

An evidence-based approach to the treatment of acute whiplash injury

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Introduction

This review has two components. The first is a selective, narrative background of some of the issues surrounding acute whiplash, and the latter part is a more systematic review of the available evidence concerning the management of acute whiplash as it stood in March 2001.

Is whiplash all in the mind?

Whiplash continues to be a controversial topic, with some commentators maintaining a view that chronic whiplash in particular is a "biopsychosocially" determined phenomena (1). It is generally accepted that pain, particularly chronic pain, is frequently associated with impaired social functioning and psychological distress. It is, therefore, difficult to separate causative from incidental relationships. Some light has been thrown on this issue by the observation that when chronic neck pain after whiplash has been fully relieved, evidence of psychological distress disappears (2). This would suggest that the psychological distress was a consequence rather than cause of the chronic pain. Another study of 117 patients with whiplash measured psychological parameters in the first seven days after whiplash and found that they were not predictive of the development of chronic symptoms (3). In an explicit study to determine whether a characteristic psychological profile could be faked, 43 university students were asked to attempt to simulate pain for six months after whiplash injury for the purpose of financial gain. Their results were then compared to the results obtained in 132 patients with whiplash injuries (4). The results were quite different, leading the authors to conclude that "... it is very difficult for an ingenuine individual to fake a psychological profile typical of a whiplash patient." On balance, it would seem that although there are psychological and social factors at play in the setting of whiplash, they are not the root cause of patients' symptoms.

Natural History

The natural history of whiplash is, for the most part, benign. Most patients recover within a few weeks of injury to have no residual symptoms. It has been argued that apparent differences in the rates of chronicity in whiplash in different countries are evidence that chronic whiplash is a socially programmed phenomena pivoting on the presence of a com-

pensation system (5). However, a careful analysis of the data reveals that many of the studies proffered to support this view were compromised by small sample size, poor study design and inappropriate end points such as insurance claims rather than clinical information (6,7). Moreover, competent follow-up studies have revealed that a significant proportion of patients develop chronic symptoms. A series of follow-up studies of an inception cohort of patients assembled in the United Kingdom in the early 1980's has been most revealing. They demonstrate that most patients destined to improve do so within a few months, with very little improvement after two years. The frequency of chronic symptoms classified as intrusive or severe at 15 years (presumably well after the settlement of any compensation claim) was in the order of 25% (8).

Treatment of acute whiplash

The aim of any intervention during the acute phase (the first three months) of whiplash would therefore be to shorten the time to recovery or, more critically, prevent the development of chronic symptoms. It follows that studies of the acute management of whiplash injuries must be carefully controlled and adequately powered to account for the favourable natural history and should ideally have the prevention of chronicity, as well as any short-term effects, as endpoints.

In the absence of a demonstrated or single pathological basis for acute pain following whiplash injury, proposed treatments have been arbitrary and empirical. They span the spectrum from simple reassurance to the use of high doses of potent corticosteroids. This paper aims to present, systematically and critically, the evidence available from controlled clinical trials for the management of neck pain following acute whiplash injury.

The following review is explicitly evidence-based and attempts to assemble the available trial data on the management of acute whiplash injury. It uses the principles of evidence-based medicine (EBM). EBM is defined as an approach to practising medicine in which the clinician is aware of the evidence in support of his or her clinical practice, and the strength of that evidence. It emphasises the need to move beyond clinical experience and physiological principles to rigorous evaluations of the consequences of clinical actions.

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Previous Reviews

A major previous review of whiplash injury was conducted under the auspices of the Quebec Task Force and was published in 1995 (9). It conducted a detailed search for articles pertaining to whiplash, including treatment, up until the end of 1994. Studies identified in the Quebec Task force were included in the current review. It is interesting to note that the conclusions of the Quebec Task Force, which have been widely quoted, are based to a great extent on consensus – a strategy currently rejected by peak scientific bodies such as the National Health and Medical Research Council of Australia. Indeed, the authors of the task force itself conclude that “the systematic review of the original research literature yielded little scientifically rigorous information addressing the mandate to the task force.”

Search Strategy

The current review is based on studies retrieved through the following strategy. Whiplash was used as a keyword and where there were options concerning the use of this word, the search term were exploded so as to increase the sensitivity of the search. The search was restricted to articles in the English language and published in 1995 or later. The titles of all retrieved articles were individually reviewed to determine whether they pertained to the management of whiplash. Where there was any uncertainty, the abstract of the article was checked. All candidate articles were retrieved.

