# Neuropathic pain due to section of inferior alveolar nerve after implant placement


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## Introduction

This paper presents the case of a 74-year-old woman with a complicated clinical picture of chronic neuropathic pain, secondary to a dental implant. Due to the patient's age and the type of pain, the prognosis was quite guarded, as the literature and clinical experience demonstrate that it tends to become chronic and is difficult to resolve, with results that leave much to be desired[1-3].

The case needed to be approached by implementing new techniques to treat this type of pain and achieve an effective response for these patients.

One of the therapeutic alternatives could be the patient's neurofunctional recovery by means of localised nonablative radiofrequency treatment, also known as diathermy or Tecartherapy[4-6].

**Key words:** neuropathic pain, complication, implant, neurofunctional recovery, nonablative radiofrequency.

## Case description

The patient visited our clinic to get a second opinion.

- General data:
  74-year-old woman; postmenopausal; body mass index (BMI): 20; resection of the medial meniscus of the left knee; non-Hodgkin lymphoma in 2013 treated with radiotherapy and chemotherapy; restless legs syndrome; insomnia; and phlebitis and thrombophlebitis of superficial vessels.

- Dental history:
  Various implants fitted in another dental clinic. They are not specified in the surgical notes, but we know they included pieces implanted in positions 34 and 36. That procedure was performed on 9 May 2016. The patient complained of severe pain from the first day, which was not alleviated with medication.

  The osseointegrated implant in position 36 was extracted seven days after surgery due to severe pain after sectioning the inferior alveolar nerve. The osseointegrated implant in 34 showed no signs of infection or mobility.

  The patient consulted several specialists and doctors without success.

  Mandibular canal compression was ruled out based on the dental CBCT scan provided by the patient and carried out in September 2016.

  Her primary care physician referred her to the Maxillofacial Surgery Service of the Hospital Universitario Rey Juan Carlos (Madrid) in January 2017. She was prescribed Hidroxil to stimulate nerve regeneration. She still reported pain in the reevaluation and was referred to the Pain Unit at the Hospital de Alcorcón (Madrid). At this institution on 27 April 2017, the patient underwent ablative radiofrequency on the left mental nerve, according to the report she provided. No change was recorded in the intensity of the pain.

  Her current medication consists of: gabapentin 300 mg, Lexatin [bromazepam] 1.5 mg, zolpidem 10 mg, paracetamol 1,000 mg, Rivotril [clonazepam] 0.5 mg, ropinirole 1 mg, Septrin Forte 800/160 mg and Nolotil [metamizole] 575 mg.

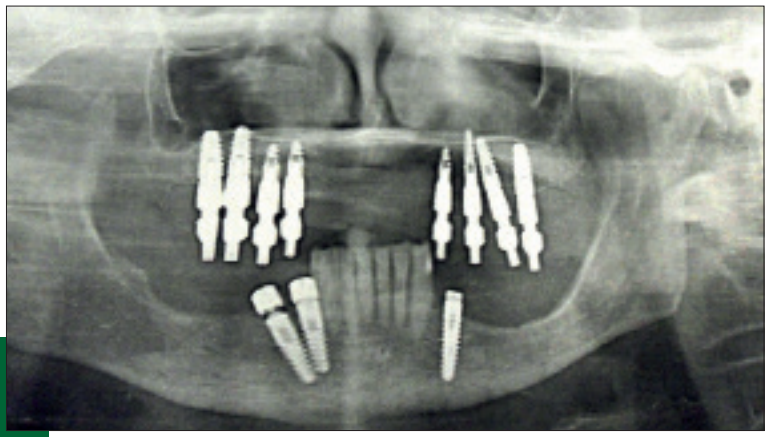


Fig. 1. A panoramic x-ray revealed implants in 27, 26, 25, 24, 14, 15, 16, 17, 34, 45 and 46. The patient presented scant separation to the inferior alveolar nerve in the third quadrant due to inferior maxillary atrophy caused by the absence of teeth.

Fig. 2. At admission, note the asymmetry of the patient's oral angle and the general expression of tiredness and pain. The photo shows the positioning of the surface electrodes to record the activity of the TMJ muscles.

## Primary complaint

When the patient visited our clinic, she presented neuropathic pain secondary to left alveolar nerve damage. The pain was chronic, burning and piercing. The patient could not sleep for more than three hours in a row, so it was unrefreshing. In addition, the pain affected her daily life and she experienced difficulty speaking, eating and drinking normally. The patient was very depressed due to the pain, the person accompanying her said she had not been the same since the pain began and looked very gaunt; in fact, she had lost weight (approximately four kilos).

## Anamnesis

A 74-year-old patient was referred to our clinic from another centre, where she was fitted with various juxtaosseous implants, implementing expansion and bone densification, not specified in the surgical notes. The implants were Eckermann Hexagon Evolution. The patient only complained of pain in positions 34 and 36.

According to the report by the implantologist who placed the implants, there was poor bone availability and it was very soft.

