



## The connection between endodontic treatment, dental implants, and neuropathy

Neuropathy is defined by the International Association for the Study of Pain (IASP) as a functional disturbance or pathologic change in the peripheral nervous system. Although neuropathy can be idiopathic, it is often induced by nerve injury and is commonly accompanied by debilitating, ongoing pain. The initial neuronal damage occurs in the periphery, though it may lead to functional and structural modifications in the central nervous system (brain and spinal cord), and leaves the nervous system in a pathologic state presenting as chronic painful posttraumatic neuropathy.

How does that relate to dentistry? As dentists, we perform numerous invasive procedures every day. Every extirpation, extraction, placement of dental implant, minor surgery, or insertion of a local anesthesia needle can injure neural tissue and induce neuropathy and neuropathic pain. Taking into consideration the number of interventions performed by dentists, the possibility of painful neuropathies in the trigeminal system is fortuitously low compared to other areas of the body. This may be related to factors we cannot control, such as genetic predisposition or reduced sympathetic activity following injury in the trigeminal system. However, I strongly believe that the local anesthesia dentists use for most procedures has a significant role in the low incidence of posttraumatic neuropathy. The anesthetic agent blocks sodium channels, significantly reducing the injury barrage (high frequency and prolonged action potential) accompanying nerve injury, and is known to have a role in the development of centrally mediated pain. Nonetheless, neuropathies do exist in the oral cavity and are strongly associated with invasive dental procedures. Chronic pain following endodontic treatment has been extensively reported in the literature. Pain lasting longer than 6 months following well-executed root canal therapy is known

to occur in 5% to 7% of procedures. The pain is moderate to severe in intensity and has a pattern of referral: Patients sometimes have difficulty localizing the pain, although it is usually worse at the original site of injury. The pain is chronic, most commonly affecting the molar and premolar areas; local anesthetic block gives ambiguous results. The patients rarely obtain relief with analgesics, including narcotics. This condition is often difficult to diagnose and may be mistaken for a normal posttreatment or posttrauma complication. Patients may undergo numerous irreversible dental procedures with no improvement in pain.

More recently, it has been suggested that a similar phenomenon can occur following dental implant insertion. The most common complication following implant placement is neuropathy or altered sensory perception. In a limited number of cases, direct anatomical damage to the inferior alveolar nerve or the maxillary sinus can be documented, though in many implant neuropathy cases, the mechanism is not clear and removal of implants associated with neuropathy does not resolve it. Further reports and studies should characterize implant neuropathy, although they may show mechanisms similar to those of postendodontic treatment neuropathies.

There is no method to predict or properly diagnose neuropathies or sensory changes following root canal therapy or dental implant placement. It is important to note that neuropathy is not the most common cause for posttreatment pain; however, dentists should consider this option and modify their treatment plans accordingly.

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