



Case Report

Neuropathic Pain Due to Avulsion of C₅-C₇ Nerve Roots: A Successful Integrative Approach by Acupuncture, Trigger Point Injection and Hypnosis

Enrico Facco^{1,2*}, Luca Queirollo¹, Gastone Zanette^{1,2}

¹Department of Neurosciences, Section Dentistry, University of Padova, Italy

²Inst. Franco Granone, Italian Center of Clinical and Experimental Hypnosis, Turin, Italy

*Corresponding author: Enrico Facco, Department of Neurosciences, Section Dentistry, University of Padova, Italy

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Abstract

Neuropathic pain is one of the major challenges in clinical practice, the pharmacological treatment of which is far below the expectations. We report on a case with persistent shoulder and arm pain following avulsion of C₅-C₇ nerve roots despite pharmacological therapy (oxycodone 20 mg and pregabalin 225 mg daily, plus ketorolac 10 mg as needed). The clinical examination disclosed the co-occurrence of myofascial trigger-points, suggesting a twofold origin of pain and the need for treating both of them. Therefore, the patient was submitted to 10 sessions of acupuncture plus trigger point injection with lidocaine and steroids, followed by three sessions of hypnosis. At 12 months follow-up the patient reported a relevant decrease of pain (VAS decrease from 7 plus frequent paroxysm at 10 to 4 plus 1-2 paroxysm/month at 7) that allowed him to withdraw the pharmacological therapy. Our results, though based on a single case, suggest the potential benefits of hypnosis in neuropathic pain and the need of a careful differential diagnosis of pain mechanisms actually involved, in order to properly guide an integrative approach.

Keywords: Acupuncture; Hypnosis; Myofascial pain; Neuropathic pain; Chronic pain; Integrative medicine

Introduction

As emphasized by the IASP definition [1,2], pain is a matter of subjective experience and its persistent elusiveness entails huge epistemological implications – i.e., the inadequacy of an inflexible mechanist-reductionist approach neglecting the role of its subjective components [3]. As a result, the weakness of the old biomedical model has led to the biopsychosocial one being introduced, emphasizing the dynamic interplay between physical factors, psychological and psychocultural components, and environment [4-7]. In this regard, it is worth mentioning the role of noetic and auto noetic factors in pain modulation – i.e., both its severity and tolerability depend on what the pain means to the patient and his/her resources to modulate it [3].

The International Association for the Study of Pain (IASP) has recently redefined Neuropathic Pain (NP) as pain caused by a

lesion or disease of the somatosensory nervous system [8]. This updated definition is more restrictive than the previous one, in that it requires the presence a structural lesion of the somatosensory pathways. Thus, it has excluded the so-called complex regional pain syndrome type I, a condition involving hyperalgesia and allodynia without evidence of nerve injury [9]. Nevertheless, some uncertainty in its diagnosis still persist due to the above-mentioned complexity, extending far beyond the limits of the history and evidence of neural damage and its biomarkers. In fact, pain may be the result of mixed physical factors – i.e., the neuropathic component may be associated to other pain mechanisms, such as myofascial pain – while hyperalgesia and allodynia, considered in the past as pathognomonic of neuropathic pain, can be also induced by nocebo effect in the absence of any neural damage [10]. These facts may explain why no reliable classification of symptoms and a scoring system based on objective evaluation has been introduced so far, while the persisting uncertainty has led to the following three classes of NP being established: 1) possible NP (when clinical features are compatible and plausible with it); 2)

Probable NP (item 1 plus sensory signs in the areas corresponding to the neural damage); 3) Confirmed NP (when diagnostic tests confirm the somatosensory damage explaining the pain) [9,11].

The aim of this article is to report on a case of chronic refractory neuropathic pain strongly improved by an integrative approach with acupuncture, trigger point (TrP) injection, and hypnosis.

Case Report

The patient, a 42 years old male, underwent a motorcycle accident on July 1st, 2020. He suffered the avulsion of right C₅-C₇ nerve roots and fracture of the 5th and 6th rib. At the neurological evaluation the British Medical Research Council scale [12] showed a score of M0 in the supraspinatus, infraspinatus, biceps, brachioradialis, flexor carpi radialis muscles, and M1 in latissimus dorsi and rhomboid. Therefore, he was submitted to brachial plexus reconstruction by accessory nerve and radial nerve for the triceps as donors, followed by a rehabilitation program that allowed for a moderate improvement of clinical conditions (M2 score on arm abduction).

The patient came to our observation on April 14th, 2021 reporting severe shoulder and arm pain. The drug intake was Oxycodone 20 mg/day, Pregabalin 225 mg/day and Ketorolac 10mg as needed. In spite of pharmacological therapy, the patient complained persistent pain and dysesthesia with a VAS score of 7/10 plus frequent daily paroxysms reaching a score of 10 that were only partially relieved by ketorolac.

Besides the clear-cut evidence of neuropathic pain, well explaining his symptoms, the clinical examination disclosed the coexistence of several TrPs. Figure 1 shows the extension of pain, the detected TrPs - involving scalene, pectoralis minor, rhomboid, spinatus inferior, teres major, and extensor carpi radialis - and the related pain projections. Therefore, the clinical examination suggested a twofold origin of pain indicating the need for treating both of them.

