am.* 1990; 4(3):539-50.
2. Stauffer RN. Pyogenic vertebral osteomyelitis. *Orthop Clin North Am.* 1975; 6:1015-1027.
3. Kemp HBS, Jackson JW, Jeremiah JD, Hall AJ. Pyogenic infections occurring primarily in intervertebral discs. *J Bone Joint Surg* 1973; 55B:698-714.
4. Ambrose GB, Alpert M, Neer CS. Vertebral osteomyelitis. *JAMA* 1966; 197:619-622.
5. Joughin E, McDougall C, Parfitt C, et al. Causes and clinical management of vertebral osteomyelitis in Saskatchewan. *Spine* 1991; 16(3):261-4.
6. Carragee EJ. The clinical use of magnetic resonance imaging in pyogenic vertebral osteomyelitis. *Spine* 1997; 22(7):780-5.
7. Schneider E, Castro KG. Tuberculosis trends in the United States, 1992-2001. *Tuberculosis (Edinb)*, 2003;81(1-3), 21-9.
8. Borchardt JK. Tuberculosis: Resurgence of a historic scourge. *Drug News Perspect* 2002; 15(8):535-542.
9. Arnold PM, Baek PN, Bernardi RJ et al. Surgical management of non-tuberculous thoracic and lumbar vertebral osteomyelitis. Report of 33 cases. *Surg Neurol.* 1997; 47(6):551-61.