The following databases were searched:

- Cochrane Collaboration clinical trials register
- Pubmed online database
- Medline search through OVID
- Embase 1995-2000

Retrieved studies were included in the review if they were a controlled clinical trial that concerned the management of neck pain in the first three months after a motor vehicle accident.

TABLE 1
Criteria for critical appraisal of studies of treatment

Primary Criteria	
-	Was the assignment of patients to treatments randomised?
-	Were all patients who entered the trial properly accounted for and attributed at its conclusion?
-	Was follow-up complete?
-	Were patients analysed in the groups to which they were randomised?
Secondary Criteria	
-	Were patients, health workers, and study personnel "blind" to treatment?
-	Were the groups similar at the start of the trial?
-	Aside from the experimental intervention, were the groups treated equally?
Results	
-	How large was the treatment effect?
-	How precise was the estimate of the treatment effect?

No formal quality score was calculated or applied, but the papers were appraised with regard to the criteria suggested by the McMaster Clinical Epidemiology Group (Table 1).

Retrieved articles

Articles were found concerning active and passive mobilisation, traction, physiotherapy, cervical collars, activity and rest, multimodal therapy and high dose corticosteroids.

Mobilisation

MEALY ET AL. studied 61 patients who presented to an accident and emergency department (10). They were randomised to two groups. The first received a soft collar, two weeks rest, analgesia and advice on gentle neck mobilisation. The active treatment group received ice on the neck for 24 hours, then Maitland neck mobilisation and daily exercises. The outcome assessment was a visual analogue (VAS) pain scale from 0-10 and a range of movement (ROM) score. Eighty-three percent of patients were successfully followed up. They were assessed by a blinded assessor, although the patients were not blinded, at four and eight weeks. At the end of the study, there was a greater improvement in the pain intensity in the active group, the difference in pain intensity at eight weeks being approximately two out of 10 on the VAS scale. No comment is made concerning the clinical significance of this difference.

Traction

PENNIE AND AGAMBAR recruited 135 patients from a British accident and emergency department (11). They were randomised to an active group, receiving a course of 10 minutes of traction twice a week for up to five months and advice on moving the neck, whereas the control group received a soft collar for two weeks and then advice to exercise. The outcome criteria were a patient global assessment and pain score assessed single-blind at six weeks and five months. The follow-up was near complete, at 94%. No significant difference was detected between the groups.

Physiotherapy

In a three-armed study of physiotherapy, 247 patients presenting within 72 hours of injury were randomised to either; rest for two weeks and advice concerning mobilising; unrestricted physiotherapy interventions for 40 minutes three times a week or verbal and written information concerning posture and home exercises (12). The outcome criteria were ROM and VAS scores, which were assessed in a single-blind fashion at two months. Follow-up rates were marginal at 69%. The study demonstrated no difference between the physiotherapy and home exercise group, with both doing significantly better than the rested group.

Pulsed Electromagnetic Field

The use of a pulsed electromagnetic field collar was compared with a sham collar in a study of 40 patients presenting within 72 hours of injury. Treatment allocation was random, and pain VAS was used as the primary outcome measure at two, four and 12 weeks. There were some early benefits from the active collar with greater reduction in pain than the sham collar at two

and four weeks, but no significant difference at 12 weeks. In keeping with the expected natural history, over 70% of the patients in this study felt moderately better or much better at the end of the study.

Soft Collars

Only one study was found that specifically addressed the use of a cervical collar. Two hundred fifty-six patients were recruited at a hospital accident and emergency department (13). They were then randomised to a soft cervical collar or no collar. The primary outcome criterion was pain assessed on a three-point scale – none, better or worse – after six weeks. It is unclear whether the assessor was blind, and after six weeks, 62% of the study population still had pain. However, there was no difference in outcome between the groups.

Multimodal Treatment

In order to assess the effect of a multimodal treatment program, PROVINCIALI ET AL studied 60 patients two months after neck injury (14). This study is fundamentally different to those described above, dealing with a more select population recruited some weeks after whiplash injury. Some components of the selection criteria are not reproducible – most notably the exclusion of patients with "... symptom exaggeration with the intention of seeking financial rewards". All patients were said to have the "cervico-encephalic syndrome", a clinical description that lacks any standardised or accepted meaning. These criteria limit the external validity or generalisability of the study. Patients were randomly allocated either to multimodal treatment consisting of postural training, manual treatment techniques and psychological support or a control treatment using physical agents only, such as interferential and ultrasound. Pain level (VAS), range of movement, self-rating scale of treatment efficacy and return-to-work delay were assessed at one and six months. The active group showed significantly greater improvement than the control group for VAS, earlier return to work and self-rating, but had no difference in cervical range of movement.

