European Journal of Dental and Oral Health
www.ejdent.org

Penetrating Injury of the Lingual Nerve Following Orthodontic Wire Displacement

Hamed Safaei and Christopher James Mannion

ABSTRACT

A 39 year old female attended hospital with a 5 day history of trismus, anaesthesia of the left side of the tongue and pain associated with the lower left mandibular region. Having undertaken a thorough assessment, it became evident that the lower orthodontic stainless steel wire, had become displaced posteriorly, penetrating the retromolar soft tissue space and lingual nerve. Removal of the wire provided improvement in the patients' symptoms and resolution of the trismus.

Keywords: Lingual nerve, Orthodontic, Trauma.

Published Online: October 21, 2021

ISSN: 2684-4443

DOI:10.24018/ejdent.2021.2.5.ID

H. Safaei*
Maxillofacial Surgery Department, Leeds Teaching Hospitals NHS Trust, Leeds, UK.
(e-mail: hamed.safaei@nhs.net)
C. J. Mannion
Consultant and Clinical Associate Professor in Maxillofacial Surgery, Leeds Teaching Hospitals NHS Trust, Leeds, UK.
(e-mail: christopher.mannion@nhs.net)

Corresponding Author

I. Introduction

The lingual nerve provides general sensation to the anterior two thirds of the tongue. It is a branch of the mandibular division of the trigeminal nerve. The chorda tympani (branch of the Facial nerve) joins the lingual nerve and extends into the floor of the mouth, it supplies taste sensation to the anterior two thirds of the tongue and parasympathetic innervation to the submandibular and sublingual salivary glands [1].

Injury to this nerve may result in pain, drooling, tongue biting, change in speech pattern, altered or burning sensation, anaesthesia and a change in perception of taste [2]. This may impact the patient's quality of life affecting their daily function and psychological health [3].

Injury to the lingual nerve can result following oral and maxillofacial procedures, the most common cause relates to third molar surgery, surgical procedures involving the floor of the mouth, or following the administration of local anaesthetic dental injections. The general reported incidence of nerve injury following these procedures is in the range of 0.5-22% [4].

We present a very rare case of lingual nerve injury as a result of trauma from the lower archwire of a fixed orthodontic appliance.

II. Case Report

A. History

A 39 year-old female presented to the emergency department. She complained of a 5 day history of acute onset of anaesthesia to the left side of her tongue and an associated intermittent sharp shooting pain radiating through the left side of her jaw (mandible). She described a severe pain with restriction in her mouth opening, difficulty eating and that it was affecting her sleep. She had been taking 500 mg paracetamol four times a day to help with pain relief. The patient believed this was due to her lower left third molar and noted it as being 'similar to severe toothache'.

Further questioning revealed the patient was approximately 9 months into orthodontic treatment, which was being managed by an orthodontist in another country. She had recently undergone an orthodontic 'adjustment' appointment 2 weeks prior to this presentation.

B. Extra-oral Assessment

There was a restriction to mouth opening, less than 1cm interincisal distance. Following mouth opening, there was also a sharp shooting pain radiating through the left side of her mandible beginning around the region of her lower left third molar. There was no pain on palpation of the muscles of mastication.

The patient appeared symmetrical with no presence of extra oral swelling or erythema. There was no pain on palpation of the left mandibular and submandibular regions and. There was no lymphadenopathy and the patient was apyrexic.

C. Intra-oral Assessment

Due to the restricted mouth opening, it was difficult to complete examination. Limited dental assessment identified no teeth were tender to percussion and showed no signs of clinical pathology. There was discomfort and pain on

European Journal of Dental and Oral Health
www.ejdent.org

palpation of the left retromolar region, posterior to a partially erupted lower third molar. Neurological assessment involving light touch stimuli, pinprick stimuli and two-point discrimination indicated anaesthesia of the anterior two thirds of the tongue.

A provisional diagnosis of pericoronitis associated with her partially erupted lower left third molar tooth was made.

D. Radiographic Assessment

An OPG (Orthopantomogram) radiograph (Fig 1.) revealed a complete dentition. The lower right first permanent molar and second premolar have had been previously root treated.

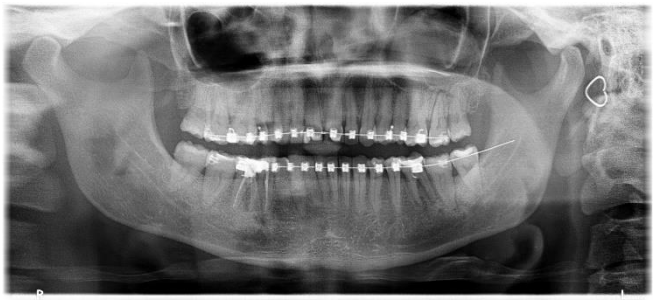

Fig. 1. OPG showing displacement of the lower orthodontic appliance.

