

Cervical Spinal Cord Intramedullary Abscess: *Streptococcus intermedius*

¹Tarek Mostafa, ²Oluwarotimi B Latinwo, ³Joan P Grieve, ⁴Carmel Curtis, ⁵Ayman M Qureshi

ABSTRACT

Intramedullary abscess of the spinal cord (IASC) is a rare condition caused by purulent infection of the central nervous system (CNS). There have been relatively few cases recorded in literature, with the condition first identified in 1830. We are reporting an interesting case of cervical cord intramedullary abscess in a young male patient caused by *Streptococcus intermedius*. The presentation was atypical, without constitutional symptoms, but progressive neurology over a short period of time.

Keywords: Abscess, Cord, Intramedullary, Spinal, Streptococcus.

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INTRODUCTION

Streptococcus intermedius is part of the *Streptococcus anginosus* group (previously termed *Streptococcus milleri* group, SMG).¹ These organisms form part of the normal flora and all share a tendency to cause purulent infections and abscesses at various sites.^{1,2} Studies have shown that *S. intermedius* is deemed to be the most pathogenic of the SMG.¹ The *S. intermedius* has shown the most resistance to antibiotic therapy out of the SMG.³ Focusing on the

particular case that presented, the most common sites of infection are crucial to consider in a clinical context. Of the three bacteria comprising the SMG, the CNS is the most susceptible to infection by *S. intermedius*.²

There are four other reported cases of IASC caused by *S. milleri*, with *S. intermedius* responsible for infection in at least two of the aforementioned cases.⁴⁻⁷ Previous literature also shows that *S. intermedius* has been found to be a typical causative agent in CNS abscesses.^{8,9} The virulence of *S. intermedius* suggests that it should be considered in clinical scenarios of neurological impairment involving infection of the medullary spinal cord.

Review of relevant literature describes the typical presentation of IASC. Previous case reports depict patients presenting acutely with symptoms of weakness, neck and/or back pain, reduced sensation, urinary retention, and fever.^{4,10-12} Inflammatory markers, such as white cell count (WCC), C-reactive protein (CRP), and erythrocyte sedimentation rate (ESR) were abnormally high in some cases.^{4,11,12} but within normal parameters in others.¹⁰ The differential diagnosis for such a constellation of symptoms is varied, making early diagnosis difficult. Conditions to be investigated and excluded are multiple sclerosis, tuberculous infection, spinal cord tumor, spinal cord ischemia, myelitis, or an arteriovenous malformation causing compression.^{5,6,10,11,13} The complex nature and rarity of IASC may readily lead to misdiagnosis; our case highlights the importance of excluding IASC in patients presenting with focal neurology as early intervention offers a good chance of regaining function.

CASE REPORT

History and Examination

A 55-year-old male previously healthy teacher attended the accident and emergency department and presented with a 1-week history of neck pain and headache. He reported a 5-day history of progressively worsening right-sided hemiplegia, which gradually spread to both his left upper and lower limbs. Neurological examination revealed a power grade 1/5 in the right upper and lower limbs and grade 3/5 power in the left limbs. The patient suffered from right-sided hemisensory pain, and left-sided pain and temperature sensory deficit. There was also a one day history of urinary retention.

¹Registrar, ²Student, ^{3,4}Consultant, ⁵Fellow

^{1,3}Department of Neurosurgery, National Hospital for Neurology and Neurosurgery, University College London Hospitals London, UK

²Faculty of Medical Sciences, University College London Medical School, University College London Hospitals, London, UK

⁴Department of Microbiology, National Hospital for Neurology and Neurosurgery, University College London Hospitals London, UK

⁵Department of Neuroradiology, King's College Hospital NHS Foundation Trust, London, UK

Corresponding Author: Oluwarotimi B Latinwo, Student Faculty of Medical Sciences, University College London Medical School, University College London Hospitals, London, UK Phone: +07821334837, e-mail: zchaobl@live.ucl.ac.uk

The patient also presented with respiratory complications and was observed to have a poor respiratory effort. Chest X-ray revealed multiple abnormalities. Radiology suggested consolidation in the right lung base and left lung lower lobe. There also appeared to be bilateral bronchial wall thickening and mild bilateral hilar lymphadenopathy. These findings were suspected to be the result of either lower respiratory tract infection and/or lung collapse.

