

Implant-related Nerve Injuries



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KEYWORDS

- Dental implants • Nerve injuries • Neurosensory disturbance • Management
- Atrophic mandible • Seddon • Sunderland

KEY POINTS

- Implant-related nerve injuries are typically permanent compared with other dentoalveolar procedural causes, which are more likely to be transient.
- Many implant-related nerve injuries are caused by inadequate planning and can be avoided with appropriate imaging and preprocedural assessment.
- Techniques to avoid nerve injuries include using local anesthetic infiltration rather than regional blocks, implementing short implants to maintain appropriate safety zones from neurovascular structures, applying bone augmentation techniques to increase available bone, cantilevering hybrid restorations to avoid placing implants in atrophic posterior mandibles, and conducting a nerve lateralization procedure as a final option.
- A suspected nerve injury or a patient presenting with numbness following an implant procedure should be managed in a systematic manner to allow timely referral when appropriate.

INTRODUCTION

Nerve injuries in the maxillofacial region may happen as a result of trauma, neoplasms, infections, or secondary to a surgical procedure. Studies investigating the incidence of nerve injury have many inconsistencies in classifying nerve impairment, rely on varying sample sizes, use differing methods for evaluation, or are retrospective in nature. Because of the limitations of such investigations there is a large range in the rates of injury reported from study to study.¹ To complicate the issue further, the data are usually stratified, separating transient impairment from permanent loss of function, and only occasionally is the presence or absence of painful neuralgias or dysesthesia included.

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The studies of the incidence of trigeminal nerve injuries related to dentoalveolar surgery go back decades.² Nonsurgical procedures such as endodontic treatment or local anesthesia administration have also been implicated.^{3,4} From the literature, the incidence of inferior alveolar nerve (IAN) injury following removal of third molars has been reported to be 0.26% to 8.4%,¹ of which 0.81% to 5.7%⁵ are transient and 0.7%⁶ permanent. Lingual nerve (LN) sensory disturbance is typically reported between 0.1% and 8%¹ with transient injury as high as 23%.⁷ A recent study showed permanent damage in more than one-third of injured trigeminal nerve injuries.¹

The convention of placing osseointegrated implants for tooth replacement in the United States started in the early 1980s and became increasingly routine in the 1990s.⁸ The first prospective studies of the rate of nerve injury related to implant placement were conducted in the early 1990s. As the frequency of placing osseointegrated implants increased, more investigations of nerve injury were undertaken.⁹ Similar to the literature concerning nerve injuries secondary to third molar surgery, these studies show great variability in the stated incidence. Published studies of the rate of nerve injury related to implant placement show a range of incidence from 0% to 13%.¹⁰ One outlier article places an incidence rate at 44%.¹¹

Unlike nerve injuries as a result of most oral surgical procedures, which tend to be mostly transient, implant-related nerve injuries are typically permanent. Libersa and colleagues¹² investigated transient versus permanent injuries sustained during various procedures, with a notable 75% incidence of implant-related nerve injuries being permanent (**Fig. 1**). The reason for the higher percentage of permanent injury is explained later in the article.

CLASSIFICATION OF NERVE INJURIES

It is important to be familiar with the various classifications for nerve injuries, and therefore to understand the severity and expected clinical course. The 2 most widely used descriptions of nerve injuries are by Seddon and Sunderland (**Fig. 2**). They classify based on the level of disruption of anatomic structures. Seddon broadly classifies by severity using descriptors that include neuropraxia, axonotmesis, and neurotmesis.¹³ Sunderland focuses on the fascicular construct of nerves and the

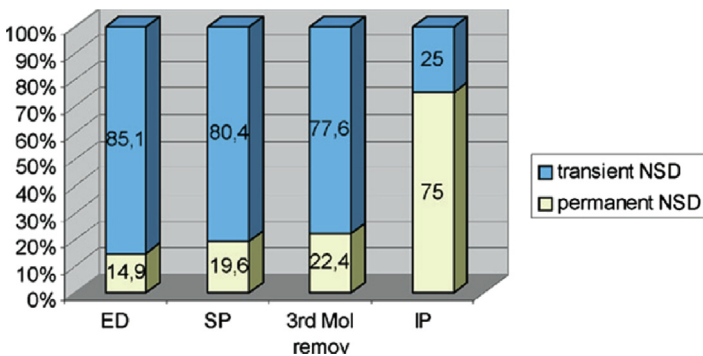


Fig. 1. Distribution (%) of the transient and permanent neurosensory disturbances (NSD) related to the various procedures. ED, endodontic procedures; IP, implant placement; SP, surgical procedures other than third molar removal (3rd Mol remov). (From Libersa P, Savignat M, Tonnel A. Neurosensory disturbances of the inferior alveolar nerve: a retrospective study of complaints in a 10-year period. *J Oral Maxillofac Surg* 2007;65(8):1487; with permission.)

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