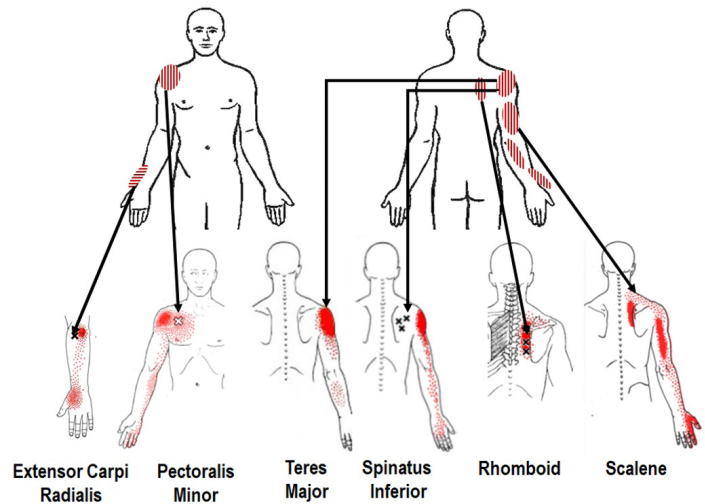


Figure 1: Distribution of pain in a patient with right C5-C7 nerve roots avulsion (top). Several trigger points were also present (bottom), suggesting that the pain depended on a mix of neuropathic and myofascial components [39]. [bottom figure modified from (Travell & Simons, 1983)].

Followed informed consent, a course of 10 sessions with acupuncture and the injection of TrPs with a solution of lidocaine 10 mg/ml plus betamethasone 0.2 mg/ml was scheduled, followed by 3 sessions of hypnosis. The selected acupoints are reported in table 1. The patient showed high hypnotic ability, as defined by an induction score of 9 out of 10 in the Hypnotic Induction Profile [13]. The first two sessions of hypnosis were aimed improve resilience, emotional stability and detachment from pain [14], while the third one was centered upon hypnotic analgesia. This session was preceded by a preliminary talk explaining to the patient that not all nerve injuries are painful while neuropathic pain may result from cortical functional plasticity perpetuating it (according to Tan & Kuner, 2021) and, thus, hypnosis could effectively help restoring it [15]. After the talk hypnosis was induced and analgesia was obtained by suggesting that the contralateral cortical pain-

related circuits in somatosensory areas would have been erased by a rubber, while repeatedly rubbing the parietal region with the fingers. At the end of the session the instructions for self-hypnosis were administered, in order to improve both resilience and pain control.

Right	Bilateral
Quchi (LI-11)	Hegu (LI-4)
Jiangu (LI-15)	Zusanli (ST-36)
Waiguan (SJ-5)	Yanglingquan (GB-34)
Jianliao (SJ-14)	Taichong (LR-3)
Jianjing (GB-21)	

Table 1: Acupoint selection I a case of co-occurring neuropathic and myofascial pain due to right C₅-C₇ avulsion.

Acupuncture and TrP injection allowed for a progressive decrease of pain extent; at the end of the treatment it was limited to the wrist and forearm, where its intensity was not changed. Hypnosis allowed to strongly reduce pain intensity. At the end of the third session the patient stared at his hand with surprise while moving the fingers and reporting that the pain had disappeared. A positive reinforcement was delivered by stressing that the disappearance of pain clearly showed his capacity to control it with his mind whenever he needed and he could effectively do it by self-hypnosis; at any rate, he could contact the first author for anything he might require.

At 12 months follow-up he reported a pain relief over 50%, allowing him to withdraw all drug intake. The VAS showed a score of 4; both the intensity and the frequency of paroxysms was decreased (VAS = 7, no more than 1-2 a month) and they could be quickly controlled by self-hypnosis.

Discussion

Acupuncture and hypnosis have been prejudicially rejected since their introduction in Western medicine, a fact entailing huge epistemological issues. In fact, the paradigm of traditional acupuncture belongs to Taoism, making it not understandable at first glance by Western physicians. Hypnosis has an unfortunate history, marked by outstanding clinical effects paralleled by prejudicial refusal stemming from the incapacity of the mechanist-reductionist and objectivist stance of positivist medicine to face the role of subjectivity in disease and recovery [16]. This paradigm also led to consciousness being considered as an irrelevant problem in both medicine and psychology until the 1980', when the science of consciousness was introduced. Likewise, pain has remained elusive so far given its nature of subjective experience, where its huge psychocultural implications may be the *trait d'union*

between experience, central sensitization and the capacity of top-down modulation by mental processing [15].

