

## Surgical Management of Pain and Paresthesia Associated with the Superficialization Phenomenon of the Inferior Alveolar and Mental Nerve in Severely Atrophic Mandibles: A Case Series

Sezai Çiftçi<sup>1,\*</sup> , Emel Yardımcı<sup>1</sup> 

<sup>1</sup>Department of Oral and Maxillofacial Surgery, İnönü University, Malatya, Türkiye

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### Corresponding Author

Emel Yardımcı, DDS

**Address:** Department of Oral and Maxillofacial Surgery, İnönü University, Malatya, Türkiye

**E-mail:** [emel.akyuz@inonu.edu.tr](mailto:emel.akyuz@inonu.edu.tr)

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Dear Editor,

Mandibular atrophy secondary to aging and prolonged edentulism can lead to superficialization of the inferior alveolar and mental nerves[1]. This condition may result in chronic pain, paresthesia and hyperesthesia, significantly reducing patients' quality of life and complicating prosthetic rehabilitation. In such cases, removable dentures often fail due to loss of retention, mucosal overload and nerve compression, which in turn lead to both functional and psychological problems [2].

Superficialization of the inferior alveolar nerve (IAN) is usually reported by patients as complaints of pain, paresthesia, or hyperesthesia. Radiographically, IAN superficialization was defined on cone-beam computed tomography (CBCT) imaging as an alveolar crest-to-mandibular canal distance of  $\leq 2$  mm and/or a cortical bone thickness overlying the canal of  $< 1$  mm, or complete loss of the cortical plate. These radiological findings were evaluated together with the patients' clinical complaints of pain and paresthesia, both of which may severely compromise quality of life. In atrophic mandibles, nerve superficialization carries the risk of iatrogenic nerve injury, particularly during placement of prostheses or implants, as these may exert pressure on the nerve. Autogenous block bone grafting, which has been reported with high success rates, represents a promising method for both relieving pain and paresthesia and creating adequate bone volume for rehabilitation [3].

In this letter, the authors present their clinical experience with autogenous bone grafting in patients suffering from pain and paresthesia due to nerve superficialization in severely atrophic mandibles, and emphasize its potential as a low-risk and effective treatment option.

### Patient Selection and Description

Four patients who presented to the Department of Oral and Maxillofacial Surgery at İnönü University between 2023 and 2025 with complaints of pain, paresthesia, and inability to use prostheses due to IAN superficialization were included in this study.

Inclusion criteria were: edentulism for  $\geq 1$  year, a cone-beam computed tomography (CBCT) finding of  $\leq 2$  mm distance between the mandibular canal and the alveolar crest, marked thinning ( $< 1$  mm) or loss of the cortical bone overlying the nerve, and provision of written informed consent for surgical treatment.

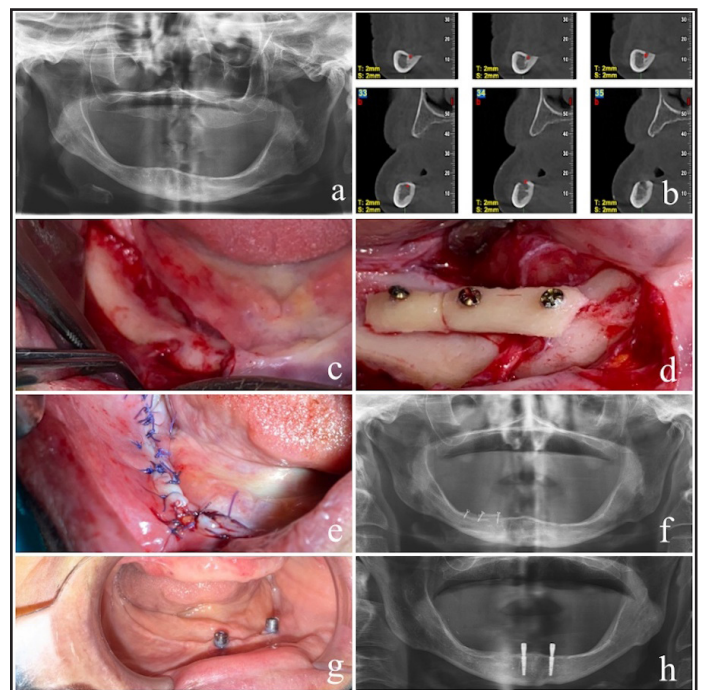
Patients with systemic diseases, a history of head and neck radiotherapy, or active infection were excluded from the study.

