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Editorial comment

Appropriate interventional management of whiplash-associated pain disorders is effective

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In the current issue of the *Scandinavian Journal of Pain*, Dr. Hambraeus and Westergren report a patient with a history of whiplash injury who developed neck pain, low back pain, signs of dysfunction of the autonomic nervous system and muscle contractions. Different interventional treatments were performed, i.e. diagnostic nerve blocks, radiofrequency denervations of the zygapophysial (facet) joints, and sympathetic blockades. The patient had a dramatic improvement 14 years after the trauma [1].

Besides neck pain or headache, low back pain can occur after whiplash injury, the incidence decreasing over the months following the accident [2]. The pathophysiology is unclear. Lesions of structures of the lumbar spine may occur, but to the author's knowledge there is no evidence for specific damages that are responsible for nociception. Pre-existing asymptomatic pathologies of the spine may be worsened by the trauma, with subsequent induction of lumbar pain. However, the causal relationships between pre-existing lesions, trauma and pain remain speculative.

For the patient discussed in the present report, the hypothesis that low back pain would origin from the facet joints was tested by nerve blocks. Typically, the medial branches of the dorsal rami (for the spinal nerves L4 and above) and the dorsal ramus of L5 are anaesthetized [3]. These nerves supply the facet joints. Thus, if pain arises from these joints, anesthetizing the nerves must lead to pain relief. The patient experienced 80% reduction in pain intensity, which confirmed the hypothesis that the facet joints were probably a relevant source of low back pain. Subsequent radiofrequency denervations of the facet joints provided long-term pain relief. The results are consistent with the available literature, which shows good results of radiofrequency denervation of the lumbar facet joints in carefully selected patients [4–6].

Further diagnostic nerve blocks performed at the cervical level in this patient revealed that the facet joints were likely the origin of the neck pain [7]. The cervical facet joints can be lesioned by a whiplash injury [8–10], which leads to chronic headache and neck pain in part of these patients [11]. In the reported case, radiofrequency denervation of the cervical facet joints produced long-lasting pain relief, again consistent with the published evidence [12–14]. Interestingly, the myotonic muscle contractions almost disappeared after facet denervation, suggesting that this disabling symptom was somehow triggered by pain arising from the joints [1].

So far, the report confirms that the facet joints are possible sources of pain after a whiplash injury, and that this pain can be effectively treated by radiofrequency denervation. Dr. Hambraeus and Westergren applied knowledge from the available literature to offer their patient an effective treatment [1].

An obvious question in this respect is why the patient had to wait 14 years to receive a treatment that has been proven effective as early as in 1996 [13]. One can argue that the efficacy of radiofrequency denervation of the cervical facet joints is based on the excellent results of only one randomized sham-controlled trial [13]: uncertainty on its efficacy would lead to limited use. However, the results have been confirmed by several prospective studies that have consistently reported complete pain relief in about 70% of adequately selected patients [12,14–16]. This outcome is unambiguous and strongly suggestive for a high efficacy of this treatment. Nevertheless, many clinicians dealing with whiplash patients do not include radiofrequency denervations in their management programmes, and the delay experienced by the patient reported is not an exception [1]. Paradoxically, other interventional pain procedures with a less convincing literature, such as pulsed radiofrequency, may have wider acceptance among pain practitioners.

In the author's opinion, a major reason for the limited use of radiofrequency denervation is the fact that its success is strongly dependent on practice principles that are frequently not respected. Lack of adherence to these principles is probably an important reason for a lack of positive results in clinical practice. Poor clinical results may lead to poor reputation and limited use of the procedure.

In order to reproduce the excellent results of the aforementioned studies, the clinical procedures have to adhere to the selection criteria and the denervation methods that have been adopted in those investigations. First, patient selection implies the use of controlled nerve blocks, at best in a double-blind fashion, with a careful observation of the effects [17–19]. No other criteria, including clinical examination and radiological findings, have been proven to be linked with a successful denervation. Pain and function have to be recorded during the expected time of effect

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of the local anaesthetic. Only those patients who display a clear effect, ideally at least 80% pain relief and restoration of functions, should be recruited for the denervation. Also, the onset and duration of effect should be congruent with the characteristics of the local anaesthetic injected. For instance, complete pain relief that lasts only 30 min after a bupivacaine injection is likely the result of a placebo effect or chance, as this local anaesthetic has a long duration of effect. Accordingly, limiting the duration of evaluation to the immediate post-procedural period is associated with a high risk of false positive response. Unfortunately, this is a common pitfall of practising diagnostic blocks, which likely leads to a high rate of unsuccessful radiofrequency denervations.

The validated denervation method for the cervical facet joints is time consuming and requires adequate training and experience. A matrix of lesions has to be performed in order to maximize the chances of coagulating the nerve and provide long-term pain relief, which results in long procedural times [20]. Alternatively, the number of lesions can be reduced if the target nerves are visualized by ultrasound: this method seems to reproduce the results of the traditional technique, with substantially shorter procedural times [14]. However, ultrasound imaging of the nerves that supply the facet joints is challenging; it can reliably be performed only by practitioners who have wide experience with this examination.

Thus, the procedures to establish the diagnosis and subsequently denervate the joints are very demanding, if performed according to the validated techniques. In some settings, this may contrast with limited availability of resources or inadequate reimbursement. Furthermore, investing so much time may not be felt as strictly necessary by part of practitioners, leading to the use of shorter procedures that are not supported by published data. In the author's opinion and experience, making such compromises strongly exposes patients to ineffective treatments. This is confirmed by the lack of efficacy in patients who are not selected according to the aforementioned criteria or undergo a quick denervation technique [21,22].

The authors of the report also performed sympathetic blocks [1]. These blocks have almost no literature in the management of pain after whiplash injury. Their role in the management of chronic spinal pain is basically unknown, and the pathophysiological basis for a possible efficacy in these conditions remains very speculative. Lack of literature does not necessarily imply lack of efficacy, but this is hardly a support for a broad application of sympathetic blocks. While we are still waiting for high quality controlled trials, the use of sympathetic blocks should be based on a careful evaluation and the definition of a reasonable working hypothesis on an individual basis. In the reported case, the presence of signs of autonomic dysfunctions was the reason for trying sympathetic blocks. In the absence of adequate clinical research, any attempt to establish a cause–effect relationship between treatment and result in a case report would be unreasonable. Moreover, any effort to explain the pathophysiology underlying a possible therapeutic effect of the intervention can hardly go beyond speculation. Nevertheless, the patient experienced a spectacular reduction of her symptoms, which may encourage more investigation of the role of sympathetic blocks in the management of chronic pain patients with signs of autonomic dysfunction.

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