

# Surgical Management of Painful Peripheral Nerves



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## KEYWORDS

- Nerve pain • End-neuroma • Neuromas-in-continuity • Scar-tethered nerves • Nerve relocation
- Flap coverage • Pain management

## KEY POINTS

- Common causes of peripheral nerve pain include end-neuromas, neuromas-in-continuity, and scar-tethered nerves.
- In the author's practice, nerve relocations to appropriate proximal bone or muscle sites relieve pain in 80% to 90% of end-neuroma cases.
- Painful small peripheral nerves in continuity (neuromas-in-continuity and scar-tethered nerves) are best treated by division of the nerve and relocation to bones or muscles. The loss of distal sensation is of minimal consequence.
- Many painful median and ulnar nerves in continuity can be given useful pain relief by wrapping them in local vascularized fascial flaps from the forearm. Division of these nerves is not recommended for obvious reasons.
- Neuromas-in-continuity of the large nerves such as the median nerve at the wrist can be helped by coverage with distant flaps from the groin, abdomen, or buttock containing thick subcutaneous fat. Distant muscle flaps should not be used, because the muscle atrophies and shrinks.

## INTRODUCTION

It is said that there are more than 150 surgical methods of relieving end-neuroma pain described in the literature.<sup>1</sup> Achieving personal experience of more than a few of these methods is unlikely for any single surgeon, because end-neuroma pain is an uncommon complication in most surgical practices. To summarize one's experience of a few is also difficult and, to some extent pointless, because the process of learning in this field is long and is usually one of trial and rejection until a technique evolves that achieves a modicum of success. Therefore, in this review, the author has chosen to provide a summary of his current, and most successful, surgical means of dealing with the pathology of neuroma pain.

Except for the nerve compression syndromes, severe pain in the peripheral nervous system is caused by 3 pathologic entities, namely:

### 1. End-neuromas

### 2. Neuromas-in-continuity

### 3. Scar-tethered nerves

The cause of the pain in scar-tethered nerves is the most elusive. These patients have only had an injury adjacent to a nerve, which has then become incorporated in the scar tissue formed in the area as part of the healing process.

Distal sensation is the end point of most of our treatments of the sensory nerves. However, when nerve pain supervenes after injury, it can become the function-limiting problem, and pain relief may have to take priority over restoration, or maintenance, of distal sensory function. This treatment may even require sacrifice of distal sensation for pain control.

## A LANGUAGE TO DISCUSS NERVE PAIN

### *Description of Pain*

For the patient, pain is usually a complex of unpleasant symptoms, for which we do not have a

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Clin Plastic Surg 41 (2014) 589–613

<http://dx.doi.org/10.1016/j.cps.2014.03.004>

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simple language whereby we can communicate with patients, or among ourselves, and record our treatments. It has been our experience that patients complain of variable degrees of 4 problems, namely:

1. Spontaneous pain
2. Pressure pain
3. Movement pain
4. Hypersensitivity or unpleasant skin sensation to light touch

The latter may give rise to considerable morbidity. It embraces hyperesthesia, hyperpathia and allodynia, all of which have slightly different meanings.

The association of cause and effect is most obvious for pressure pain, or tenderness, and movement pain, elicited by movement of adjacent tendons and joints. When present, hypersensitivity usually affects the skin directly overlying the involved part of the nerve. The most poorly understood and unpleasant of all these pains is that of spontaneous pain, which is almost invariably present. This pain is most often a continuous aching, or basal spontaneous pain, punctuated by spikes of increased intensity of pain, or spiking spontaneous pain, which are often severe, occur with variable frequency, and may be associated with reflex motor activity, causing the whole upper limb to jerk.<sup>2</sup> It wears down the resolve of the patient and cannot be avoided without medical help. In itself, it is probably enough to create the character changes that make us speculate whether nerve pain problems occur in those who are mentally predisposed.

### **Documentation of the Degree of Pain**

Any assessment of pain is inevitably subjective. Although pain charts scoring pain from 0 to 10,

or 0 to 5, create an impression of science, these remain based on the patient's opinion. Patients often find it difficult to understand this scoring, and we have found it quicker in busy clinics to score each pain as severe, moderate, mild, or none. If required, this scoring can be translated into numbers for research purposes.

The symptomatic end point of the 3 nerve pathologies is surprisingly similar, allowing for use of the same system of recording and assessing the degree to which each of the types of pain is present. A table can be created to assess the initial problem and the achievement of treatment (Table 1).

### **PREOPERATIVE DISCUSSION AND LOCAL ANESTHETIC ASSESSMENT**

It is important to explain the cause of the pain, the concept of relocation of the nerve end, and the reasoning behind the particular choice of relocation site to the patient. This strategy requires the surgeon to know the basic nerve anatomy of all of the cutaneous nerves in the locality of the neuroma pain and to be aware where several nerves may be involved and where anatomic variation can occur. Patients should be warned that it may be necessary to perform more than 1 operation to achieve maximum benefit from local surgery.

Excepting those patients with needle phobia, it is usually possible to identify the nerve(s) innervating a site of pain by local anesthetic injections. For a variety of reasons, including the operator's knowledge of nerve anatomy, their skill in placing the needle exactly beside the nerve to be blocked, the thickness of the subcutaneous fat, and anatomic variations, this is an imprecise activity and the results should be interpreted with caution. We use 2% lignocaine for these blocks, because it

**Table 1**

**Typical nerve relocation patient chart after relocation of an end-neuroma of the dorsal branch of the ulnar nerve to the pronator quadratus muscle at the wrist**

	Primary Site		Secondary Site	
	Preoperative	Postoperative	Preoperative	Postoperative
<b>Spontaneous Pain</b>				
Baseline	Moderate	Nil	—	Nil
Spikes	Severe 4 times a day	Nil	—	Nil
Pressure Pain	Severe	Nil	—	Nil
Movement Pain	Severe <sup>a</sup>	Nil	—	Mild <sup>b</sup>
Hyperesthesia	Moderate	Nil	—	Nil

<sup>a</sup> Severe pain on any movement of the wrist and on any movement of the long extensor tendons of the little finger.

<sup>b</sup> Mild pain at the extremes of wrist extension and supination only.

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