Activity and Rest

To gauge the effect of simple advice to "act-as-usual", BORCHGREVINK ET AL. randomised 201 patients presenting to an emergency department to either advice to continue with normal activities, or two weeks off work and a soft collar (15). Assessments were performed single-blind at 14 days and six months. There was one patient to whom the assessor was unblinded as they wore their collar to the first assessment. The primary outcome measure was subjective assessment of neck pain, neck stiffness and headache. Further analysis collapsed these components into a pain factor which was scored on a 0-5 scale. There were no significant differences in this factor. However, individual symptom components such as neck stiffness intensity, pain with activity and VAS scores of neck pain and headache favoured the active group. The differences were small, amounting to around 5mm on a 100mm VAS. Measurements of range of movement and sick leave showed no differences between the two groups.

ROSENFELD ET AL. recruited 97 patients from a combination of primary care settings, emergency departments and private

clinics seen within 96 hours of injury (16). They were randomised to rest and soft collar or a protocol of active movements. The two treatments were (randomly) administered either early (within four days) or late (after two weeks). The primary outcome measure was neck pain VAS, which was assessed at six months by a blinded observer. However, it is possible that the observer may have been unblinded by having to ask what interventions the patient had received outside the study protocol as part of the follow up. After six months, neck pain VAS scores favoured early intervention with the active regime over other combinations, with a mean difference of –15mm of a 100mm scale between this group and the next most effective intervention and –30mm over the least effective intervention. This would certainly be a clinically useful improvement.

Methylprednisolone

A single, methodologically sound, double-blind, randomised trial has investigated the use of high dose, intravenous methylprednisolone for the acute management of whiplash injury (17). Based on the beneficial effect of steroids on spinal cord injury, this study compared the effects of high dose, intravenous methylprednisolone administered over 24 hours with a placebo infusion in 40 patients. Most of the patients had neurological signs (WAD III) and so probably represent a more severely injured group than is commonly reported. At six months, complete follow-up was achieved and there was a highly significant difference in the number of sick days taken in favour of the treatment group. No major adverse effects were noted in the trial, but in other settings, although typically in medically-unwell patients, high dose methylprednisolone has been associated with the short-term effects of cardiac arrhythmias, electrolyte disturbances, psychological disturbances, mania and depression. In the longer term, avascular necrosis and immunosuppression are both thought to be related to this type of treatment. This intervention certainly warrants further study, including long-term follow-up, but should focus on poor prognosis patients.

Summary

The literature dealing with the acute management of whiplash is sparse. Because of differences in treatments, heterogeneity in outcome measures and variations in inclusion and exclusion criteria, it is impossible to pool the results of the available studies. However, important themes do emerge. Firstly, there is no study in which a regime of rest and the use of collars have been shown to confer any benefit over the other treatments. Therefore the use of rest and a cervical collar should be discouraged. The encouragement of early activity by the patient, either to act as usual or pursue an active mobilisation regime, is superior to both rest and passively administered physiotherapy. These conclusions are in accordance with a systematic review published immediately before this conference (18). Their review differs from this one in that they dealt with conservative treatments only and identified four other articles, two German language articles, one article retrieved from Ireland Physiotherapy (which was not indexed in the databases used in this current review), and one dealing with chronic patients. Furthermore, studies were only included if they met

quality criteria – with an arbitrary cut off at 50%. There was no limit on time of inclusion and external validity was not explicitly considered. Their review ended up with three acceptable studies, and concluded that “rest makes rusty”.

In terms of more specific modalities, pulsed electromagnetic therapy appears to confer only early benefit over placebo in terms of pain relief. Traction is ineffective. Sick leave at six months post injury was shown to be reduced by the early administration of methylprednisolone and also a multimodal rehabilitation program. The long-term risks of treatment with intravenous methylprednisolone, such as avascular necrosis of

the hip, have not been determined, and, given the generally favourable prognosis of acute whiplash, need to be carefully considered before this therapy is widely applied. No studies had sufficient follow-up to determine the effect of any one treatment on chronic symptoms beyond six months.

It is pertinent to note that despite significant numbers of **{clarify}** patients were still troubled by pain and functional impairment in most studies. The challenges of future studies in this are to prevent chronicity, develop valid reliable prognostic indicators and identify those patients likely to respond to specific treatments.

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