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Case report

Subdural empyema following lumbar facet joint injection: An exceeding rare complication

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ABSTRACT

Chronic low back pain is extremely common with a life time prevalence estimated at greater than 70% [1]. Facet joint arthrosis is thought to be the causative aetiological substrate in approximately 25% of chronic low back pain cases [2].

Facet joint injection is a routine intervention in the armamentarium for both the diagnostic and therapeutic management of chronic low back pain. In fact, a study by Carrino et al. reported in excess of 94,000 facet joint injection procedures were carried out in the US in 1999 [3].

Although generally considered safe, the procedure is not entirely without risk. Complications including bleeding, infection, exacerbation of pain, dural puncture headache, and pneumothorax have been described.

We report a rare case of a 47-year-old female patient who developed a left L4/5 facet septic arthrosis with an associated subdural empyema and meningitis following facet joint injection. This case is unique, as to the best of our knowledge no other case of subdural empyema following facet joint injection has been reported in the literature.

Furthermore this case serves to highlight the potential serious adverse sequelae of a routine and apparently innocuous intervention. The need for medical practitioners to be alert to and respond rapidly to the infective complications of facet joint injection cannot be understated.

1. Case report

All appropriate and required ethical and institutional board approval was obtained. Informed consent was obtained from the patient.

1.1. History

A 47-year-old lady was admitted to her local hospital with back pain, acute onset left-sided sciatica and left lower limb weakness, 2-weeks following a lumbar left L4/5 facet joint injection with local anaesthetic and steroid. Further history

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demonstrated that immediately following her facet joint injection, she had developed some low-pressure headaches worse on sitting up which had eventually settled.

Clinically these features most likely suggested a dural puncture and CSF leak following the facet joint injection. This symptomatology was subsequently replaced over the subsequent 2 weeks with features of meningism including neck stiffness and photophobia. This patient had no previous significant medical history. She had no medical conditions such as diabetes mellitus which predisposed her to infection.

1.2. *Examination*

Clinical examination was essentially unremarkable with except of a diffuse weakness affecting her left lower limb myotomes (MRC grading 4−/5). There was no evidence of anal or urethral sphincter (bowel/bladder) dysfunction.

1.3. *Radiology*

MRI of her spine demonstrated a subdural abscess collection extending from the left L4/5 facet joint through the paraspinal musculature and into the epidural and subdural space (Figs. 1–3). Cranio-caudal extension was apparent superiorly to the level of the L2/3 disc space and inferiorly to the level of the L5/S1 disc space (Fig. 2). There was also evidence of some collection tracking along the left S1 nerve root on the left side (Fig. 3). The thecal sac was pushed anterio-laterally by the collection with displacement of the nerve roots of the cauda equine (Fig. 3). Diagnostically, this was a case of a subdural abscess and meningitis following a facet joint injection.

1.4. *Chemistry and microbiology*

Her inflammatory markers on admission demonstrated a CRP of 240 with a white cell count of 15.5. Blood cultures demonstrated a staphylococcal aureus species. A lumbar puncture was performed which demonstrated purulent and turbid cerebrospinal fluid with gram positive cocci. CT-guided aspiration of the left multi-loculated paraspinal collection was performed within 24 h of admission. Frank pus was drained. All samples grew staphylococcal aureus species.

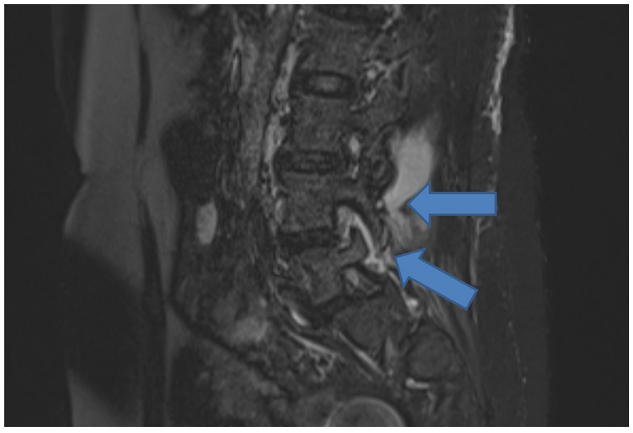

Fig. 1 – Sagittal T2 (STIR) image of lumbosacral spine. Abnormal high signal intensity demonstrated in left L4/5 facet and paraspinal muscles.