### Case Summary

This study was approved by the Scientific Research and Publication Ethics Committee of İnönü University, Health Sciences Research Ethics Committee, with Session Number: 3 and Decision Number: 2025/6996. Four patients with severe mandibular atrophy presented with chronic pain, paresthesia, and inability to use prostheses due to superficialization of the inferior alveolar and mental nerves. Panoramic radiographs and CBCT imaging revealed superficialization of the IAN and thinning of the overlying cortical bone. Autogenous block grafts harvested from the mandibular ramus or iliac crest were surgically thinned on the inner surface facing the mental nerve to prevent compression. The prepared grafts were then placed on the alveolar crest of the posterior mandible over the superficialized nerve and fixated with titanium mini-screws. The Bichat's fat pad graft harvested from the patients was used to cover the fixed autogenous bone grafts and provide soft tissue support. The fat graft helps reduce mucosal pressure over the bone graft, particularly in areas of superficialized IAN, thereby preventing nerve compression. Additionally, the vascularity of the autogenous fat graft supports the nourishment of the bone graft, reducing the risk of graft necrosis and promoting healing. Therefore, in selected patients, covering the autogenous bone graft with Bichat's fat pad aimed to prevent potential complications. No intraoperative complications were observed. The clinical characteristics and treatment approaches of the four cases included in this study are summarized in Table 1.

### Case 1

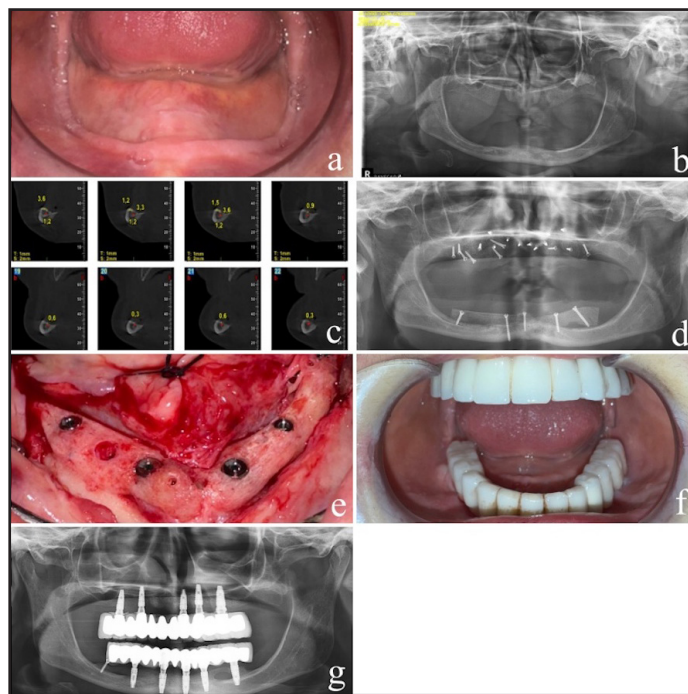
A 72-year-old female patient presented to our clinic with complaints of pain in the right posterior mandible. Clinical examination revealed hypoesthesia in the mental nerve region. Cone-beam computed tomography (CBCT) findings demonstrated superficialization of the inferior alveolar nerve (IAN) with thinning of the overlying cortical bone. The cortical bone thickness above the mental foramen, as measured on CBCT, was 0.1 mm. An autogenous block bone graft harvested from the mandibular ramus was placed at the alveolar crest over the superficialized IAN region in the posterior mandible and fixed with three mini-screws. Subsequently, a Bichat's fat pad graft was placed over the autogenous bone graft. At the 6-month follow-up, pain and paresthesia had significantly resolved, and two implants were placed for an overdenture prosthesis (Figure 1).



