



Review

Should suspected cervical spinal cord injury be immobilised?: A systematic review



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ABSTRACT

Background: Spinal cord injuries occur worldwide; often being life-threatening with devastating long term impacts on functioning, independence, health, and quality of life.

Objectives: Systematic review of the literature to determine the efficacy of cervical spinal immobilisation (vs no immobilisation) in patients with suspected cervical spinal cord injury (CSCI); and to provide recommendations for prehospital spinal immobilisation.

Methods: Searches were conducted of the Cochrane library, CINAHL, EMBASE, Pubmed, Scopus, Web of science, Google scholar, and OvidSP (MEDLINE, PsycINFO, and DARE) databases. Studies were included if they were relevant to the research question, published in English, based in the prehospital setting, and included adult patients with traumatic injury.

Results: The search identified 1471 citations, of which eight observational studies of variable quality were included. Four studies were retrospective cohorts, three were case series and one a case report. Cervical collar application was reported in penetrating trauma to be associated with unadjusted increased risk of mortality in two studies [(OR, 8.82; 95% CI, 1.09–194; $p = 0.038$) & (OR, 2.06; 95% CI, 1.35–3.13)], concealment of neck injuries in one study and increased scene time in another study. While, in blunt trauma, one study indicated that immobilisation might be associated with worsened neurological outcome (OR, 2.03; 95% CI, 1.03–3.99; $p = 0.04$, unadjusted). We did not attempt to combine study results due to significant heterogeneity of study design and outcome measures.

Conclusion: There is a lack of high-level evidence on the effect of prehospital cervical spine immobilisation on patient outcomes. There is a clear need for large prospective studies to determine the clinical benefit of prehospital spinal immobilisation as well as to identify the subgroup of patients most likely to benefit.

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Introduction

Traumatic spinal cord injury (SCI) is a relatively rare event, however, it may result in critical neurological damage causing permanent disability, reduced participation in work, and decreased quality of life. Global incidence rates are reported to range widely from 8 to 246 cases per million population varying between regions and countries [1]. Differences in incidence rates between countries are likely to relate to a variety of factors, including socio-economic and geographic differences, but may also reflect heterogeneity in reporting and coding practices. Predominantly affecting males [2,3], traumatic SCI is primarily caused by motor vehicle collision [2,4–7] and falls [3,8,9]. With changing demographic trends and injury patterns, the proportion of neck injuries causing a cervical SCI (CSCI) is reported to be growing (around 55–60% of all traumatic SCIs), whilst the incidence of neurologically complete lesions is reducing [10].

Prehospital spinal immobilisation has long been considered as the standard of care for patients with suspected cervical or other SCI [11–13]. This practice is based on the assumption that immobilisation minimises spinal movement [14,15], reduces risk of secondary injuries [15,16], and facilitates extrication and transport [15]. There is emerging evidence, however, that spinal immobilisation may be associated with adverse effects, including increased risk of respiratory compromise [15,17,18], back and neck pain [17–21], pressure sores [22,23], and increased intracranial pressure [24]. Moreover, it may lead to additional cost and scene time [17], as well as the possible risk of dropping the immobilised patient by prehospital providers in difficult extrication situations when traversing narrow and unstable paths [17,22].

As prehospital spinal immobilisation is a widely accepted standard of care for patients with suspected CSCI, the association between immobilisation and patient outcomes should be clearly established on a rigorous evidence base. Following from a Cochrane review in 2001 that demonstrated a lack of evidence to support the value of routine immobilisation a systematic review is required to update the evidence to inform practice guidelines [12].

Objectives

Primary objectives

This systematic review is designed to answer the question: in adult patients attended by emergency medical services (EMS) following suspected cervical spinal cord injury, does the application of a cervical collar improve patient outcome compared to no collar at all [25]?

Secondary objectives

Secondary aims of this systematic review are to identify whether the cervical spine (c-spine) immobilisation is required for all mechanisms of suspected CSCI and to identify any potential sub-groups of patients with cervical SCI who may benefit from spinal immobilisation.

Methods

Information sources, search strategy, and inclusion criteria

The systematic review protocol has been previously described, including a detailed search strategy [25]. Online databases were searched from the first publicly accessible date to 7th October 2013. These databases included the Cochrane library, CINAHL, EMBASE, Pubmed, Scopus, Web of science, Google scholar, and OvidSP (MEDLINE, PsycINFO, and DARE). In addition, reference lists of relevant papers were hand-searched to identify further studies that might have been missed by the electronic search. The search included different combinations of Medical Subject Headings (MeSH) terms, prehospital search filter terms [26], as well as keywords that are relevant to immobilisation, traumatic spinal cord injury, and outcomes (see Table 2: summary of search terms).

The studies were eligible for inclusion if they were characterised as primary studies, relevant to the research questions, published in English, based in the prehospital setting, and performed in adult human subjects with traumatic spinal injuries.

Study selection and data extraction

The titles and abstracts were screened for relevancy by two independent reviewers (AOO and PAJ), with disagreements settled by consensus. Potential papers were evaluated for inclusion by two independent reviewers (combination of AOO, PAJ, JS or KS), with disagreement resolved by an adjudicator. The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow diagram describes the selection process (Fig. 1).

Studies were considered relevant if the patients sustained trauma with a potential to cause a spinal cord injury and were managed in the prehospital setting (with or without spinal immobilisation). Any reported outcome measure associated with the application or non-application of c-collars was included [25]. Data were extracted by two independent authors (AOO and PAJ) (see Table 1: Summary of characteristics of included studies).

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