

Awareness of incidence and management of nerve injuries during implant treatment

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ABSTRACT

Background: Nerve injury is one of the most serious complications in implant dentistry. This nerve injury can occur during local anesthesia, implant osteotomy, or implant placement. This study discusses the cause of nerve injury and its diagnosis, prevention, and management during implant treatment. **Aim:** The objective of the study was to determine the incidence and management of nerve injuries during implant treatment. **Materials and Methods:** A sample size of 100 dental practitioners who perform implant procedure was considered as participants. A questionnaire comprising 16 questions on the incidence and management of nerve injuries and the recordings were made individually by the investigator and results were analyzed. **Results:** The results inferred from the study show that nerve injuries during implant treatment have been experienced by 25% of dental practitioners and the patients have experienced complications post-treatment. 42% of the participants feel that they do not have enough knowledge about the incidence and management of nerve injuries. **Conclusion:** Nerve injuries during implant treatment are not rare and there is not enough awareness among practitioners, so awareness programs and workshops must be conducted in this field.

KEY WORDS: Awareness, Implant, Nerve injury

INTRODUCTION

Despite considerable development of technology and techniques used in dentistry throughout the past few decades, tooth loss is still a common problem. Dental implants are used in such incidences as a solution.^[1] As practitioners gained experience in the implantology field, they became exposed to various complications arising as a result of the surgical procedure. One of the most common and serious complications faced by the clinician and the patient following implant placement is nerve injuries.^[2,3] Inferior alveolar nerve (IAN) injury is one of the most serious complications in implant dentistry. This nerve injury can occur during local anesthesia, implant osteotomy, or implant placement.^[3]

Proper understanding of anatomy, surgical procedures, and implant systems and proper treatment planning is the key to reducing such an unpleasant complication.^[4] Sensory disturbances resulting from the injury will

provide an unpleasant experience for both the doctor and the patient.^[5] Effective management of those cases is based on providing treatment – conservative or surgical, immediately on diagnosis of damage. That is to say, early diagnosis is the key for successful treatment. One of the most important things the practitioner should check after the operation is completed is whether the patient experienced a return of normal sensation.^[6] 6 hours after operation or after the local anesthesia effect wears off the patient should be contacted. In cases of the patient reporting persistent numbness or anesthesia, it would be the first sign for the surgeon that something went wrong and nerve damage probably occurred. Numbness usually will be felt on the side of implant placement, including the lower lip and chin.^[7]

Another symptom that may indicate nerve damage is the feeling of tingling, tickling, or burning skin in other words, paresthesia. In some cases, numbness may not appear immediately but later on. The patient does feel improvement in sensation in the beginning, although some discomfort is present, and later, numbness appears. Proper localization of the nerve

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and accurate measurement of the available bone are of extreme importance to avoid nerve injuries.^[8] Another important point is that many implant drills are slightly longer, for drilling efficiency than their corresponding implants. The present study was conducted to identify the awareness about incidence and management of nerve injuries during implant placement among dental practitioners.

MATERIALS AND METHODS

The study was conducted among 100 dental practitioners in South India who perform implant treatment among patients. A questionnaire was prepared consisting of 16 closed-ended questions to know the awareness of incidence and management of nerve injuries during implant treatment. The answers were tabulated and statistical analysis was performed using the SPSS software and one-way ANOVA was performed to determine the statistical significance.

Questionnaire

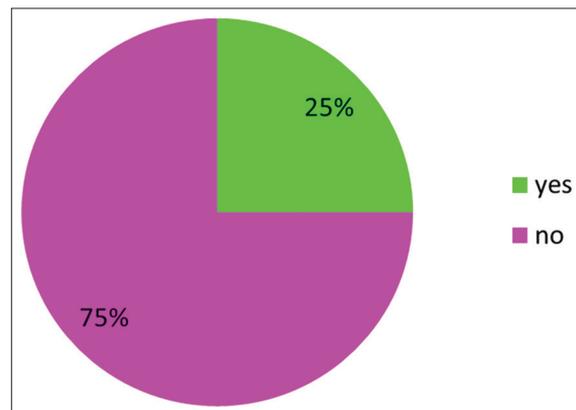
1. Have you come across nerve injuries during implant treatment?
 - Yes
 - No
2. How many cases have you experienced?
3. According to you what results in nerve injuries?
 - Improper pretreatment planning
 - Incorrect drilling depth
 - Wrong implant selection
4. What is the most common nerve injuries during implant?
 - Crush injury
 - Nerve stretching
 - Puncture
 - Thermal
 - Hematoma
5. After your implant surgery, did your patient experience a change in feeling or sensation?
 - Yes
 - No
6. The period of sensation loss was temporary or permanent?
 - Temporary
 - Permanent
7. The loss of sensation was complete or partial loss?
 - Complete loss of sensation
 - Partial loss of sensation
8. What was the usual complaint by patient after implant placement?
 - Pain
 - Tingling sensation

