We report on two cases of infective spondylodiscitis caused by *Gemella haemolysans* in otherwise healthy patients. This organism has only rarely been identified as a cause of bone and joint infection, with only two previous reports of infective spondylodiscitis.

We describe the clinical features, investigations and treatment options.

*Gemella haemolysans* is an aerobic or facultative anaerobic Gram-positive coccus that is a normal inhabitant of the oral cavity, upper respiratory, gastrointestinal and genitourinary tracts and is of low virulence. It is known to cause endocarditis in immunocompromised patients and infections have been occasionally been reported in immunocompetent patients. There have been few case reports of bone and joint infections caused by *Gemella* species and only two reports of spondylodiscitis due to *G. haemolysans*. In this paper we present two patients who developed spondylodiscitis due to this particular organism.

### Case reports

**Case 1.** A 70-year-old woman presented with a three-month history of gradually increasing back pain. Her past medical history included controlled hypertension and hypothyroidism. Physical examination revealed tenderness at the thoracolumbar junction, severe muscle spasm and marked restriction of spinal movements. She was only able to walk ten yards. Neurological examination of the lower limbs was normal. The white blood cell count (WCC) was 8.7 × 10^9/l (normal range: 4 to 11 × 10^9/l), CRP 125.4 mg/l (normal range < 5 mg/l) and ESR 109 mm/hour (normal range 0 to 10 mm/hour). Plain radiographs demonstrated a loss of definition of the vertebral endplates at T12-L1, particularly in the superior endplate of L1. MRI was suggestive of infective discitis at this level (Fig. 1). CT-guided aspiration biopsy was performed and histological examination showed acute inflammatory granulation tissue with areas of necrosis.

Microbiological culture of the biopsy at 48 hours did not grow any organisms. She was treated empirically with intravenous flucloxacinil, 1 g every six hours. Extended cultures, for a further 48 hours, revealed weakly haemolytic colonies on the blood agar plate and *G. haemolysans* was identified by the API 20 STREP system (Biomérieux, Marcy I’Etoile, France). This system contains dehydrated substrates for the demonstration of enzymatic activity or the fermentation of sugars that enable the identification of organisms. This organism was sensitive to penicillin, amoxicillin, erythromycin, vancomycin and doxycycline, but resistant to gentamicin. She was treated with oral doxycycline, 100 mg every 12 hours. The CRP progressively decreased to 28 mg/l over three weeks and the WCC remained within the normal range at 6.7 × 10^9/l. She remained afebrile and her general condition improved with antibiotic treatment continuing for three weeks. However, her back pain persisted and repeat MRI at the end of the three-week period showed progressive collapse of the vertebral bodies (Fig. 2). Accordingly anterior spinal decompression with T12-L1 corporectomy and instrumented anterior spinal fusion from T11 to L2 was performed through a transpleural, retroperitoneal thoraco-abdominal approach (Fig. 3). Histological examination of the samples confirmed a chronic inflammatory process. There was no bacterial growth on cultures, probably because of the antibiotic treatment. Post-operatively she developed pneumonia, which was treated with parenteral Tazocin for one week. Eventually her back pain resolved and she was discharged home.

Six weeks post-operatively the CRP was 8.5 mg/l and WCC 6 × 10^9/l, although the ESR was 81 mm/hr. At six months follow-up, the CRP was 3.4 mg/l, WCC 5.3 × 10^9/l and the ESR 20 mm/hr. One year post-operatively she was pain-free with normal blood tests and mobilising independently.
Case 2. A 49-year-old man presented with acute onset of low back pain of six weeks duration. He had night sweats and was increasingly immobile. The pain radiated along the lateral aspect of his left thigh. Past medical history was unremarkable. Examination revealed tenderness at the lumbosacral junction with pain on spinal flexion and extension. There was no neurological deficit. The WCC was $8 \times 10^9/l$, CRP 44 mg/l and ESR 45 mm/hr. MRI revealed a high signal area at L5-S1 (Fig. 4). CT-guided aspiration biopsy was performed and treatment started with flucloxacillin (1 g every six hours). *G. haemolysans* was grown on extended culture at 96 hours and was sensitive to penicillin, amoxicillin, erythromycin, vancomycin and tetracycline, but resistant to gentamicin. Treatment was changed to oral amoxicillin (1 g every eight hours). His symptoms resolved after six weeks of antibiotic treatment; there was rapid reduction in the WCC and inflammatory markers which were normal by 12 weeks.

