

Evaluation of Touch-Evoked and/or Spontaneous Neuropathic Pain after Hand Surgery

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Cutaneous sense disorders are a frequent and sometimes transitory complication after hand surgery. But it could evolve in painful complications such as neuropathic pain, which are a challenge to properly evaluate because of the subjective nature of pain. On the other hand, the proper and detailed evaluation of cutaneous sense can provide health professionals a precise view of the problem. Considering that neuropathic pain can arise from a partial lesion of A β neurofibers (Jensen & Finnerup, 2014), affecting directly the capacity of the somatosensory nervous system to function properly in terms of conduct and analyse tactile stimulations and perceptions, to evaluate the cutaneous sense will provide information directly related to neuropathic pain. With an axonal lesion on A β neurofibers, it is logic to expect a partial tactile hypoaesthesia. If a reorganisation of the somatosensory nervous system occurs after such a lesion and if a maladaptive neuroplasticity occurs with a central sensitization, then a paradoxically painful-to-touch hypoaesthesia can appears (McCabe, 2009). It is possible to effectively evaluate two specific cutaneous sense disorders: tactile hypoaesthesia and/or mechanical allodynia. These cutaneous sense disorders can be evaluated in terms of a precise portion of skin affected and the severity of the problem.

Spontaneous neuropathic pain, related to a fiber lesion of a define nerve, origins in a specific portion of skin related to the cutaneous distribution of the affected nerve. In order to evaluate the **tactile hypoaesthesia** generated by the A β fibers lesion, it is also possible to create a precise map that is called aesthesiography (Létiévant, 1869; Tinel, 1916 ; Inbal et al., 1987). The cartography of the portion of skin affected by diminished of tactile perception is made by using a precise stimulus of pressure, that can be normally be detected when the cutaneous sense is normal. A Semmes & Weinstein monofilament of 0.4 gram is use on the back of the hand and a monofilament of 0.2 gram is use on the palm of the hand. A monofilament of 0.7 gram is use for the rest of the upper arm, far less sensitive that the hand. It is also possible to evaluate the severity of tactile hypoaesthesia, and to monitor progress with different tests. First, the static two-point discrimination test is a test that provides information on the capacity of discrimination. There is existing norms for each cutaneous branch in the upper arm and the amount of variation with the patient result will provide information if the condition is severe or light. Second, the pressure perception threshold gives information considering the capacity of detecting a specific pressure on the skin. Third, the vibration perception test indicates the capacity to identify a certain level of vibration.

Touch-Evoked neuropathic pain, or **static mechanical allodynia**, is simply evaluated with a cartography name allodynography (Spicher, 2013). That map represents the precise portion of skin that show a reaction of pain with a non-painful stimulus (Merskey &

Bogduk, 1994), That non-painful stimulus is represent with a pressure of 15 grams, provide with a Semmes & Weinstein monofilament. This stimulus is easy and quick to use in a clinical environment and also precise as needed in research conditions. The severity of mechanical allodynia can be announced with the smallest pressure that triggers pain, express on a scale of 7 levels: the rainbow pain scale.

These evaluations guide the health professional in the decision-making process considering the non-pharmacological treatment with neuropathic pain patients and give information on the progression of the cutaneous sense disorders over time.