**Figure 1. Case 1.** **a.** Panoramic image showing severe resorption in the posterior mandibular region. **b.** CBCT image demonstrating the superficialization of the mental nerve in the right posterior mandible. **c.** Intraoral exposure of the mental nerve at the crest level. **d.** Fixation of the autogenous graft harvested from the mandibular ramus to the recipient site with mini screws. **e.** Placement of the Bichat fat graft over the bone graft. **f.** Primary closure of the surgical site with sutures. **g.** Radiographic image at postoperative 3 months. **h.** Panoramic radiograph at postoperative 10 months.

**Case 2**

A 44-year-old patient with a history of osteoporosis presented with complaints of mandibular pain, intermittent hypoesthesia, burning sensation, and inability to use a complete denture. Panoramic radiography and cone-beam computed tomography (CBCT) revealed advanced bone atrophy in both jaws and less than 0.9 mm of residual bone over the inferior alveolar nerve (IAN) in the posterior mandible. Under general anesthesia, corticocancellous bone grafts were harvested from the anterior iliac crest. The grafts were fixed to the mandible using a total of five titanium mini-screws. Follow-up examinations showed a reduction in pain and paresthesia symptoms. After six months, a total of ten implants were placed, and oral functions were restored with a fixed prosthesis (Figure 2).

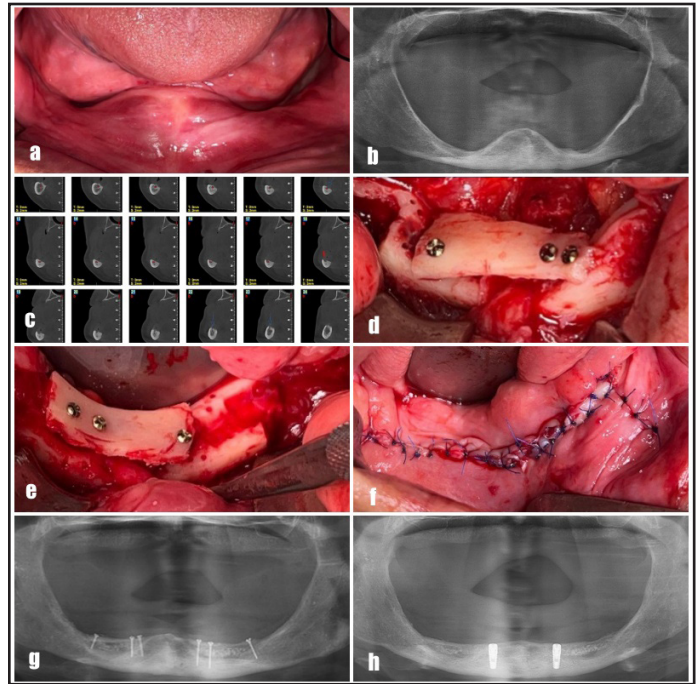


**Figure 2. Case 2.** a and b. Intraoral and panoramic views showing severe resorption in the maxilla and mandible. c. CBCT image demonstrating the superficialization of the mental nerve in the posterior mandible. d. Panoramic radiograph at postoperative 4 months. e) Intraoral view of implant placement at postoperative 6 months. f. Intraoral view at postoperative 12 months. g. Panoramic radiograph at postoperative 12 months.

**Case 3**

A 54-year-old patient presented with complaints of pain and burning sensation in the bilateral posterior mandible, along with inability to use a removable prosthesis. Cone-beam computed tomography (CBCT) revealed superficialization of the inferior alveolar nerve (IAN) in the posterior mandible with insufficient

cortical support overlying the nerve. The cortical bone thickness above the mental foramen, as measured on CBCT, was 0.1 mm. Under general anesthesia, autogenous bone grafts were harvested from both mandibular rami and placed at the alveolar crest over the superficialized nerve regions in the posterior mandible. The grafts were fixed using six mini-screws. Postoperatively, the patient’s symptoms regressed. At the 6-month follow-up, the mini-screws were removed, and vestibuloplasty was planned due to inadequate vestibular depth (Figure 3).