**Discussion**

*Gemella haemolysans* was first isolated from the throat, eyes and nose of patients with measles in 1917. Initially it was described as *Neisseria haemolysans*, but was later shown to be different from *Neisseriae* and was allocated to a new genus *Gemella*, with a single species, *G. haemolysans*. Subsequently, based on DNA hybridisation and comparative 16s-rRNA gene sequencing, the genus *Gemella* has been transferred to the family *Streptococcaceae*. The members of the genus are *G. haemolysans*, *G. morbillorum*, *G. bergeri*, *G. sanguinis*, *G. palaticanis* and *G. cuniculi*. *G. haemolysans* occasionally causes severe localised and/or generalised infections, of which the most common is endocarditis. Other infections caused by this bacterium include meningitis, brain abscess, endophthalmitis, pharyngeal abscesses, thoracic empyema and spondylodiscitis. There was no evidence of endocarditis in our patients and the primary source of the infection remains uncertain. Bacteraemia ensuing from the gastrointestinal or genitourinary tracts or from dental sepsis was the most likely source.

Generally, infections caused by *Gemella* species are associated with immunocompromised states such as cancer, heart disease or poor dental hygiene. However, there have been reports of infection, including life-threatening sepsis, in previously healthy patients with normal immune status. Both our patients were previously healthy, and apart from the controlled hypothyroidism and hypertension in

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**Fig. 1**

Case 1. Sagittal T2 MRI at presentation showing features of infective discitis with high signal in T12-L1 intervertebral disc and collapse of adjacent T12-L1 vertebrae. There is also early involvement of the T11 vertebral body. Moderate narrowing of the spinal canal is present at the T12-L1 level but no overt compression of the lower thoracic spinal cord. There is also hyper intensity of the body of L5 vertebra consistent with an asymptomatic incidental haemangioma.

**Fig. 2a**

Case 1. Sagittal T2 MRI in a) sagittal and b) axial planes after six weeks of antibiotic therapy, showing narrowing of the disc space at the T12-L1 level with marked erosion of the endplates and collapse of the vertebral bodies at T12-L1 level. The incidental haemangioma in the L5 vertebral body is shown.
the first patient, did not have other underlying medical conditions.

There have been few reports of orthopaedic infections caused by Gemella species,3–6 including septic arthritis4–6 and infection after total knee arthroplasty in a patient with rheumatoid arthritis.3

There have only been two reports of G. haemolysans causing spondylodiscitis.2,7 One occurred in a patient in good general health whilst the other occurred in a patient who had a ruptured abdominal aortic aneurysm (Table I).

Infections due to Gemella are probably under-reported in the literature, possibly due to the difficulty in identifying the organisms on Gram staining and culture. It is not easy to differentiate G. haemolysans from Streptococcus viridans. G. haemolysans is easily decolourised and may appear Gram variable or even Gram negative. Identification of the organism on cultures may be delayed due to slow growth and fastidious requirements (fastidious strains require additional incubation with enriched media in order to produce sufficiently large colonies for identification). However, improvement in culture and identification techniques facilitated the diagnosis and in both cases presented, G. haemolysans grew on blood agar at the end of 96 hours of aerobic incubation under a CO₂-enriched atmosphere at 37°C.

In most patients the infections were successfully treated with antibiotics, either alone or in combination with
surgery. *G. haemolysans* is usually sensitive to penicillin, amoxicillin and doxycycline and in both our patients it also proved sensitive to vancomycin and erythromycin.

Spondylodiscitis requires a prolonged course of antibiotic treatment from six to 12 weeks or longer, based on the clinical response. Oral treatment is preferred as there are risks from prolonged parenteral therapy, particularly from line-associated complications. Doxycycline has better penetration into the avascular nucleus pulposus of the intervertebral disc. The nucleus pulposus is negatively charged and therefore positively charged antibiotics such as vancomycin, doxycycline, gentamicin and clindamycin are more easily attracted to it.

In summary, spinal infection due to *G. haemolysans* is rare. Identification of the organism is difficult due to its slow growth and the need for extended cultures. However, in most patients the infection will resolve following oral antibiotic treatment, either alone or in combination with surgery.

No benefits in any form have been received or will be received from a commercial party related directly or indirectly to the subject of this article.

**References**


**Table I. Case reports of *Gemella haemolysans* spondylodiscitis**

<table>
<thead>
<tr>
<th>Author/s</th>
<th>Age (yrs)</th>
<th>Gender</th>
<th>Spinal level</th>
<th>Predisposing factors</th>
<th>Onset/duration</th>
<th>Treatment</th>
<th>Outcome</th>
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<tbody>
<tr>
<td>Martha et al</td>
<td>72</td>
<td>Female</td>
<td>L4-5</td>
<td>None</td>
<td>Acute</td>
<td>12 weeks of amoxicillin and 10 weeks of clindamycin</td>
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<tr>
<td>Gatibelza et al</td>
<td>68</td>
<td>Male</td>
<td>L4-5</td>
<td>Infected aortic aneurysm</td>
<td>Acute</td>
<td>Surgery followed by antibiotic therapy</td>
<td>Good</td>
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<td>Female</td>
<td>T12-L1</td>
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<td>3 weeks of oral doxycycline therapy, surgery for spinal instability and Tazocin for one week for chest infection</td>
<td>Good</td>
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<td>Current study</td>
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<td>Male</td>
<td>L5-S1</td>
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