- Numbness
 - Palpitation
9. Are you aware of neurapraxia?
 - Yes
 - No
 10. Are you aware of traumatic neuroma?
 - Yes
 - No
 11. Are you aware of mental nerve looping?
 - Yes
 - No
 12. What are the common sites of nerve injury?
 13. Which method do you prefer for management?
 - Medication
 - Surgical
 14. Name some medication which can be used for nerve injuries?
 15. Do you have enough knowledge on ways to manage nerve injuries?
 - Yes
 - No
 16. Do you think awareness programs and workshops need to be conducted in this field?
 - Yes
 - No

RESULTS

From the results obtained from the study, we could infer that 25% (Graph 1) of the dental practitioners have experienced nerve injuries during implant treatment among their patients. When it comes to the type of nerve injury, 46% of injuries were nerve puncture, 24% includes crush injury to the nerve, and 15% the injury occurred were thermal damage and hematoma (Graph 2).

Among the participants, 64% of the individuals feel nerve injuries during treatment occur due to improper



Graph 1: Experienced nerve injury

pretreatment planning and 36% of participants feel that it is due to the operator error (Graph 3), also among the participants, 33% (Graph 4) of their patients who have undergone treatment have experienced loss of sensation post-implant treatment of which 92% was temporary loss of sensation and the usual complaint that was given by the patient after treatment was that 41% of the patient had pain, 17% of the patients experienced numbness, and 42% of people experienced tingling sensation (Graph 5).

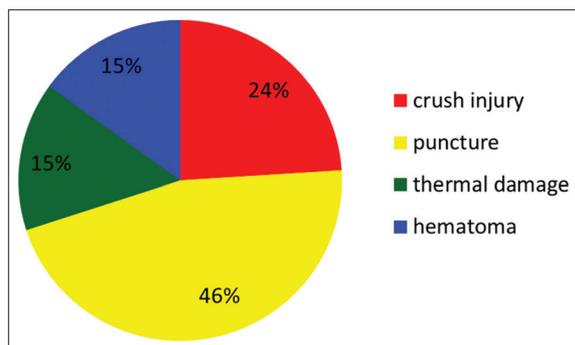
When it comes to knowledge about the possible complications, 17% of the practitioners are not aware of neurapraxia and neuroma and when deciding on the type of management post-complication, 8% of practitioners prefer surgical approach, 42% advice medication, and 50% prefer retrieval of the implant. Most importantly, 42% (Graph 6) of the participants feel that they do not have enough knowledge about the incidence and management of nerve injuries during implant treatment and all the participants feel that awareness programs must be conducted in this field for a better treatment.

DISCUSSION

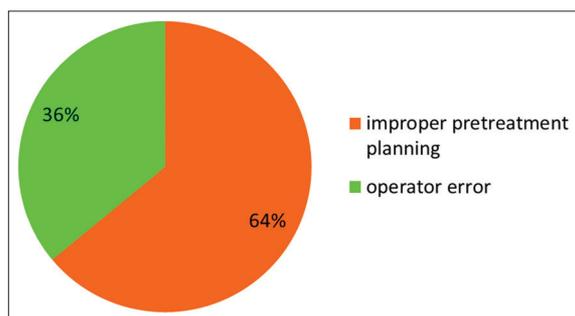
Careful pre-operative planning and the availability of appropriate radiographs are important not only for the proper placement of implants for restorative reasons but also to avoid injuries to the important structures in the surgical region. For many cases, plain radiographs, clinical measurements, and direct surgical visualization are sufficient for judicious

implant placement. The bone quality at the site of the implant is also a factor contributing to nerve injuries. If a surgeon puts pressure on the implant drill while preparing the osteotomy and encounters an unexpected change in bone density, the drill will be inserted deeper than intended.

