CASE REPORT

Atypical presentation of thoracic spondylodiscitis caused by *Streptococcus mitis*Vincent P Cariati,¹ Wu Deng²

¹Department of Internal Medicine, Scottsdale Healthcare, Shea Hospital, Scottsdale, Arizona, USA
²University of California, Irvine, California, USA

Correspondence to
 Dr Wu Deng,
 wdeng1@uci.edu

Accepted 16 April 2014

SUMMARY

Spondylodiscitis, which is most commonly caused by *Staphylococcus aureus*, is an uncommon infection in adults. The diagnosis of spondylodiscitis is often delayed by its vague and non-specific presentations. As part of the normal flora in human mouth and sinuses, *Streptococcus mitis* is a very rare cause of spondylodiscitis. We report a case of thoracic spondylodiscitis caused by *S. mitis* in a patient with chronic sinusitis. The patient atypically presented with a sharp chest pain that radiated to the back and the imaging studies were initially negative. He failed outpatient pain management and the diagnosis of spondylodiscitis was confirmed by bone biopsy 6 weeks later. Treatment with antibiotics completely alleviated the pain. Increased awareness and a high index of suspicion are essential for early diagnosis of spondylodiscitis with an atypical presentation.

BACKGROUND

Spondylodiscitis is an infection of intervertebral disc spaces and vertebrae. The incidence of spondylodiscitis in developed countries was reported to range from 4 to 24 per million per year, depending on the location, era and inclusion criteria of the studies.¹ Owing to its rarity in adult population and vague presentation, the diagnosis of spondylodiscitis is frequently delayed.^{1–3} The most common organism that causes spondylodiscitis in adults is *Staphylococcus aureus*, which accounts for more than 50% of cases in developed countries.^{1–2} As a Gram-positive bacteria that frequently resides in the respiratory tract and on the skin, *S. aureus* generally reaches the spine via three routes, including haematogenous spread, direct inoculation from trauma or spinal surgery and contiguous spread from adjacent infected tissues. Other pathogens, including *Streptococcus*, *Enterococcus*, Gram-negative bacilli, *Mycobacterium tuberculosis*, *Brucella* and anaerobes, are less frequently reported.³

Streptococcus mitis is part of the normal flora in human mouth and sinuses.⁴ Under certain conditions, it is associated with serious infections including infective endocarditis and bacteraemia.^{5–6} Here we report a case of thoracic spondylodiscitis caused by *S. mitis* in a patient who presented with atypical chest pain and experienced a delay on diagnosis.

CASE PRESENTATION

A 63-year-old Caucasian man presented to the emergency department of our hospital reporting of severe right-sided chest pain for 1 week. He stated that the pain started the morning after an extreme

physical exertion. The pain was located in the area between the lower sternum and right rib cage, radiating to the back in a radicular pattern, constant, sharp and stabbing, and accompanied by the feeling of spasm around the chest wall. Twisting the torso and deep inspiration exacerbated the pain. He went to his chiropractor and had some 'rib manipulation', which resulted in worsening of the pain. Outpatient treatment with tramadol and cyclobenzaprine failed to give any relief. The patient also reported a subjective low-grade fever for 2 days but denied chills or recent weight loss. Medical history includes hypertension, hyperlipidaemia, coronary artery disease with a 50% stenosis of the obtuse marginal artery and chronic sinusitis. The patient denied history of intravenous drug use but admitted to a current tobacco use of 45 pack years. He had three sinus surgeries years ago but denied any recent dental or sinus procedures.

INVESTIGATIONS

During the first hospitalisation, physical examination revealed an afebrile, normotensive and moderately distressed man. Chest examination revealed sparse crackles on the right base. Deep palpation elicited pain in the right lateral rib cage, lower right sternocostal joints and middle left sternum. No tenderness was noted in the paraspinal muscles and the spine. The cardiac and neurological examinations were not remarkable. No lymphadenopathy or splenomegaly was found. Laboratory testing showed mild leucocytosis with a white cell count (WCC) of $10.6 \times 10^3/\mu\text{L}$, neutrophil 62.1%. The chest X-ray and CT scan of chest with contrast, ECG, serial cardiac enzymes, echocardiogram and stress test were all negative. During hospitalisation, the patient was given ketorolac, oxycodone-acetaminophen and morphine as needed for pain management. He was discharged with the diagnosis of possible costochondritis.

