

REVIEW ARTICLE

Haematoma and abscess after neuraxial anaesthesia: a review of 647 cases

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Abstract

Although rare, spinal haematoma and abscess after central neuraxial blocks may cause severe permanent neurological injury. Optimal treatment and outcome remain unclear. In order to identify possible predisposing patient characteristics and describe the ensuing clinical course, we searched Medline, Embase, and the Cochrane Library for reports of spinal haematomas and abscesses associated with central neuraxial blocks. Extracted data included patient characteristics, symptoms, treatment, and outcome. We analysed 409 reports, including 647 patients (387 patients with spinal haematoma and 260 patients with spinal abscess). Spinal haematoma and abscess occurred predominantly after epidural anaesthesia (58% and 83%, respectively). Neurological recovery was correlated with the severity of initial neurological deficit. When decompression of spinal haematoma was delayed for >12 h after clinical diagnosis, neurological outcome was worse compared with earlier decompression (odds ratio 4.5, 95% confidence interval 2.1–9.9, $P < 0.001$, $n = 163$). After spinal haematoma, 47% of published patients had full recovery, 28% had partial recovery, and in 25% no recovery was observed. Good outcome after conservative management was observed in patients with mild symptoms or with spontaneous recovery during the diagnostic and therapeutic workup. After spinal abscess, 68% of reported patients recovered fully, 21% showed partial recovery, and no recovery was reported in 11%. Persistent neurological symptoms after spinal haematoma and abscess are common and correlate with the severity of initial neurological deficit. Neurological outcome seems worse when decompressive surgery of haematoma is delayed. Notwithstanding the considerable risk of selection bias and publication bias, conservative management may be feasible in patients with mild symptoms or spontaneous recovery.

Keywords: haematoma; abscess; complication; anaesthesia, epidural; anaesthesia, spinal

Editorial decision: November 30, 2017; **Accepted:** November 30, 2017

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Editor's key points

- The authors reviewed reports of spinal haematoma and abscess after neuraxial block. A total of 647 instances of spinal haematoma or abscess were described.
- They found a clear association between the adversity of outcome and the severity of the initial presentation, and the delay in surgical decompression.
- Epidural anaesthesia (compared with spinal anaesthesia) was associated with a greater incidence of haematoma, and a much greater incidence of abscess.

The incidence of major complications after neuraxial anaesthesia, such as spinal haematoma or abscess, is more common than estimated in past decades. In 1998, the rate of serious adverse events after epidural anaesthesia was estimated at 1:150 000.¹ In the meantime, indications for epidural anaesthesia have changed, patient characteristics have shifted,² and awareness has grown.³ Nowadays, it is accepted that the incidence of major complications of central neuraxial anaesthesia in non-obstetric patients may range from 1:6000 to as high as 1:1000 epidural procedures.^{4–9} A retrospective case note review across six years, identified three cases of spinal haematoma and six cases of spinal abscess in 8100 perioperative epidural procedures.⁹ The incidence of major complications of central neuraxial blocks (CNB) is much lower in obstetric patients, with spinal haematoma estimated at 1:154 730 and spinal abscess too rare to calculate in one major study.⁴

Not only is the incidence of severe complications of importance, but also ultimate patient outcome. In the UK, the Third National Audit Project of the Royal College of Anaesthetists found that permanent injury after CNB caused by spinal haematoma or abscess, but also by meningitis, nerve injury, spinal cord ischaemia, fatal cardiovascular collapse or wrong-route errors, was 1:23 810 cases (4.2 per 100 000), and the incidence of the two worst possible complications, paraplegia or death, was 1:55 556 cases (1.8 per 100 000).³

As a result of the rare occurrence of these severe complications, accurate data on risk factors and clinical course are not available and, consequently, there is no evidence on which to base recommendations for management strategies.¹⁰ Three large literature reviews were previously reported, focusing on spinal haematomas or abscesses with diverse pathophysiological origin, including mainly non-iatrogenic spontaneous, idiopathic, traumatic, or tumorous spinal haematomas or abscesses, but also including complications of iatrogenic origin, i.e. after CNB.^{11–13} As these reviews comprise haematomas and abscesses with different underlying pathology, the results are not directly applicable to the anaesthetic setting. A small review, specifically reporting spinal haematomas related to epidural anaesthesia (51 cases), was published in 1996,¹⁴ but major changes in clinical practice have occurred since then.

The aim of this review was to collect all cases reported in the literature concerning spinal haematomas or abscesses after CNB, in order to identify possible predisposing patient characteristics and describe the ensuing clinical course. Realising the limitations of interpreting case report series, we aimed to gain insight under which circumstances complications would be most likely to occur, whether particular clinical factors might predict persistent neurological damage, and whether indication or timing of neurosurgical management was correlated with outcome.

Methods

For this review we followed the Preferred Items for Systematic Reviews and Meta-analyses (PRISMA) guidelines.¹⁵

Search strategy

An information specialist performed a systematic search in OVID MEDLINE, OVID EMBASE and Central (the Cochrane Central Register of Controlled Trials) from inception to August 24, 2017 to identify relevant studies. The search consisted of controlled vocabulary (i.e. MeSH in MEDLINE) and free text words for central neuraxial blocks and epidural/spinal haematomas and abscesses. Animal studies were safely excluded by double negation (not exp animals/not humans). No further language, date, or other restrictions were imposed. For entire MEDLINE search strategy see Appendix Table A1. We cross-checked the reference lists and the cited articles of the identified relevant papers for additional references. The bibliographic records retrieved were imported and de-duplicated in EndNote X7.5 (Thomson Reuters, USA).

Article selection

Titles, abstracts, and subsequently, full texts were independently screened for reports concerning haematomas and abscesses associated with CNB by two authors (E.B. and J.H. or P.L.). Inclusion criteria for eligibility were spinal haematoma or abscess after CNB in humans. We defined spinal haematoma or abscess as any epidural, subdural, or subarachnoid haematoma or abscess below the level of C0. CNBs were classified as continuous epidural anaesthesia, spinal anaesthesia, combined spinal–epidurals (CSE), epidural injection, spinal catheters, spinal cord stimulators, caudal block, and facet joint block. Facet joint block is usually not referred to as CNB; however, if facet block resulted in spinal complications, it was included. Case reports, case series, prospective and retrospective cohort studies, systematic reviews and literature reviews (if containing original data) in English, Dutch, French, or German were included. When articles in other languages were encountered but an English abstract was found, we restricted data extraction to the abstract. We confirmed that no overlap was present between cases described in reviews or cohort studies and case reports. Cases where causality of the haematoma to CNB was uncertain were included; however, cases were excluded if the haematoma could clearly be explained by underlying disease. Regarding abscesses, all cases with CNB before the development of a spinal abscess were included; also cases where causality of the complication to CNB was uncertain or when abscess could be explained by underlying disease.

Quality assessment

We used the critical appraisal of a case study checklist, adapted from The Pocket Guide to Critical Appraisal by Crombie,¹⁶ to assess the quality of the included studies. Two authors (E.B. and P.L.) independently assessed the quality of all publications reporting on more than one case. The quality of single case reports was not assessed because of likely selection and publication bias.

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