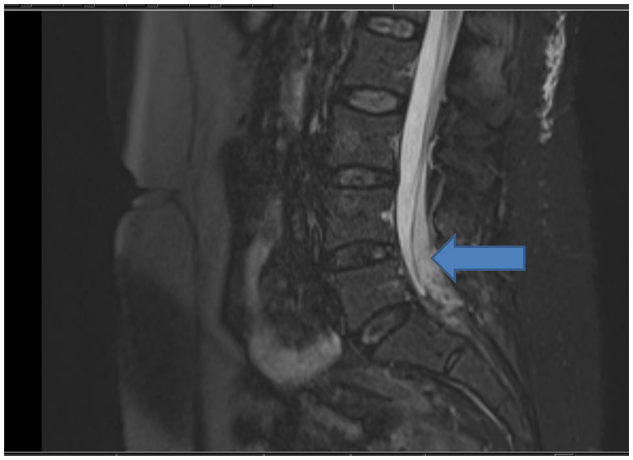

Fig. 2 – Sagittal T2 (STIR) image of lumbosacral spine. Subdural collection demonstrated extending from inferior margin of L3 to S1.

1.5. *Therapy*

The patient was initially started on treatment with empirical antibiotics with intravenous meropenem and vancomycin, which was subsequently converted to ciprofloxacin and rifampicin following sensitivities. The total duration of antibiotic therapy was for a period of 6-weeks. The patient rapidly improved following a few days of antibiotics with resolution of the left L5 radicular pain and mild left lower limb weakness.

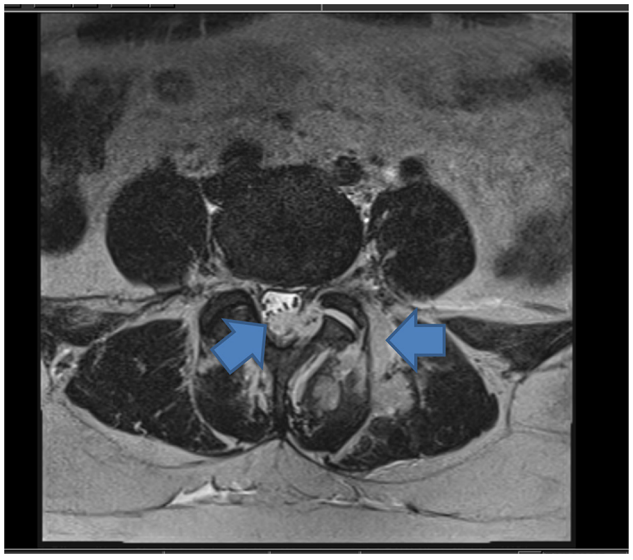

Fig. 3 – Axial T2 image at L4/5 level. Subdural collection again demonstrated. Also evident is abnormal high signal intensity in left L4/5 facet joint and left paraspinal muscles.

2. Discussion

The concept of spinal facet joint culpability in the aetiology of chronic back pain has circulated since the early twentieth century. Goldwaith in 1911 described the role of the lumbosacral zygoapophysial joints in the development of back pain in the context of their traumatic displacement or dislocation [4]. However, it was Ghormley's description in 1933 of the facet syndrome that clearly illustrated the zygoapophysial joints as a potential cause of chronic low back pain [5]. This model of facet pain was supported by pathomorphological zygoapophysial joint examination undertaken by Badgley in 1941 [6].

The first objective demonstration of the facet joint as an aetiological cause of low back pain came in 1963 when Hirsch et al. revealed that injection of normal saline into facet joints could reliably produce symptoms of low back pain [7]. This work was expanded upon in the 1976, when Mooney and Robertson began systematic studies fluoroscopically confirming that intra-articular facet joint injections of normal saline provoked low back pain [8]. They also demonstrated that injection of local anaesthetic into the provoked facets provided relief of the symptoms [8].

Currently lumbar facet joint injection together with medial branch nerve block form one of the principal pillars of treatment in the management of chronic lower back pain. Unquestionably the procedure itself is relatively quick and generally safe. The main risks described with facet joint injections include bleeding, dural puncture and CSF leak headache, potential exacerbation of pain and of course infection [9].

