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A small group Whiplash-Associated-Disorders (WAD) patients with central neck pain and movement induced stabbing pain, the painful segment determined by mechanical provocation: Fusion surgery was superior to multimodal rehabilitation in a randomized trial

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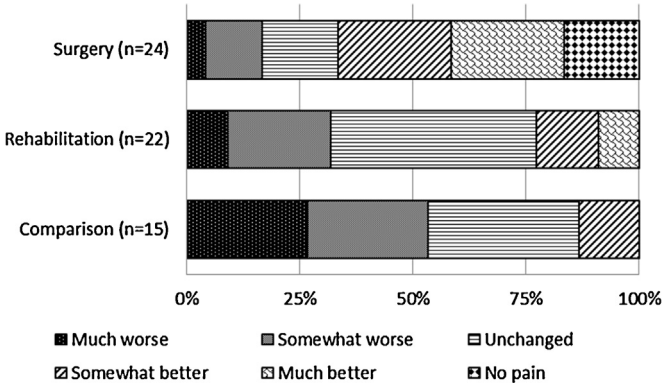
HIGHLIGHTS

- Some patients with Whiplash-Associated-Disorder (WAD) have central neck pain and movement induced stabbing pain.
- Such WAD-patients were evaluated for possible segmental pain and surgical fusion.
- A mechanical provocation test determined segmental fusion level/s.
- Cervical fusion was compared with multimodal rehabilitation in a randomized trial.
- Fusion was significantly better than rehabilitation in relieving neck pain.

GRAPHICAL ABSTRACT



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ABSTRACT

Background: The majority of patients suffering from a whiplash injury will recover, but some will have symptoms (Whiplash Associated Disorders, WAD) for years despite conservative treatment. Some of these patients perceive neck pain that might come from a motion segment, possibly the disc. In comprehensive reviews no evidence has been found that fusion operations have a positive treatment effect on neck pain in WAD patients.

Purpose: Our aim was to evaluate the possibility of (a) selecting a subgroup of chronic WAD patients based on specified symptoms possibly indicating segmental pain, and (b) treating said segmental pain through fusion operation based on non-radiological segment localization. The hypothesis was that fusion operation in this selected subgroup of chronic WAD patients could alleviate perceived neck pain.

Methods: Eligible patients for the study had a traffic accident as the origin for their neck pain, and no previous neck symptoms. Neck pain should be the predominant symptom and the pain origin reported to be in the midline, being dull, aching in character and at sudden movements combined by a stabbing

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pain in the same area. Forty-nine patients with these specified symptoms were identified among a large number of chronic WAD patients. Those selected had pronounced symptoms for a median of around 50 months and had previously been investigated and fully treated within the ordinary healthcare system without success.
No neurological abnormalities were to be found at clinical examination and no specific changes to be seen on X-ray and MRI. The patients were randomized to either cervical fusion operation or multimodal rehabilitation. By using a mechanical provocation test the level/s to be fused were identified. In all but one patient the surgery was performed anteriorly using microsurgical technique and a right-sided Smith-Pedersen approach and plate fixation. The multimodal rehabilitation at the Clinic of Medical Rehabilitation, Karolinska Hospital, Stockholm, included outpatient treatment for four days a week for six weeks and included treatment by physician, physiotherapists, occupational therapist, psychologists, social-service worker and nurses. Perceived change in neck pain was assessed using the Balanced Inventory for Spinal Disorders questionnaire at the 2-year-follow-up.
Results: Mean age of the patients was 38 and 40 years (surgery and rehabilitation groups, respectively), the most common type of accident being rear-end collision. At clinical examination muscle tenderness was not an outstanding sign. In most patients the mid-cervical region appeared to be the painful area but one patient localized the pain to C1. At follow-up 67% of the patients in the surgery group and 23% in the rehabilitation group assessed improvements in the ITT analysis. Corresponding proportions in the per protocol analysis were 83% and 12%, respectively.
Conclusions: The results support the supposition that among patients with central neck pain for long periods of time following a whiplash injury there are some in whom the neck pain emanates from a motion segment, probably the disc, a situation suitable for fusion surgery.
Implications: Thorough individual symptom evaluation in patients with chronic WAD may identify patients who will benefit from cervical fusion surgery.

1. Introduction

The large majority of patients with acute whiplash injuries will recover within weeks or months, but in 10–40 percent of the victims severe symptoms have been reported for years [1–5]. In a recent Swedish study the symptoms, disabilities and life satisfaction of Whiplash Associated Disorders (WAD) patients were studied five years after the injury [6]. It was found that at that time many patients reported symptoms similar to those for mild traumatic brain injury but also that 46% of the women and 49% of the men still reported neck pain, and in 17% (women) and 6% (men) it was severe. The authors concluded that "continuous research within this area may provide a possibility to identify subgroups of the dominating symptoms in patients with WAD such as somatic, emotional or cognitive". To the best of our knowledge we classified patients with dominating neck pain as a somatic subgroup, but within this group there might also be further subgroups based on the origin of the pain.

In comprehensive reviews [7–10] no evidence has been found that fusion operations have a positive treatment effect in WAD patients, nor in patients suffering solely from neck pain for other reasons [9]. In our experience some chronic WAD patients report neck pain symptoms similar to segmental pain in the lumbar spine [11], indicating the possibility of pain from a motion segment, possibly the disc. Our aim was therefore to evaluate if it is possible to identify and select a subgroup of chronic WAD patients based on specified symptoms probably indicating segmental pain. And secondly, if this segment, although not radiologically evident, could be localized and treated by fusion operation in order to alleviate perceived neck pain among those identified patients.

For selection, chronic WAD patients were examined to find those with cervical symptoms similar to those in chronic lumbar pain patients that have been improved from fusion operation [11]. In a randomized controlled trial, the change in neck pain perceived by patients in this group after cervical fusion surgery was compared with the change in neck pain of those receiving best possible multidimensional rehabilitation treatment. The focus of this paper is to describe the specific patient selection procedure and the treatments as well as the patients' assessments of overall perceived change in neck pain.

2. Material and methods

This study was undertaken from July 1999 until March 2005, with a second follow-up ending in March 2010.

2.1. Patient selection

2.1.1. Inclusion criteria

Eligible patients for this study had a traffic accident as the origin of their neck pain and pronounced symptoms lasting for at least one year. Further inclusion criteria were an age of 18–60 years, working full time until the accident, and without previous neck pain. After the accident all included patients should have been fully investigated and fully treated within the ordinary healthcare system, but with continued pronounced symptoms. They should have had an ordinary plain X-ray, also in flexion and extension, and an MRI. Only patients who showed no specific changes on X-ray and MRI were included. All patients should have a marked reduction in working capacity, and be able to work a maximum of halftime.

2.1.2. Symptoms and signs

To be included the patients should present primarily with pronounced neck pain with or without pain and/or paresthesias in one or both arms, and often also in combination with headache. The neck pain should be the predominant symptom, and in the patient interviews its origin should be reported to be in the midline and to feel localized to a restricted part in height of the cervical spine. The character of the pain should be dull, aching, and when increasing possibly with radiation in the cranial or caudal direction from the origin. With sudden movements, such as missing a step or quickly turning the head, there should be a stabbing pain in the midline in the same area as the origin of the continuous dull aching pain. The sensations in the arms should be of a minor degree, including either diffuse radiation of pain or paresthesias such as tingling, pricking or numbness with varying extension. Headache as well as other commonly noticed sensations among WAD patients such as