The implant in the fourth quadrant was angled more toward the distal to avoid the mental nerve, while the implant in the third quadrant was positioned vestibular to the alveolar nerve. Autologous grafts were used. The usual medication was prescribed.

Nevertheless, the patient immediately began to complain of very severe pain, that did not respond to medication or routine pain control measures.

As the pain continued and implant 36 was unstable, the implantologist decided to extract it after seven days. However, the pain did not subside.

The patient consulted her primary care physician who referred her to the Maxillofacial Surgery Service of the Hospital Universitario Rey Juan Carlos, where she was evaluated and treated with Hidroxil without success. She was then redirected to the Pain Unit of the Hospital de Alcorcón, where she was administered medication for neuropathic pain and scheduled for ablative radiofrequency. Unfortunately, despite the medication and radiofrequency sessions, the patient continued to experience pain.

She then decided to seek the opinion of a second implantalogist, which is when she finally visited our clinic.

## Evaluation

The patient scored 10 on the Visual Analogue Scale (VAS), with a detriment of 70% in the Quality of Life (QoL) scale. The patient had allodynia in the region of the left alveolar nerve, accompanied by paraesthesia in the periorbicular region of the lips, on the left side in particular.

An electromyograph was carried out on the surface of the masticatory muscles (masseter, temporalis and parietal) to assess the effect on the motor unit endplates and neuromuscular function. Measurements were taken with a NeuroTrac® MyoPlus Pro 2 EMG unit, with proprietary PC software.

A highly increased baseline was observed (around 30.7 µV), typical of irritation, that concurred with the clinical picture of spontaneous pain referred by the patient.

Functional voluntary motor response was preserved, but with paroxysmal exacerbation due to pain caused by the irritation activity in the left mandibular muscles. This implies a limitation in the range of articular movement of the TMJ for the oral functions of opening, occlusion, left and right lateral deviation, mandibular protrusion and retrusion.

Her verbal function was affected by 40%, confirmed by the patient and the person accompanying her, due to dysarthria and fatigue after ten minutes of minimal vocal effort.

## Clinical approach

The clinic's implantology team assessed the patient and deemed her suitable for palliative neurofunctional nonablative radiofrequency treatment using the dental C-500 Intraoral Capenergy medical device.

The patient and the person accompanying her were explained that the treatment, as it is palliative, aims to control the pain and improve quality of life. She was informed that the result could not be guaranteed, as it is very complicated to treat neuropathic pain. After addressing all their doubts and questions, the patient signed the informed consent form and began the treatment.

Daily massage therapy stimulation with ice for five minutes, muscle and functional reinforcement exercises (oral, lingual and laryngeal) three times a day and respiratory and verbal execution exercises, which were taught to the patient and the person accompanying her to carry out at home, were prescribed.

Three sessions of nonablative radiofrequency were indicated. Capacitive high-frequency sinusoidal emission was prescribed with absorption optimised coupling at 1 MHz and the temperature sensor set to 39 °C in the primary intraoral transmitter (Fig. 4). The extraoral transmitter (Fig. 5) was applied to the area innervated by the left alveolar nerve and to the periorbicular area. These emissions were performed for seven minutes on the external part and five minutes in the intraoral area.

## Results

To facilitate follow-up and the presentation of patient data, the following time controls were defined:

T0: Baseline measurement before beginning the treatment.
T1: Corresponding to the results obtained after the first session.
T2: Results obtained after the second session, performed after 24 hours.
T3: Results obtained in the third and final session, one week later.
T4: Corresponding to the one month follow-up measurement.
T5: Three month follow-up.
T6: Six month follow-up.

Fig. 4. Intraoral transmitter. Image courtesy of Capenergy Medical.

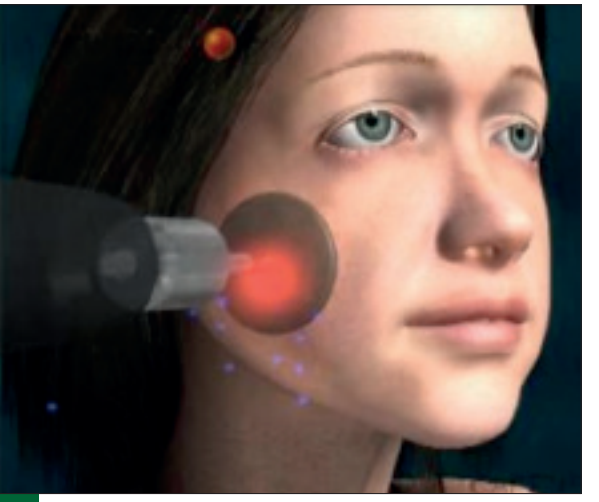
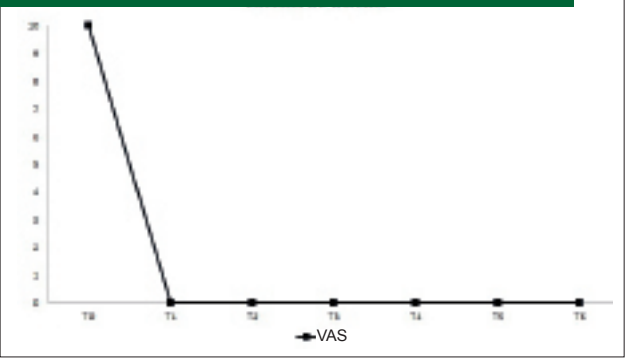


Fig. 5. Extraoral transmitter. Image courtesy of Capenergy Medical.