The patient was previously well before the reported episode. Past medical history was unremarkable, and the patient had not suffered from any recent traumatic injury. He had travelled to Ghana 3 months preceding this episode, and reported no history of tuberculosis (TB) infection or any TB contacts.

The patient was afebrile, and initial blood tests were not indicative of infection. The WCC, CRP, and ESR were all predominantly within normal parameters, and blood cultures were negative. Intracranial computed tomography

displayed no detectable abnormalities with expected appearance of ventricles, sulci, and gray–white matter differentiation. The MRI with and without contrast of the head, cervical spine, and thoracolumbar spine was conducted (Figs 1 to 6). The T2-weighted imaging revealed a region of diffuse intramedullary hyperintensity in the upper cervical cord extending from C2 to C5, and a more discrete T2 hyperintense collection at C2/C3 with a T2 hypointense rim (Figs 1 and 2). Diffusion-weighted MR imaging (DWI) displayed peripheral hyperintensity around the collection, with further patchy adjacent hyperintensity in the upper cervical cord, indicating restricted diffusion (Fig. 3). The apparent diffusion coefficient (ADC) map revealed corresponding regions of hypointensity (Fig. 4). The lesion also demonstrated associated signal changes extending from the base of the medulla oblongata along the length of the spinal cord down to the level of T12. Based on these imaging findings,



Fig. 1: Preoperative T2-weighted sagittal MRI of cervical spine demonstrates diffuse intramedullary T2 high signal within the cervicothoracic spine and a collection at C2/C3

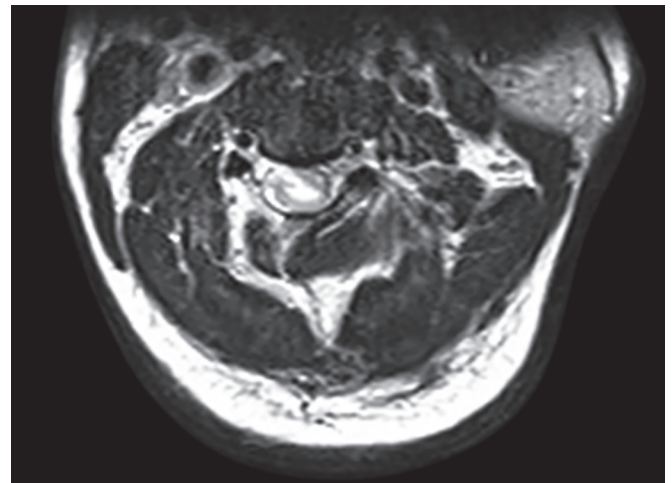


Fig. 2: Preoperative T2-weighted axial MRI of the cervical spine reveals a central T2 hyperintense collection within the spinal cord

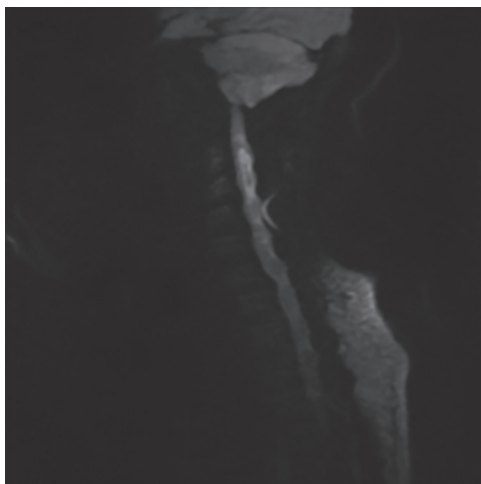


Fig. 3: Preoperative sagittal DWI scan with intramedullary signal hyperintensity representing restricted diffusion, a finding associated with pyogenic infection