The OPG also highlighted widening of the periodontal ligaments associated with the upper left second and lower left first permanent molar teeth, the patient was advised to seek further investigation and discussion into these findings with her own dentist. There is the presence of an upper and lower fixed orthodontic appliance, the lower orthodontic wire had been displaced posteriorly.

E. Treatment and Progress

It was agreed with the patients consent, to clip the orthodontic wire on the left side and remove the penetrating portion of the wire. The wire had to be clipped more anteriorly between the lower left canine and first premolar due to restricted mouth opening and removed in separate sections. Following this, there was improvement in mouth opening and resolution of discomfort.

As there was no longer a restriction to mouth opening a complete intra-oral assessment was now possible to exclude other clinical possibilities. The floor of mouth was not raised or tender, with no presence of intra-oral swelling. There was a single puncture wound in the region of the left retro-molar pad where the wire had previously penetrated. There was no swelling, bleeding, or bruising in this region and no evidence of pus suppuration from the wound either.

Clinical review of the patient after 3 months revealed a complete resolution of her symptoms. Trismus and pain had completely resolved over a few days following removal of the wire. Abnormal sensation (paraesthesia) persisted on the left lateral region of the tongue and gradually resolved over the following 3 months.

III. DISCUSSION

We are unsure of the reason behind the mechanism of injury in this case. There is limited information in the literature concerning orthodontic injuries of this nature. Reports of orthodontic appliances causing penetrating injuries usually relate to orthodontic headgear causing penetrating ophthalmic injuries [5]. Lingual and inferior alveolar nerve injuries have also been associated with orthodontic treatment, consideration should be given to this when treatment planning, especially regarding the ‘uprighting’ of lingually tilted lower molar teeth [6].

Damage to the lingual nerve can result in temporary or permanent general sensory changes to the anterior two-thirds of the tongue and floor of mouth. These can manifest as anaesthesia, paraesthesia, dysaesthesia or hypoaesthesia. This results in the loss of sensory function and can lead to speech changes, pain and burning sensation, loss of proprioception, drooling, and tongue biting [7], [8].

Whilst lingual nerve injury is widely attributed to iatrogenic factors relating to surgery and local anaesthetic administration, infective causes (e.g., syphilis, Lyme Disease, Herpes Zoster) may present with lingual nerve neuropathy. It is also important to note the possibility of neuropathy of neoplastic origin. Although very rare, it may be the initial presenting sign concerning a primary tumour, perineural spread or metastatic relapse [9].

In this case, it is difficult to completely conclude that a penetrating nerve injury had occurred without further investigation such as a cone beam computed tomography. However, from the OPG radiograph (Fig. 1.) undertaken at the time of presentation, the orthodontic wire is clearly visible and projecting to the region of the mandibular foramen and the closely related lower third molar. The lingual nerve has an intimate relationship with the mandibular third molar region. Anatomical studies report the location of the lingual nerve to be at the level of the alveolar crest or higher in 17.6% of cases. In the retromolar region, the distance from the lingual alveolar crest to the nerve is averaged at 4.45 mm and ranges between 3.01 mm to 2.28 mm in the third molar area [10].

We can agree that penetrating injuries such as this may result in damage to the trigeminal nerve, specifically the mandibular division in this case. If trauma to the lingual nerve is suspected, a neurological assessment should be conducted as shown in Table I. Initially it is important to identify and map out the neuropathic area, followed by a discussion into the symptoms the patient is experiencing. A simple assessment for the detection of sensory recovery would include light touch stimuli (ideally with a von Frey hair), pinprick stimuli and two-point discrimination threshold tests. Other factors to consider when assessing the lingual nerve include, sharp or blunt discrimination, fungiform papillae count, subjective function tests, palpation of the lingual nerve in the retromolar region for pain and an assessment of the tongue for trauma and scarring. Neurosensory dysfunction should be reviewed up to a 3 month period for signs of improvement [7], [11].

During each clinical encounter, it is prudent to check the distal extension of an arch wire and to clip any over extensions to an appropriate length. In a case where the arch wire has shifted, initially, it is recommended to reposition the arch wire if possible. Following reposition the distal end of a round wire may be bent into a loop to decrease movement and the possibility of soft tissue trauma. In rectangular archwires strategic use of a crimpable archwire stop, section of tubing

or direct bonding of composite to the archwire will help prevent a shift. There is an association between archwire displacement and the use of reduced friction bracket systems. It may be wise to incorporate the use of a "stop" mechanism as described to prevent an archwire shift when using these systems [12].

