

# Iatrogenic trigeminal post-traumatic neuropathy: a retrospective two-year cohort study

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**Abstract.** With the growing demand for dental work, trigeminal nerve injuries are increasingly common. This retrospective cohort study examined 53 cases of iatrogenic trigeminal nerve injury seen at the Department of Oral and Maxillofacial Surgery, University Hospitals of Leuven between 2013 and 2014 (0.6% among 8845 new patient visits). Patient records were screened for post-traumatic trigeminal nerve neuropathy caused by nerve injury incurred during implant surgery, endodontic treatment, local anaesthesia, tooth extraction, or specifically third molar removal. The patients ranged in age from 15 to 80 years (mean age 42.1 years) and 68% were female. The referral delay ranged from 1 day to 6.5 years (average 10 months). The inferior alveolar nerve (IAN) was most frequently injured (28 cases), followed by the lingual nerve (LN) (21 cases). Most nerve injuries were caused during third molar removal (24 cases), followed by implant placement (nine cases) and local anaesthesia injuries (nine cases). Pain symptoms were experienced by 54% of patients suffering IAN injury, compared to 10% of patients with LN injury. Persistent neurosensory disturbances were identified in 60% of patients. While prevention remains the key issue, timely referral seems to be a critical factor for the successful treatment of post-traumatic neuropathy.

Key words: trigeminal nerve; post-traumatic; neuropathy; iatrogenic; nerve damage.

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A variety of dental and maxillofacial procedures carry the risk of post-traumatic neuropathy (PTN), making it difficult to estimate the overall incidence of iatrogenic trigeminal nerve damage specifically caused by dental and oral surgery<sup>1</sup>. The

increased performance of dental procedures is one cause of the rising occurrence of trigeminal nerve injuries, which can lead to trigeminal sensory nerve neuropathy ranging from loss of sensitivity to severe neuropathic pain. Such complica-

tions can decrease the patient's quality of life and sometimes lead to medico-legal action<sup>2,3</sup>.

This retrospective study was performed to examine the incidence and clinical characteristics of trigeminal nerve injuries

at the Department of Oral and Maxillofacial Surgery, University Hospitals Leuven in Belgium (OMFS UZL), which offers orofacial PTN care. Focus was placed on delay and referral patterns in particular, since these are key factors for treatment success. Moreover, little evidence on referral delay has been described in the current literature. Prompt recognition of PTN, followed by appropriate referral and early treatment, gives the patient the best chance of improvement or recovery of sensory function in the damaged nerve branch.

## Materials and methods

After receiving ethical approval from the Medical Ethics Committee of UMZ, the patient records from the Department of Oral and Maxillofacial Surgery were screened to identify patients seen for iatrogenic damage to branches of the trigeminal nerve during the period 2013–2014. Specifically, cases in which the causative sensory neuropathy was due to third molar removal, implant surgery, endodontic treatment, administration of local anaesthesia, or extraction of non-third molars were selected.

Information retrieved from the patient records included demographic data, details of the injury itself, the date of injury and duration, the referral type, the course of symptoms, and details of the local anaesthesia product used. The follow-up and progress of the neuropathy over the full duration of each patient's

neurosensory disturbance was observed. Cases of PTN that continued beyond 3 months were labelled persistent. Patients with PTN were grouped according to the causative procedure, nerve damaged, and referral type. Symptoms were categorized into three groups: loss of sensitivity, including hypoesthesia and anaesthesia (negative symptoms); no pain, encompassing any symptom or combination of symptoms not involving pain (positive symptoms, such as paresthesia and dysesthesia); and pain, either alone or as part of a combination of symptoms.