Systematic review of the literature with relevance to serious infective complications yielded eight case reports describing nine patients [10–17]. One report detailed a patient who developed an isolated epidural abscess following facet joint injection [10]. Another described a patient who developed an isolated paraspinal abscess [11]. Two patients developed septic arthritis together with a paraspinal abscess [12,13]. Two patients developed meningitis in association with a paraspinal abscess [14]. A further reported a patient with an epidural abscess in association with a paraspinal abscess [15]. Another reported development of infective endocarditis with a paraspinal abscess [16]. Finally, one report documented a patient with generalised sepsis leading to multiple organ failure and death following a facet joint injection [17].

To the best of our knowledge there has been no previous reported case of subdural empyema formation consequent to facet joint injection in the literature. The unique aspect of the case that we report is predicated on the fact that this patient developed a subdural empyema. This is extremely unusual given that the dura typically provides a robust barrier to the potential spread of infection into the subarachnoid compartment.

We surmise that there was an inadvertent dural breach at the time of the facet joint injection with subsequent translocation of skin surface micro-organisms from the needle into the subdural CSF space. Indeed our patient described a change in her usual symptomatology with the immediate onset of a new pattern left L5 distribution radicular pain following the facet injection. We postulate that this change in the pattern of pain actually epitomised direct needle trauma to the left L5 nerve root at the time of the facet injection.

Methicillin sensitive staphylococcus aureus was identified as the causative agent in the case that we report. In fact this has been the predominant documented causative organism with six out of the nine reported cases isolating it. Of the remaining three cases, an organism could not be identified in two and one grew staphylococcus epidermidis on culture.

This distribution of organisms is perhaps unsurprising given that iatrogenic spinal infection following facet joint injection would always likely be attributable to common skin commensal organisms. However, it is interesting that Muffoletto et al. reported that Staphylococcus aureus was also the most common organism identified in spontaneous haematogenous pyogenic facet joint infection [18].

The treatment of localised septic complications following facet joint injection usually comprises a protracted course of intravenous antibiotics with or without subsequent oral therapy. A suggested duration of therapy of 6–8 weeks has been recommended in the literature [13]. This treatment strategy is often augmented with percutaneous aspiration of any significant paraspinal abscess component thereby reducing the overall reservoir of infection. Operative surgical drainage is usually reserved for those cases of significant neurological compromise secondary to a compressive infective collection.

In the current case report, the patient was duly managed by combined percutaneous aspiration of the paraspinal abscess together with long term intravenous antibiotics. Although the case that we report was managed entirely with a conservative schema, review of the existing case reports revealed a trend towards operative intervention.

Specifically of the nine patients who experience the infective sequelae of facet joint injection, five received operative abscess drainage with concomitant intravenous antibiotic therapy. A single patient was treated with isolated surgical abscess debridement and another treated with just intravenous antibiotics. Finally, in the remaining two patients the employed treatment modalities could not be determined.

Although the reported number of cases is clearly insufficient to edict categorically the optimal treatment protocol of the infective complications of facet joint injection, consideration of the reported outcomes would suggest that there is a role for both conservative and more aggressive surgical treatment strategies.

Of the 6 previously reported cases in which surgical treatment was identifiable, there were two adverse negative outcomes. This included a catastrophic outcome of a patient death and a patient left with residual neurological compromise. Our patient made a good clinical recovery with no residual neurological deficit on a conservative treatment regime.

In conclusion, prevention of development of infection post facet joint injection should always be paramount when considering any invasive treatment for facet pain syndrome. This is best achieved by employing rigorous asepsis and limiting both the frequency of injections, and the number of simultaneous injections [17].

However, should infection become established the single most important prognostic factor is the timing of therapy instigation relative to the onset of symptoms [19]. Interventionists who treat lumbar facet pain syndrome should appreciate that while facet joint injection is generally safe there does exist a small but tangible risk of catastrophic infective complications. Immediate diagnosis together with rapid commencement of treatment with either non-surgical or surgical abscess drainage and administration of antibiotics is essential for good patient outcome.

Conflict of interest

None declared.

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Ethics

The work described in this article has been carried out in accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for experiments involving humans; Uniform Requirements for manuscripts submitted to Biomedical journals.

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