TABLE I: LIST OF FACTORS TO CONSIDER WHEN CLINICALLY ASSESSING FUNCTION AND RECOVERY OF THE LINGUAL NERVE FOLLOWING TRAUMA

Clinical assessment of the lingual nerve	
[I]	Discussion of symptoms
[II]	Mapping of the neuropathic area
[III]	Light touch stimuli
[IV]	Pinprick stimuli
[V]	Two-point discrimination threshold tests
[VI]	Sharp or blunt discrimination
[VII]	Fungiform papillae count
[VIII]	Subjective function tests
[IX]	Palpation of the lingual nerve in the retromolar region
[X]	Assessment of the tongue for trauma and scarring

IV. CONCLUSION

Lingual nerve injury is well documented in the literature however this appears to be the first related to a displaced lower fixed appliance wire. Although this was managed with a simple intervention, the correct fixation and anchorage of an orthodontic wire is vital to its safe use.

REFERENCES

[1] S. Sittitavornwong, M. Babston, D. Denson, S. Zehren, J. Friend, "Clinical Anatomy of the Lingual Nerve: A Review," *Journal of Oral and Maxillofacial Surgery*, vol. 75, Issue 5, pp. 926.e1-926.e9, 2017.

[2] A. E. Fielding, D. R. Rachiele, G. Frazier, "Lingual nerve paresthesia following third molar surgery: A retrospective clinical study," *Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, and Endodontology*, vol. 84, Issue 4, pp. 345-348, 1997.

[3] M. A. Pogrel, J. Bryan, J. Regezi, "Nerve damage associated with inferior alveolar nerve blocks," *The Journal of the American Dental Association*, vol. 126, pp. 1150-5, 1995.

[4] H. Behnia, A. Kheradvar, M. Shahrokhi, "An Anatomic Study of the Lingual Nerve in the Third Molar Region," *Journal of Oral and Maxillofacial Surgery*, vol. 58, pp. 649-651, 2000.

[5] H. Travess, D. Roberts-Harry, J. Sandy, "Orthodontics. Part 6: Risks in orthodontic treatment," *British Dental Journal*, Vol. 196, pp. 71–77, 2004.

[6] H. Mahmood, M. Stern, S. Atkins, "Inferior Alveolar Nerve Anaesthesia: A Rare Complication of Orthodontic Tooth Movement," *Journal of Orthodontics*, Vol. 46, no. 4, pp. 374–377, 2019.

[7] P. P. Robinson, A. R. Loescher, J. M. Yates, K. G. Smith, "Current management of damage to the inferior alveolar and lingual nerves as a result of removal of third molars," *British Journal of Oral and Maxillofacial Surgery*, vol. 42, pp. 285-292, 2004.

[8] J. W. Pichler, O. R. Beirne, "Lingual flap retraction and prevention of lingual nerve damage associated with third molar surgery: A systematic review of the literature," *Oral surgery, oral medicine, oral pathology, oral radiology and endodontics*, vol. 91, no. 4, pp.395-401, 2001.

[9] W. C. Ngeow, W. L. Chai, "Lingual Nerve Neuropathy: More than Just Third Molar Surgery and Inferior Alveolar Nerve Blocks," *Dental Update*, vol. 46, pp. 775–789, 2019.

[10] J. E. Kiesselbach, J. G. Chamberlain, "Clinical and anatomic observations on the relationship of the lingual nerve to the mandibular third molar region," *Journal of Oral and Maxillofacial Surgery*, vol. 42, no. 9, pp. 565-7, 1984.

[11] T. Renton, A. Thexton, S. J. Crean, M. Hankins, "Simplifying the assessment of the recovery from surgical injury to the lingual nerve," *British Dental Journal*, vol. 200, no. 10, pp. 569-73, 2006.

[12] S. J. Littlewood, L. Mitchell, B. R. K. Lewis, S. K. Barber, F. R. Jenkins, "*An introduction to orthodontics,"* 5th edition. Oxford, United Kingdom: Oxford University Press, 2019.

H. Safaei was born in Shiraz, Iran in 1994. He completed his Bachelor of Dental Surgery at the University of Sheffield, United Kingdom (2017). The author's current field of interest lies in Orthodontics.

He has undertaken further training as a Dental Core Trainee working in the Oral and Maxillo-Facial Surgical department (2019-2020) in Leeds General Infirmary, Leeds, United Kingdom and in Paediatric Dentistry and Orthodontics in The Royal School of Dentistry, Belfast, Northern Ireland (2020-2021).