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Abstract

Symptom control is often difficult to achieve in individuals with NTOS, and conventional therapy can be inadequate. A wide variety of alternatives thus present themselves, as they do in other neuropathic pain syndromes. This chapter summarizes 20 years of experience with a wide variety of modalities, focusing on the relevance and effectiveness of new pharmaceutical and behavioural approaches mainly directed at pain control.

Given that physical therapy, opiates, muscle relaxants, anti-epileptics, NSAIDs, and operative interventions do not consistently give acceptable results in patients with NTOS and that symptoms can return even after the best post-operative result, alternative therapies continue to be relevant. These are modalities for which rigorous proof of mechanism or effectiveness is controversial or lacking, but may, nonetheless, be of benefit in patients with NTOS. Specifics vary, but their very existence underlines the inadequacy of much of our understanding and treatment of neuropathic pain, of which NTOS is an example. Finally, whether prescribed or not, patients may

choose to treat themselves with such and even the most empiric clinician needs to have a sense of what issues are thus created.

Essentially by definition, proof of efficacy for many “alternative” therapies is lacking and as a result, the following descriptions are largely anecdotal. They are based, however, on 20 years of clinical observations in over 1,500 patients with diagnosis of NTOS. Controlled studies and further discussions of mechanisms are described in the appropriate citations. Modalities are presented roughly in order of effectiveness and possible mechanisms of action in NTOS are noted. The focus is on interventions that reduce or eliminate pain, the driving complaint in NTOS (to our knowledge, no “alternative therapy,” used in this context, is thought to be marketed as a treatment for NTOS).

Careful physical therapy (e.g. Edgelow’s protocol) emphasizing increased self awareness and gentle, appropriate movement is indispensable and is discussed at length in Chap. 23, Physical Therapy for NTOS [1–3]. The importance of proper technique is underscored by the frequent

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and significant injuries from inappropriate physical therapy or manipulations. Specific protocols such as Feldenkrais and Alexander work, developed initially to treat and prevent chronic re-injuries in athletes, are very useful for the same purpose in NTOS and are felt to work by sensitizing the patients to actions that potentially create damage and by hastening recovery from existing injury [4]. Proponents feel that the specific protocols need to be followed avidly for decent results.

Heparin, the most negatively charged molecule in the human, actively entrains, sequesters and degrades cytokines, chemokines, MMPs, growth factors, and related products untouched by NSAIDs and steroids, all of which in theory decrease and block neural inflammation [3–7]. Because of its anti-inflammatory and anti-proliferative effects, when injected peri-neurally in small amounts it can offer dramatic relief of pain [8]. Results are largely activity dependant and the propensity for easy re-injury continues in these patients. Duration of relief is variable and ranges from 10 to 14 days to many months probably reflecting the degree of neuro-fibrotic involvement as well as injection technique and other unknown factors.

Erythropoietin, as well as stimulating the production of red blood cells, is a neuroprotectant and seemingly normalizes function in both neurons and Schwann cells by inducing terminal differentiation with a consequent reduction in neurogenic inflammation [9–11]. Erythropoietin presumably acts in NTOS by inhibiting apoptotic pathways and normalizing hyperexcitable neurons. It provides excellent, lasting, pain relief starting 3–7 days after peri-neural injection of very small amounts [12]. Thromboembolic side effects are potentially limiting with caution demanding more extensive trials, despite the excellent results to date.

Nalbuphine, a kappa receptor agonist, works better than methadone or morphine in controlling pain, although nausea is a common side effect [13]. With the increasing amount of opiate tolerance in many patients, the fact that it acts on a different receptor makes it valuable. The main drawback is that it must be injected subcutaneously once or twice a day.

Expert, knowledgeable acupuncture can often relieve symptoms for up to a week [14]. Great controversy regarding the various proposed mechanisms of action exists and objective evidence is lacking, but it has been proposed that micro-injury at the site of needle insertion followed by locally intense stimulation seems to activate viscerosomatic and autonomic reflexes as well as extensive neural activity up to and including at the cerebral cortex [15–17]. Alternative explanations include systemic endorphin release and placebo effects. The traditional explanation of anatomical “meridians” and the elicitation of “Qi” (although used clinically by some) do not correspond to modern understanding of anatomy and physiology and is discounted by most.

Hypnosis with an experienced hypnotist and a patient able to be deeply hypnotized (critical) can be very helpful in multiple ways: changing activity patterns, pain and inflammation control, and by teaching autohypnosis for symptom flares [18, 19]. The precise mechanism(s) of action are clearly psychogenic but still remain largely unknown despite evidence of obvious (MRI, EEG) cerebral activation and the often dramatic ability to influence and change sensory and autonomic functioning. Debate continues as to whether hypnosis is truly a qualitatively different state of consciousness or merely a form of relaxation.