Actually, the activity of somatosensory cortex 1 – besides representing the sensory-discriminant component of pain – is involved in other pain components including emotions, a fact marked by the increased connectivity between somatosensory cortex, salience network and default mode network in chronic pain [17]. Furthermore, the complex relationship between the default mode, salience and central executive network is involved in 1st person perspective and self-referential processing, episodic memory retrieval, neurovegetative regulation and pain processing, as well as post-traumatic stress disorder [18-21]. It is worth emphasizing that hypnosis can modulate the activity of these brain circuits [22,23], improve chronic pain [24] and increase the pain threshold up to the level of surgical analgesia [25]. Hypnotic analgesia is the result of an intentional introspective activity involving the activation of the prefrontal cortex and anterior cingulate cortex, in turn resulting in pain matrix modulation and inhibition of pain inputs to the somatosensory cortex [26]. Likewise, acupuncture effects involve several central mechanisms [27], including an improved balance between the default mode network, dorsolateral and medial prefrontal cortex, anterior cingulate cortex and precuneus [28].

Despite being one of the most frequent causes of chronic pain, myofascial pain is still under-diagnosed or misdiagnosed [29] and, as a result, ill-managed for two different reasons: a) its capacity to mimic pain syndromes due to organic lesions; b) the absence of any physical abnormality justifying the pain (apart from TrP clinical assessment). These two factors may lead to a twofold diagnostic error, when an inflexible mechanist-reductionist approach is adopted. First, the coexistence of structural abnormalities may lead to they being wrongly considered as the only cause of pain - e.g., pseudoradicular syndromes of myofascial origin resulting in failure of back surgery – a fact remaining largely unrecognized [30,31]. Second, in the absence of physical abnormalities the patients are at risk of being diagnosed as suffering somatic symptom disorder and unduly psychiatrized [32] - a frequent doom in women with chronic pelvic pain [33,34]. This is tantamount to a bad use of Occam razor, where only the physical coincident abnormality is taken for cause. The same may occur in case of neuropathic pain, a proper diagnosis of which does not exclude in itself the co-occurrence of myofascial components. This is an essential aspect of management, since the latter can be successfully treated and, thus, may allow for steady improvement of pain.

Our case suffered from a so-called refractory pain (a term coined to justify invasive pain treatment following the failure of pharmacological therapy [35]). He refused the administration of cannabis and was strongly motivated to withdraw the opioids too, if possible, in order to avoid adverse events and driving

impairments. Given the severity of neural damage, the diagnosis of neuropathic pain was clear-cut, but it did not exclude possible myofascial components of pain in turn depending on two main causes: a) an overload and/or excessive stretching of shoulder and arm muscles yielded by the accident; b) a repetitive overload and stretching during rehabilitation. The trigger points detected by clinical examination suggested a co-occurring neuropathic and myofascial pain. In other words, the reported pain is the algebraic sum of all possible components – i.e., neuropathic, myofascial, all related process of central sensitization and psychological-existential reactions – and their detection is a relevant aspect for a proper management.

The combined treatment by acupuncture and trigger point injection allowed for the disappearance of pain from shoulder, chest and arm, confining it to the forearm, wrist, thumb and index finger, where pain intensity remained unchanged. Three sessions of hypnosis and the instructions for self-hypnosis allowed a meaningful and steady decrease of pain and an improved self-control of paroxysms. This seems surprising at a first glance; on the other hand, the results are perfectly compatible with the above-mentioned data on functional central mechanisms of both pain and acupuncture, the neuro-correlates of hypnotic analgesia and the very definition of pain [25].

A recent meta-analysis on hypnosis in musculoskeletal and neuropathic pain [36] and systematic review on hypnosis in neuropathic pain [37] have reported a significant moderate to large effect size, and an effect superior to active comparator or standard care, respectively. Unfortunately, the neuropathic cases cannot be told from musculoskeletal one in the former, while the latter also includes patients with complex regional pain syndrome type I (now excluded from the definition of neuropathic pain). In both articles, the included trials were strongly heterogeneous as regard the hypnotic protocol and the number of sessions, but most of them also included self-hypnosis; the best effects were found when at least 8 sessions were administered in one study [36]; unfortunately, no data about hypnotic ability, on which result also depend [24], are available.

The good results obtained by our patient in only three sessions plus self-hypnosis may depend on two factors: a) the patient's high hypnotic ability and strong motivation; b) the adopted protocol, including both detachment and resilience and the specific suggestions used for analgesia, providing an immediate effect on pain relief. The used suggestion for hypnotic analgesia (i.e., "canceling out" cortical functional plasticity) have been used by us for the first time and, to our knowledge, it has not been used so far by other authors; therefore, it is worth of further study to check its effectiveness.

Our results, despite based on a single case report, and the

available data in the literature are promising and suggest the need of further study to check the effectiveness of hypnosis in neuropathic pain, including the assessment of hypnotic ability and the role of specific suggestions for pain relief. It is a topic of strong relevance, since neuropathic pain is a *bête noire* of pain management, due to its severity, the risk of drug abuse and the need for invasive procedures in refractory cases. The effectiveness of the latter - involving a strong placebo effect and adverse events related to invasiveness - is far below the expectation of both patients and physicians [38]. Instead, acupuncture and hypnosis are non-pharmacological treatments able to modulate central processing of pain and related psychological reactions and are virtually free from adverse events. If pain is a matter of experience, one should be aware that it can be also managed by changing the experience: indeed, it is what hypnosis can do by a top-down modulation of pain pathways, while drugs mainly try to relieve pain by altering nociception. The former is not less relevant than the latter [25].

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