## Results

### Demographic characteristics

During the 2-year study period (2013–2014), a total of 8845 patients were seen at OMFS UZL, including 4080 in 2013 and 4765 in 2014. Among these patients, 53 (0.6%) consulted due to PTN of the trigeminal nerve caused by an iatrogenic injury incurred during one of the selected procedures. The patients who arrived at the department with iatrogenic nerve injuries were more commonly female ( $n = 36$ , 68%) than male ( $n = 17$ , 32%). The average age was 42.9 years (range 15–80 years) for female patients and 40.4 years (range 23–69 years) for male patients (overall average age 42.1 years).

### Referral

For 15 patients, the causal procedure was performed at OMFS UZL (hereafter

termed 'internal referrals'). The remaining 38 patients consulted OMFS UZL after undergoing a procedure that caused iatrogenic PTN at an external centre (hereafter termed 'external referrals'). Among the external referrals, 11 were referred directly by the clinician who performed the causative procedure ('direct external referrals'), 16 patients were indirectly referred by another medical professional, such as a general practitioner or dentist ('indirect external referrals'), and seven patients consulted the OMFS UZL on their own initiative; the referral route was unclear for the remaining four patients.

### Delay

Among the 53 patients included, the average referral delay was 323 days (10 months), with a range of 1 day to 2383 days (6.5 years). Overall, 29% of patients attended OMFS UZL within 3 months, 49% within 6 months, and 63% within 1 year of injury. Among internal referrals, the average delay was 14 days, and all were seen within 3 months after the injury. The patterns for external referrals are displayed in Table 1. The average delay was 103 days (3 months) for direct external referrals and 478 days (1 year and 4 months) for indirect external referrals. Of the 11 direct external referrals, only five (45%) patients, including one patient injured during third molar extraction and four injured during the administration of local anaesthesia, consulted OMFS UZL within the critical period of 3 months. Further-

**Table 1.** External referrals displayed according to the cause of injury and referral delay. All direct external referrals were seen within 1 year after the causative procedure. Indirect external referrals suffered up to 3 years of delay in referral to the University Hospitals Leuven.

|                          | Total | M3 extraction | Implant surgery | Endodontic treatment | Local anaesthesia | Non-M3 extraction |
|--------------------------|-------|---------------|-----------------|----------------------|-------------------|-------------------|
| <b>Direct referral</b>   |       |               |                 |                      |                   |                   |
| Delay of <3 months       | 5     | 1             | –               | –                    | 4                 | –                 |
|                          | 45%   | 17%           |                 |                      | 80%               |                   |
| Delay of <6 months       | 9     | 5             | –               | –                    | 4                 | –                 |
|                          | 82%   | 83%           |                 |                      | 80%               |                   |
| Delay of <1 year         | 11    | 6             | –               | –                    | 5                 | –                 |
|                          | 100%  | 100%          |                 |                      | 100%              |                   |
| Total                    | 11    | 6             | 0               | 0                    | 5                 | 0                 |
| <b>Indirect referral</b> |       |               |                 |                      |                   |                   |
| Delay of <3 months       | 5     | 1             | 0               | 3                    | 0                 | 1                 |
|                          | 31%   | 25%           | 0%              | 100%                 | 0%                | 33%               |
| Delay of <6 months       | 7     | 1             | 1               | –                    | 0                 | 2                 |
|                          | 44%   | 25%           | 20%             |                      | 0%                | 67%               |
| Delay of <1 year         | 9     | 1             | 2               | –                    | 0                 | 3                 |
|                          | 56%   | 25%           | 40%             |                      | 0%                | 100%              |
| Delay of <2 years        | 12    | 3             | 3               | –                    | 0                 | –                 |
|                          | 75%   | 75%           | 60%             |                      | 0%                |                   |
| Delay of <3 years        | 14    | 4             | 4               | –                    | 0                 | –                 |
|                          | 88%   | 100%          | 80%             |                      | 0%                |                   |
| Delay of >3 years        | 16    | –             | 5               | –                    | 1                 | –                 |
|                          | 100%  |               | 100%            |                      | 100%              |                   |
| Total                    | 16    | 4             | 5               | 3                    | 1                 | 3                 |

M3, third molar.

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