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Editorial comment

A surgical treatment for chronic neck pain after whiplash injury?

Michele Curatolo*, John D. Loeser

Department of Anesthesiology and Pain Medicine, University of Washington, Seattle, USA

This issue of the *Scandinavian Journal of Pain* publishes a randomized controlled trial by Nyström and co-workers on cervical fusion for chronic neck pain after whiplash injury [1]. Patients were randomized to either cervical fusion or multimodal rehabilitation. In the surgical group, a diagnostic provocation test was performed that consisted in an open and direct mechanical stimulation of the suspected discs, followed by fusion of the symptomatic segments. The patients in the rehabilitation group received a six weeks multimodal outpatient treatment involving physiotherapists, occupational therapist, psychologist, social workers and nurses. In the intention-to-treat analysis, improvement at follow-up was observed in 65% and 23% of patients in the surgery and rehabilitation group, respectively. In the per-protocol analysis, the improvement was observed in 83% and 12% of patients in the two groups, respectively.

The study has several merits. The enormous difficulties in planning and completing a randomized controlled trial of a surgical treatment are obvious and the authors have to be commended for their undertaking. The average follow-up period was approximately 2 years. The treatment for the rehabilitation group was an extensive multidisciplinary programme that seems to meet all criteria of an optimized and intensive conservative care.

There are however several limitations of this study. The number of patients was low. While the long follow-up time is an excellent feature of the study, it is unclear what patients did during this time; the treatment effects were not controlled for potential confounding factors related to therapies undertaken during the follow-up time. The selection criteria deserve particular attention. Some of them were based on the authors' experience and beliefs on possible signs of discogenic pain. As such, they are not validated and difficult to reproduce. The type of provocative test was changed during the study, thus not all patients who underwent surgery were selected with the same test. The open provocation test that was eventually used to identify the level for surgery implied mechanical stimulation of the suspected segments, with the aim to evoke or enhance the patient's typical pain. This method has not been validated by previous research. The authors cite an own abstract for a meeting in 1991, but apparently no further publications have been made on this procedure. The technique is invasive, as it implies skin incision in awake patients. It is unclear how many incisions had to be made to eventually identify the levels for surgery. There are no quantitative measures to assist the diagnostic process and the test relies on the experience and subjective judgement of the assessor. Its reliability and validity are unknown. These are important limitations, as they render the external validity of the results uncertain. The unfeasible blinding to treatment allocation does not allow full evaluation of the specificity of the treatment.

Despite the limitations, the study is relevant and gives opportunity for reflection. Chronic pain after whiplash injury remains poorly understood. Objective findings of tissue damage are rarely found and in many cases cannot be related to the symptoms. This has led to pathophysiological models that tend to minimize the importance of tissue damage and nociceptive components. Rather, the attention has been strongly focused on psychosocial factors. The problem is compounded by the all-too-common litigation surrounding the originating event. The injury typically occurs in the setting of a motor vehicle accident. Disabled patients seek compensation and the insurance costs can be significant, depending on the local jurisdiction. The absence of detectable morphological changes associated with high disability levels raises concerns about potential malingering. Patients feel unfairly treated, which has been shown to predict poor outcome [2].

A surgical treatment is based on the assumption that tissue damage and consequent nociception are relevant to the patient's symptoms. In fact, there are several arguments in favour of a role of tissue damage in whiplash-associated disorders (WAD). These arguments have been previously reviewed [3]. The best currently available evidence is on lesions of the zygapophysial (facet) joints. Facet lesions have been predicted by bioengineering studies and validated through animal studies; clinical research has shown that a valid diagnostic test (nerve blocks) and a proven treatment (radiofrequency neurotomy) are available [3]. This line of research rejected the belief that tissue lesions are never primarily responsible for WAD.

However, as only a minority of patients qualifies for treatment of facet-mediated pain, we still have a huge gap in knowledge and treatment options for WAD. In the area of tissue damage as

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* Corresponding author. Tel.: +1 206 543 2568.
E-mail address: curatolo@uw.edu (M. Curatolo).

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potential determinant of WAD, lesions of the intervertebral disc have been produced in cadavers subjected to whiplash injuries and observed in postmortem studies; also, we know that during the injury strains in the annulus fibrosus can exceed physiologic limits, making the discs prone to potentially painful rims [3]. However, while these data provide a basis for a potential clinical relevance of lesions of the disc or the anterior longitudinal ligament, this model has not been explored by clinical research. In this context, the study by Nyström and co-workers [1] takes the important step to test the hypothesis that fusing a pathological segment alleviates pain in WAD. While positive results of a treatment do not validate per se a pathophysiologic model, they provide some support for a role of lesions of the intervertebral disc or other structures of the fused segment in the determination of WAD.

Finally, it has to be stressed that any tissue damage is hardly the only determinant of pain and disability. Central nervous system plasticity leads to altered processing of sensory stimuli in WAD [4]. The resulting hyperalgesia is one of the predictors of poor recovery [5]. Psychosocial factors are associated with outcomes of WAD [2,6]. They have shown associations also with the results of interventional treatments: radiofrequency neurotomy is less effective in patients with depression, catastrophizing and high disability levels [7,8]. As for any treatment for chronic pain, consideration of the multiple potential determinants of pain and disability on an individual basis is essential to maximize treatment efficacy.

Conflict of interest

The authors have no conflict of interest.

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