Following discharge, the patient had moderate relief of the chest pain but developed progressive back pain over 6 weeks. He also reported intermittent fever of approximately 100°F that was relieved by acetaminophen during that period. An outpatient spinal MRI without contrast was performed. Lytic lesions on T4 and T5 vertebral bodies and loss of endplate definition were detected on T1-weighted images and increased signal intensity in T4–T5 intervertebral disc was observed on T2-weighted images, which were consistent with spondylodiscitis (figure 1). The patient was sent to our hospital for further evaluation. During the second hospitalisation, repeated complete blood count (CBC) showed

CrossMark

To cite: Cariati VP, Deng W. *BMJ Case Rep* Published online: [please include Day Month Year] doi:10.1136/bcr-2013-200532

Figure 1 T1-weighted sagittal image showing lytic lesions in T4 and T5 vertebral bodies and obscure endplate definition.

mild leucocytosis with a WBC count of $10.6 \times 10^3/\mu\text{L}$, neutrophil 63%, C reactive protein (CRP) 14.7 mg/dl, erythrocyte sedimentation rate (ESR) 98 mm/h. To identify the sources of infection in the chest, abdomen and pelvis, a CT scan with contrast was performed but no evidence of infection was found. Transoesophageal echocardiogram did not show evidence of endocarditis. A CT-guided fine needle biopsy was attempted but complicated by the biopsy needle breaking off in the soft tissue. Spinal surgery was performed to remove the broken needle and to obtain a bone biopsy at T5 and of the T4–T5 disc. The bone culture grew *S. mitis*, which was identified using the commercial Rapid ID 32 STREP kit (Bio Mérieux, La Balme les Grottes, France) as well as the phylogenetic analysis of the nucleotide sequences of four housekeeping genes *ddl*, *gdh*, *rpoB* and *sodA*.⁷ The susceptibility testing showed that the isolated *S. mitis* strain was sensitive to penicillin, clindamycin and gentamicin. The blood cultures were negative.

DIFFERENTIAL DIAGNOSIS

The differential diagnoses in patients who present with back pain and fever include infectious and non-infectious spinal conditions. The non-infectious aetiologies include metastatic spinal lesions, degenerative spinal disease and spinal compression fractures. The spinal infection could be caused by a wide variety of bacteria, fungi and zoonoses, the most common being *S. aureus*. In North America, *Brucella* or *Mycobacterium tuberculosis* infection has been very rare.

TREATMENT

The patient was empirically treated with intravenous vancomycin and ceftriaxone, then switched to intravenous ceftriaxone for 8 weeks.

OUTCOME AND FOLLOW-UP

The patient experienced complete relief of the chest and back pain 2 weeks after the initiation of intravenous antibiotic treatment. CBC, ESR, CRP after 8 weeks demonstrated no evidence of infection. The 6 month follow-up MRI showed complete resolution of the lesions.

DISCUSSION

Spondylodiscitis, a rare infection in adults, is predisposed by the underlying conditions including diabetes mellitus, malnutrition,

substance abuse, immunodeficiency, malignancy, long-term steroid use, chronic kidney disease and cirrhosis.⁸ The vague presentation of spondylodiscitis and its rarity in adult population lead to delayed diagnosis and possible disabling complications.⁹ The major symptom of spondylodiscitis is progressive spinal pain that may last for weeks, even months.¹⁰ Fever or leucocytosis is not always present but most patients have elevated ESR and CRP.¹⁰

Here we report a case of spondylodiscitis initially presenting with a sharp, right-sided chest pain radiating to the back that was aggravated by twisting the body and breathing. Although the patient reported subjective fever, he was found to be afebrile in the hospital and his initial radiological studies were negative. In the English literature, there are six cases of spondylodiscitis presenting with chest pain.^{11–16} All these cases had evident vertebral lesions consistent with spondylodiscitis in imaging studies on hospital presentation. Only two cases described pleuritic chest pain and one case exhibited reproducible pain in the right lateral ribcage with palpation.^{12–16} We postulated that the chest pain in our case was related to nerve root irritation and/or compression at T4–T5, which could also be complicated by possible injuries during his extreme exertion and the rib manipulation performed by his chiropractor.