Nitroglycerine applied topically by patch to focus delivery, can reduce symptoms dramatically [20]. This is probably a result of local nitric oxide production leading to an increased anti-inflammatory effect: nitroglycerine is more effective than local anesthetic patches, supporting this mechanism of action. The major drawback is headache, of course, due to cerebral vasodilatation.

Octreotide, a neuropeptide inhibitor, is felt to alleviate the often ongoing neurogenic inflammation but, again, needs to be delivered locally by injection and has a short half-life [21]. For these reasons it is most useful in acute symptom flare-ups.

We have shown that pulsed high intensity magnetic stimulation can ameliorate pain in NTOS patients, but this has not been widely accepted by others [22, 23]. One explanation

of this effect is that very quickly pulsed, Tesla-strength fields induce depolarization of affected peripheral nerves and muscles which relieves spasm and increases local circulation. Similar trials are currently being pursued at the NIH.

There is some literature on potential therapeutic effects of monochromatic infra-red (0.8–1.1 μm) laser light. Theories abound, and the consensus seems to be that the infra-red light normalizes aberrant mitochondrial ATP formation. How this translates into benefit, however, is unknown [24]. Anecdotally this can work very well, albeit in a minority of patients.

Much the same can be said for transcutaneous nerve stimulation (TNS), with some patients continuing to use it for years [25]. The transcutaneous electrical activation of local neural networks is thought to mimic the effects of acupuncture (see above) as well as activate descending spinal inhibitory signals. This is, of course, a widely used technique and it continues to be surprising that its precise mechanism of action is not better known (similar to acupuncture).

Vagal nerve stimulation may have a place in treating in treating pain and autonomic dysfunctions in failed thoracic outlet decompressions and is probably safer and more effective, in this context, than spinal cord stimulation [26]. It has not been studied widely for this condition.

Topical sphenopalatine ganglion blocks are felt to normalize autonomic dysfunction and can be very helpful in the same population (failure after surgical decompression) or when attempting to interrupt an on-going symptom flare [27]. Finding practitioners who are able to perform this is difficult.

Intraosseous blockade (usually in the ischium – but any accessible marrow bone will work) for chronic pain was explored in a few centers in the former Soviet Union, and might still be available in Moscow [28]. Our own experience with a visiting Soviet orthopedist was quite positive in a small group of patients.

Histone mimics, capsaicin, conotoxins, botulinum, cannabinoids, agents modulating inositol-3-phosphate and, not least, colchicine, all show promise using a wide variety of mechanisms [29, 30]. None of these has been studied widely.

Lastly, as every practitioner knows, the emotional state of the patient can affect treatment for better or worse. Appropriate and preemptive effective psychoactive pharmaceuticals and/or expert psychotherapy obviously have their place (see Chap. 57).

When dealing with chronic pain and related issues in this class of patients any of the options discussed above can be considered and all are ripe for further research and better definition of action and effectiveness. Recognizing and better understanding the neuro-inflammatory nature of why symptoms exist, increase, spread and change will be a significant step in our ability to modulate and reverse them. Achieving phenotypic changes for the better in localized pathology with transcription factors is possible and is being sought by a number of groups. We are hopeful.

Editorial Note: Complimentary and Alternative Medicine for TOS

There is no such thing as “conventional” and “alternative” (or “Eastern” or “Western,” or “patriarchal” or “matriarchal” or any other artificial division) medicine – there is only medical treatment that can be shown to work in a rigorous, repeatable fashion, and that which cannot. While the definition is stable, therapies within each are not – phrenology, for example, was once accepted as a scientifically valid diagnostic tool, while many drugs we use today (leech saliva, for example) were first used in anecdotal fashion despite the criticism and scorn of mainstream science. The same standard should be applied to any therapy we wish to use on a human – does it work, and do the benefits exceed the risks – and we must strive to understand a mechanism of action that makes sense within the context of science and physiology. Keep in mind, however, that anything we now label as “alternative” may someday be part of our accepted armamentarium (and things we do today, in fact, may someday be shown not to work!).

This chapter presents “alternative” techniques for treatment of patients with NTOS (largely with chronic pain) in a rational and valid style (note

that most of the references are from what most would describe as solid peer-reviewed sources). It is interesting that few patients with this problem seem to have latched upon things which clearly have no effect; the modalities presented here are all associated with reasonable mechanisms of action and bear study. Dr. Ellis and his colleagues have an extensive experience and the issues suggested in this chapter bear study by all.

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