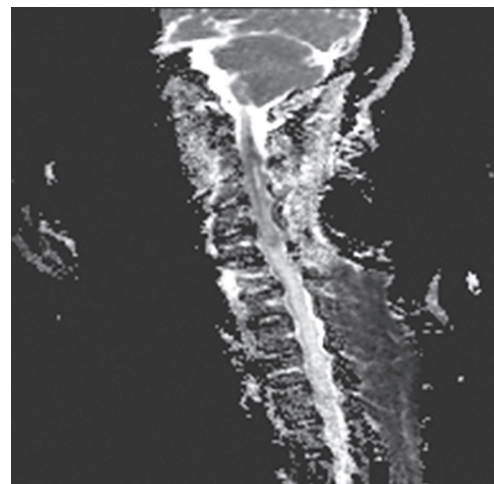


Fig. 4: Preoperative sagittal ADC areas of hypointensity that correlate with the DWI signal abnormality. These constellations of findings would be unusual for demyelination or a neoplastic lesion

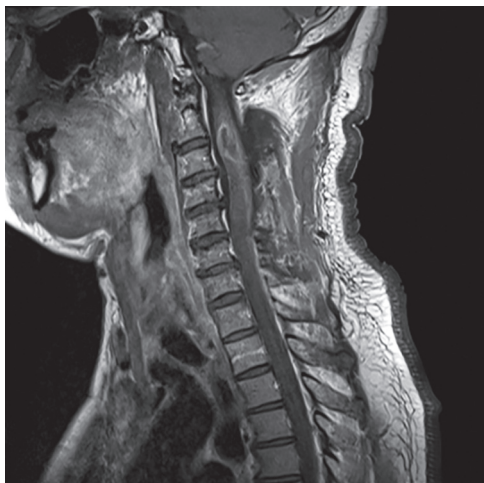


Fig. 5: Preoperative sagittal contrast-enhanced T1-weighted MRI reveals the residual intramedullary abscess cavity with mainly dorsal leptomeningeal enhancement, in keeping with postsurgical changes

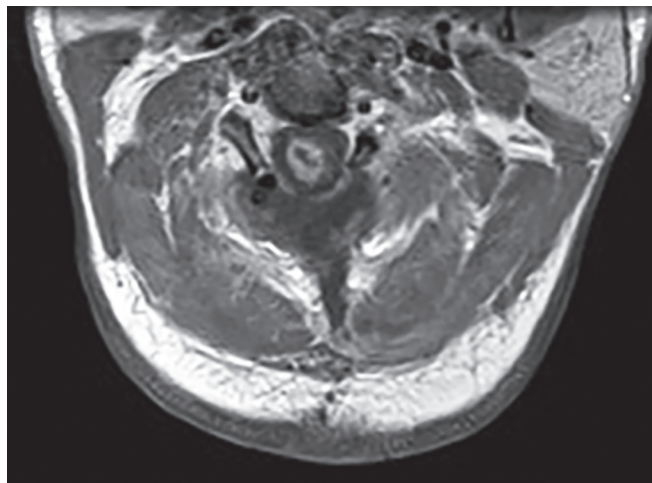


Fig. 6: Preoperative axial T1-weighted image with contrast shows a laminectomy, and postsurgical appearances of the spinal cord abscess cavity following washout

the narrowed differential diagnoses of the abnormality included an abscess, a necrotic tumor, a demyelinating lesion, or an atypical infection. The absence of other lesions in the brain excluded a demyelinating lesion, and the acute onset strongly suggested an infectious process taking place.

Operation

The patient was taken to the theater for a C2 to C6 laminectomy to decompress the spinal cord and a midline myelotomy (in the avascular plane so as to cause minimal damage to spinal cord fibers) at the C3/C4 level, allowing drainage of material (which turned out to be pus) and washout of the abscess. The spinal cord was kept open to prevent re-accumulation, while the dura mater was sutured to prevent leakage of cerebrospinal fluid. Microbiology analysis of the pus sample obtained from surgery identified the organism as *S. intermedius*, with sensitivity to a wide range of beta-lactam antibiotics. A 2-week course of IV ceftriaxone and metronidazole was administered and the patient transferred to a high-dependency unit.