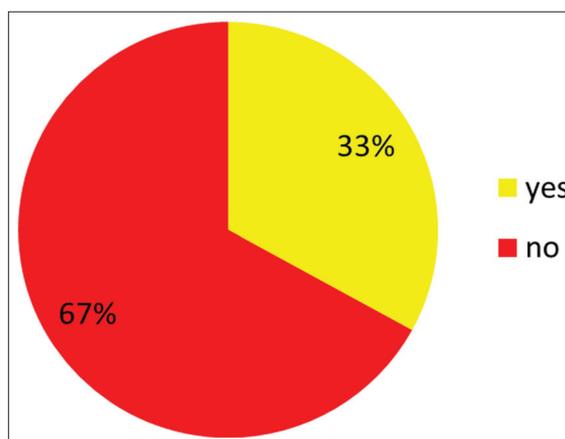
Another cause of nerve injuries is the overzealous use of immediate implants in areas that are too close to the neurovascular structures. Many immediate implants require drill preparation and implant placement apical to the extraction socket to gain primary stability. Renton *et al.*^[9] found, in 2012, in their study regarding



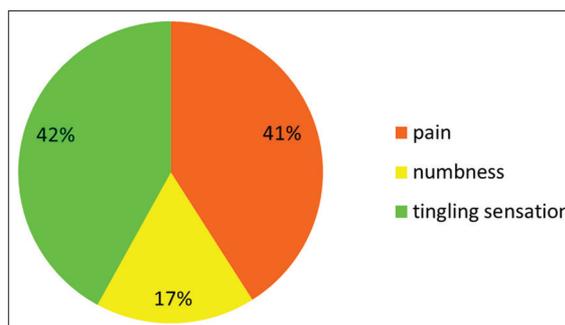
Graph 2: Reason for nerve injury



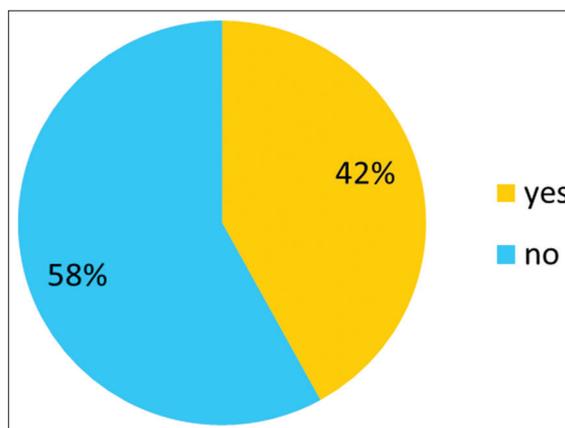
Graph 3: Cause of injury



Graph 4: Loss of sensation



Graph 5: Complaint after implant treatment



Graph 6: Enough knowledge about nerve injuries

post-implant neuropathy of the trigeminal nerve that over 50% of patients suffered constant pain and/or discomfort. Paresthesia was the main feature for 47% of cases.

Chiapasco *et al.*^[10] and Visser *et al.*^[11] reported in their studies in the years 2003 and 2005, respectively, that the incidence of temporary IAN injury despite careful planning ranges from 0% to 24%, while persistent injury has been found in 11% of cases. Heller *et al.*^[12] says that the practice of using infiltration for local anesthesia instead of an IAN block, because without complete lack of sensation, the patient will feel pain if the drill approaches the IAN canal a significant indication to stop drilling. At the same time, an intraoperative radiograph with the presence of the drill or other gauges in the osteotomy site is of great value, especially if nerve approximation is expected.

Strauss *et al.*^[13] concluded that 50% of the patients who underwent microsurgical repair of the IAN reported significant improvement, 42.9% reported slight improvement, and only 7.1% reported no improvement. They also reported that highly significant improvements were achieved after 1 year of microsurgical intervention. Juodzbalyis *et al.*^[14] in his study stated that the most frequent (50%) risk factor for IAN injury was intraoperative bleeding during bone preparation. The most common (56.3%) etiological risk factor of nerve injury was dental implant.

One of the serious complications of posterior mandibular implant placement is IAN injury. Proper understanding of the involved anatomy, the surgical procedures, and implant systems along with proper treatment planning will reduce the chances of such an unpleasant complication. If nerve injury occurs, early and proper management is the key to maximizing the chances of recovery.

CONCLUSION

Implant treatment is one of the recent most preferred dental permanent prosthetic treatment preferred by both the patients and practitioners. From the study we could infer that the need for early referral and intervention when IAN injuries occur is important and nerve injuries during implant treatment is not rare and there is not enough awareness among practitioners. So awareness programs and workshops must be conducted in this field also. To avoid nerve injury during surgery guidelines were developed based on the literature

with respect to verifying the position of the mental foramen and validating the presence of an anterior loop of the mental nerve. These guidelines included leaving a 2 mm zone of safety between an implant and the coronal aspect of the nerve; observation of the IAN and mental foramen on panoramic and periapical films before implant placement; and use of CT scans when these techniques do not provide clarity with respect to the position of the nerve these criteria must be taken in concern in pre-treatment planning for a proper and successful treatment for both the patient and the practitioner.

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