Although the tenderness to spinal percussion has been regarded as the most reliable sign for spondylodiscitis, one study reported that it only occurs in less than a fifth of the patients.¹⁷ This patient demonstrated no local tenderness to palpation of thoracic spine even when the vertebral lesions were evident in MRI 6 weeks later. MRI is the most sensitive radiological tool to detect spondylodiscitis.¹⁸ As shown in this case, CT scan could be falsely negative during the early stage.¹⁸ Our patient demonstrated typical MRI findings of spondylodiscitis including decreased signal intensity in the vertebral bodies and obscurity of endplate definition on T1 images and increased signals of intervertebral discs on T2 images. Given the atypical clinical presentation, history of extreme exertions, and the negative CT scan during the first admission, spondylodiscitis was not considered as the initial differential diagnosis of this case.

In most patients with spondylodiscitis, appropriate antimicrobial therapy leads to a complete recovery and good prognosis.^{1–3,7} Surgery is needed in a minority of patients.^{1–7} Ideally, antimicrobial therapy should be guided by results of susceptibility testing of isolated pathogen. With the exception of spondylodiscitis caused by fluoroquinolone-susceptible Gram-negative rods, parenteral antibiotics are routinely given and most patients receive parental therapy throughout. Switching to oral antibiotics could be considered in patients with proven good response to parental antibiotics and compliance to oral therapy and follow-up. Our patient was empirically treated with intravenous vancomycin and ceftriaxone before the culture and susceptibility testing results were available and then switched to intravenous ceftriaxone based on the susceptibility of the isolated *S. mitis* strain to penicillin (minimum inhibitory concentration (MIC) $<0.12 \mu\text{g/mL}$).

S. mitis, a member of the viridans group streptococci, is a very rare cause of spondylodiscitis. Most of patients with viridians group streptococci spondylodiscitis had infective endocarditis, which presumably causes bacteraemia and haematogenous spreading of bacteria to bones.¹⁸ In the literature, there are a few case reports of viridans streptococcal spondylodiscitis in patients without infectious endocarditis, but most of the studies did not differentiate the organism to the species level.^{19–23} A recent study isolated *S. mitis* from the blood of a child with osteomyelitis of long bones.²⁴ To the best of our knowledge, this is the first reported case of atypical presentation of *S. mitis*

thoracic spondylodiscitis without evidence of infectious endocarditis. *S. mitis* has been isolated from the sinuses of patients with chronic inflamed maxillary sinusitis²⁵ and sinusitis has been related to systemic *S. mitis* bacteraemia and meningitis.^{26 27} Although the patient had chronic sinusitis, we did not obtain the sinus culture because the treatment had started based on the result of bone culture. It is unclear whether *S. mitis* gained access to the blood stream via membrane breakdown resulting from the chronic maxillary sinusitis in this case. Further microbiological study will be conducted to further characterise the strain isolated from the case.

Learning points

- ▶ Chest pain could be one of the atypical manifestations of spondylodiscitis.
- ▶ Persistent, refractory back pain with or without fever warrants further investigation for infectious aetiologies.
- ▶ A history of extreme exertion or recent injury might trigger the symptoms of spondylodiscitis and obscure the diagnosis.
- ▶ Imaging studies might be falsely negative at the early stage of spondylodiscitis.

Acknowledgements We acknowledge Dr Eric Farbman for radiology support.

Contributors VPC was the primary care physician of the patient and a major contributor in writing the manuscript. WD contributed to information collection, data interpretation and manuscript preparation.