Pathological Findings

Acid fast bacteria microscopy and culture were conducted on samples from the surrounding tissue, pus, and bone. These all came back negative, making tuberculous infection of the CNS unlikely. The patient's cardiac function was also investigated, echocardiography was normal, blood cultures were negative, and infective endocarditis was thus ruled out.

Postoperative Course

The lesion was preoperatively localized between C2 and C5, whereas after surgery, the extent of the associated

signal change progressed. Postoperative MRI C-spine demonstrated cranial extension of the lesion to involve the medulla and caudal extensions to involve the thoracic cord. Clean-intermittent self-catheterization four times daily was recommended to manage urinary retention. Global power and sensation began to steadily improve following surgery. The patient was discharged with a 6-week course of oral amoxicillin and referred to neurorehabilitation services where 5 months following the incident, he has regained power on his left side, but still suffers from right-sided hemiplegia; he currently walks with the aid of a crutch. Successful culture of the causative organism, adequate surgical debridement, and clinical improvement in the patient's condition meant there were no indications for follow-up imaging following discharge.

DISCUSSION

Spontaneous instances of IASC are rare. They are most commonly seen in infants and children, in association with dermal sinus (a congenital abnormality causing communication of the skin with the spinal canal).¹⁴ Trauma and penetrating injury to the spinal cord or surrounding tissue have also been reported as causes of IASC.⁴

In this case, the most likely etiology was suspected to be hematogenous spread of infective foci from the lung. Reported cases of hematogenous seeding of infection to the spinal cord have been documented in the past, often affecting the following groups of patients: Intravenous drug users, diabetics, or the immunosuppressed.^{12,15} Echocardiography showed no signs of infection, hence, excluding the heart as a potential source of the infection. The CT and MRI displayed no signs of cystic bone lesions, and the immediately surrounding vertebrae showed no indication of osteomyelitis or bony deformity. The patient's respiratory pathology was highly suggestive of

an infectious process taking place within the lungs. Due to the patient's urgent neurological deficits, no culture was obtained from the lungs. However, the simultaneous onset of pulmonary infection and spinal cord lesion strongly suggest that the former may have been responsible for the latter.

Similar cases in literature presented clinically with symptoms of motor weakness, paraesthesia, headache, and sphincter disturbance.¹⁵ Symptoms may present in isolation causing mimicry of other conditions, such as meningitis, encephalitis, or diabetic neuropathy. Once the clinical diagnosis is suspected and supported by radiological evidence, a prompt surgical intervention is advised to avoid spinal cord damage by mechanical compression, venous thrombosis, or arterial ischemia.

The cornerstone of management of IASC is neurosurgical intervention followed by appropriate antibiotics. The importance in recognizing this is imperative for clinicians, in order to ensure that prompt action is taken to protect against long-term damage.

Patients must be closely monitored postoperatively to ensure the ensuing inflammation and edema caused by surgery do not further compromise the patient's condition.

Infection caused by *S. intermedius*, unless suspected, may lead to inappropriate management of a patient. This pathogen's tendency to form abscesses hinders the detection of infection, due to the lack of a peripheral response. Upon initial presentation, the patient's WCC and inflammatory markers were normal. Similar past cases have often presented with a rise in inflammatory markers making the infection more clinically obvious.^{4,11-13} However, it is also not uncommon for inflammatory markers to be completely normal in patients presenting with IASC.¹⁰ Due to the walled-off nature of the infection, it helps the organism remain undetected by the host's immune system. Therefore, it is important for clinicians to consider IASC when assessing patients with neurological signs, even in the apparent absence of infection. *S. intermedius* should be considered as a causative agent along with more common suspects (*S. aureus*, *S. pyogenes*, *Mycobacterium tuberculosis*, etc.).

Intramedullary spinal cord abscess is a rare finding in a clinical setting; hence, clinicians may tend to explore and investigate alternative diagnoses, thus delaying appropriate management of the condition.

The IASC should be on the list of differential diagnoses in patients presenting with acute neurology with or without an obvious source of infection and normal inflammatory markers.

A high clinical suspicion at initial presentation with a consistent history should ensure appropriate patient

management. The MRI with contrast is the investigation of choice in order to guide the management plan.

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