## Pain scale

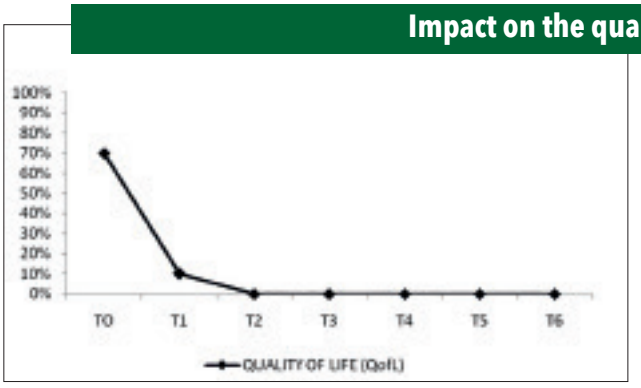



Graph 1. VAS for pain, scale from 0 (absence of pain) to 10 (the most severe pain).

### Pain

The neuropathic pain was controlled effectively after the first radiofrequency session. At T1, the patient reported a VAS score of 0 which was maintained for the rest of the sessions and throughout the following six months post-treatment (Graph 1).

## Impact on the quality of life

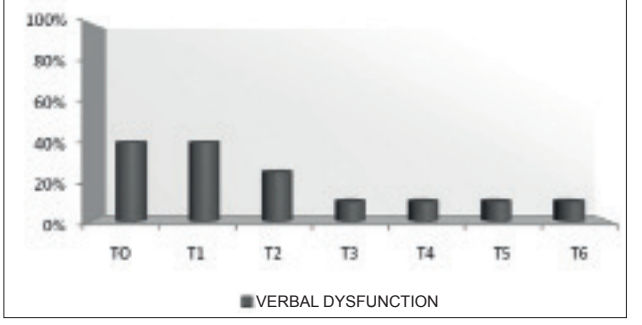



Graph 2. Evolution of the percent of impact on the patient's quality of life.

### Quality of Life (QoL)

The patient's quality of life improved one hundred percent. The patient can currently sleep the whole night and sleep is refreshing. She can eat, drink and speak without inconvenience or pain (Graph 2).

## Verbal dysfunction

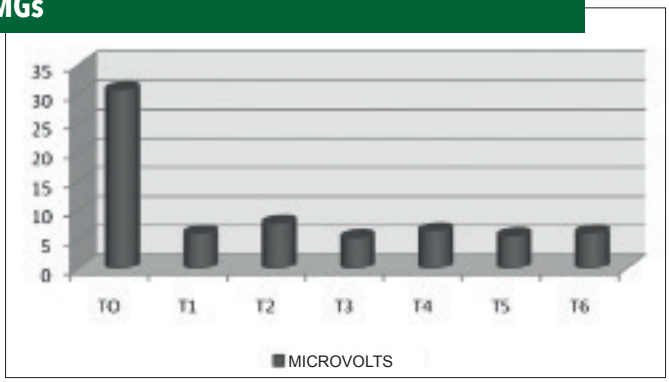



Graph 3. Follow-up of the patient's verbal disability. The remaining dysfunction was due to her edentulism.

### Impact on vocal function

Vocal function was practically normal. Only the patient's partial edentulism prevented her pronouncing some syllables (Graph 3).

## Baseline EMGs




Graph 4. Normalisation of the response after the first session was maintained over time.

### Surface electromyography

Surface electromyography results collected at the end of the treatment show a normalisation of the baseline (6.1 μV at the time of writing), elimination of the irritative and paroxysmal hyper-response to the oral functions of opening, occlusion, left and right lateral deviation, mandibular protrusion and retrusion (Graph 4).

### Evaluation of the results

The patient scored the result as ten out of ten (Fig. 6), while our evaluation was 9.5. We discharged her from the service and recommended she continued with the massage therapy and exercises.

Only slight hypoaesthesia in a small area of the left lower lip remained. It did not cause discomfort or interfere in basic everyday activities.

Her emotional state was good. The depression had subsided and the person accompanying her said that she had not looked this good in years.

Fig. 6. Note the change in the patient's facial gesture and wellbeing.

## Conclusions

Oral neurofunctional recovery through nonablative radiofrequency therapy seems to be a good alternative for treating patients with neuropathic pain secondary to dental implant placement. However, more research and case studies are needed before deciding upon suitable treatment protocols.

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