Competing interests None.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

REFERENCES

- 1 Jorge LS, Chueire AG, Rossit AR. Osteomyelitis: a current challenge. *Braz J Infect Dis* 2010;14:310–15.
- 2 Fantoni M, Trecarichi EM, Rossi B, et al. Epidemiological and clinical features of pyogenic spondylodiscitis. *Eur Rev Med Pharmacol Sci* 2012;16 (Suppl 2):2–7.
- 3 Gouliouris T, Aliyu SH, Brown NM. Spondylodiscitis: update on diagnosis and management. *J Antimicrob Chemother* 2010;65 (Suppl 3):iii11–24.
- 4 Dewhirst FE, Chen T, Izard J, et al. The human oral microbiome. *J Bacteriol* 2010;192:5002–17.
- 5 Tleyjeh IM, Abdel-Latif A, Rahbi H, et al. A systematic review of population-based studies of infective endocarditis. *Chest* 2007;132:1025–35.
- 6 Tunkel AR, Sepkowitz KA. Infections caused by viridans streptococci in patients with neutropenia. *Clin Infect Dis* 2002;34:1524–9.
- 7 Hoshino T, Fujiwara T, Kilian M. Use of phylogenetic and phenotypic analyses to identify nonhemolytic streptococci isolated from bacteremic patients. *J Clin Microbiol* 2005;43:6073–85.
- 8 Cheung WY, Luk KD. Pyogenic spondylitis. *Int Orthop* 2012;36:397–404.
- 9 Venkatachalam S, Dennison E, Sampson M, et al. An unusual cause of back pain in osteoporosis: lessons from a spinal lesion. *Ann Rheum Dis* 1999;58:327–31.
- 10 Zimmerli W. Clinical practice. Vertebral osteomyelitis. *N Engl J Med* 2010;362:1022–9.
- 11 Landa C, Giddings S, Reddy P. Chest pain? An unusual presentation of vertebral osteomyelitis. *Case Rep Med* 2013;2013:416498.
- 12 Acharya U. A case of atypical presentation of thoracic osteomyelitis & paraspinal abscess. *McGill J Med* 2008;11:164–7.
- 13 Chen Y, Kim BJ, Lee SH, et al. High thoracic spinal infection following upper gastrointestinal work-up. *J Clin Neurosci* 2007;14:1132–5.
- 14 Minematsu A, Sawai T, Matsutake T, et al. [A case of Mycobacterium intracellulare pulmonary infection with vertebral osteomyelitis]. *Kansenshogaku Zasshi* 2011;85:527–31.
- 15 Nitta E, Ishiguro H, Baba H, et al. [A case of spinal osteomyelitis detected by MRI]. *Rinsho Shinkeigaku* 1991;31:1252–4.
- 16 Sullivan PJ, Currie D, Collins JV, et al. Vertebral osteomyelitis presenting with pleuritic chest pain and bilateral pleural effusions. *Thorax* 1992;47:395–6.
- 17 Priest DH, Peacock JE Jr. Hematogenous vertebral osteomyelitis due to *Staphylococcus aureus* in the adult: clinical features and therapeutic outcomes. *South Med J* 2005;98:854–62.
- 18 An HS, Seldomridge JA. Spinal infections: diagnostic tests and imaging studies. *Clin Orthop Relat Res* 2006;444:27–33.
- 19 Cone LA, Hirschberg J, Lopez C, et al. Infective endocarditis associated with spondylodiscitis and frequent secondary epidural abscess. *Surg Neurol* 2008;69:121–5.
- 20 Honan M, White GW, Eisenberg GM. Spontaneous infectious discitis in adults. *Am J Med* 1996;100:85–9.
- 21 Weber M, Gubler J, Fahrer H, et al. Spondylodiscitis caused by viridans streptococci: three cases and a review of the literature. *Clin Rheumatol* 1999;18:417–21.
- 22 Friedman JA, Maher CO, Quast LM, et al. Spontaneous disc space infections in adults. *Surg Neurol* 2002;57:81–6.
- 23 Adeoteye O, Kupfer R. Streptococcus viridans vertebral osteomyelitis. *J R Soc Med* 1999;92:306–7.
- 24 Nomura R, Nakano K, Makela K, et al. Isolation and characterization of *Streptococcus mitis* from blood of child with osteomyelitis. *Int J Paediatr Dent* 2011;21:192–9.
- 25 Paju S, Bernstein JM, Haase EM, et al. Molecular analysis of bacterial flora associated with chronically inflamed maxillary sinuses. *J Med Microbiol* 2003;52:591–7.
- 26 Kutlu SS, Sacar S, Cevahir N, et al. Community-acquired *Streptococcus mitis* meningitis: a case report. *Int J Infect Dis* 2008;12:e107–9.
- 27 Balkundi DR, Murray DL, Patterson MJ, et al. Penicillin-resistant *Streptococcus mitis* as a cause of septicemia with meningitis in febrile neutropenic children. *J Pediatr Hematol Oncol* 1997;19:82–5.

Copyright 2014 BMJ Publishing Group. All rights reserved. For permission to reuse any of this content visit <http://group.bmj.com/group/rights-licensing/permissions>.
BMJ Case Report Fellows may re-use this article for personal use and teaching without any further permission.

Become a Fellow of BMJ Case Reports today and you can:

- ▶ Submit as many cases as you like
- ▶ Enjoy fast sympathetic peer review and rapid publication of accepted articles
- ▶ Access all the published articles
- ▶ Re-use any of the published material for personal use and teaching without further permission

For information on Institutional Fellowships contact consortiasales@bmjgroup.com

Visit casereports.bmj.com for more articles like this and to become a Fellow