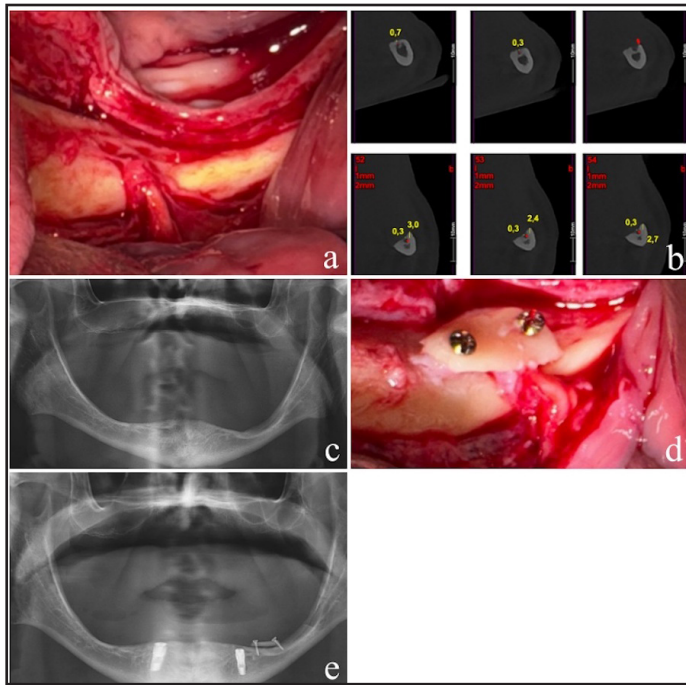


**Figure 3. Case 3.** a and b. Intraoral and panoramic views showing severe resorption in the posterior mandible. c. CBCT image demonstrating the superficialization of the mental nerve in the posterior mandible. d and e. Fixation of the autogenous grafts harvested from the mandibular ramus to the crest level of the right and left mandibular mental regions with mini screws. f. Primary closure of the surgical site with sutures. g and h. Intraoral and panoramic radiographic views at postoperative 7 and 12 months.

**Case 4**

A 65-year-old male patient presented with longstanding dull pain and paresthesia in the left posterior mandible. The mental foramen was noted to be close to the alveolar crest, and the cortical boundaries of the inferior alveolar canal appeared indistinct. The cortical bone thickness above the mental foramen, as measured on CBCT, was 0.3 mm. Under local anesthesia, an autogenous bone graft harvested from the left mandibular ramus was placed over the nerve and fixed with two titanium mini-screws. A Bichat’s fat pad graft was then positioned over the

autogenous bone graft. Follow-up examinations demonstrated a significant reduction in the patient’s pain and paresthesia complaints (Figure 4).



**Figure 4. Case 4.a.** Intraoral view showing superficialization of the mental nerve in the left posterior mandible. **b and c.** CBCT and panoramic radiographic views of the posterior mandible. **d.** Fixation of the autogenous graft harvested from the mandibular ramus to the crest level of the left mandibular mental region with mini screws. **e.** Placement of the Bichat fat graft over the bone graft. **f.** Postoperative panoramic radiographic view.

**Follow-up and Outcomes**

Preoperative and postoperative pain was assessed using the Visual Numeric Scale (VNS). Patients were instructed that 0 indicated “no pain” and 10 indicated “unbearable pain,” and

they were asked to rate their pain on a 0–10 scale. The VNS scores are presented in Table 2.

Radiological evaluation was performed using preoperative CBCT and postoperative panoramic radiographs. Preoperative CBCT measurements showed an average cortical bone thickness over the mandibular canal of  $1.0 \pm 0.5$  mm (range: 0–2 mm). Postoperative panoramic radiographs at 3 and 6 months demonstrated successful graft stability and osseointegration. However, due to the absence of postoperative CBCT images, quantitative measurements and graft resorption rates could not be calculated using standard methods, representing a limitation of the study.

Neurosensory assessment was performed preoperatively and postoperatively in the lip and mental regions using a palpation probe and two-point discrimination (Figure 5). During the palpation probe test, a pinprick test was applied, and patients were asked to rate the sensation from 0 (“no sensation”) to 10 (“full sensation”), constituting a subjective paresthesia assessment (Table 3). Preoperatively, patients marked the paresthesia areas between the lip and menton, which were recorded (Figure 5). At the 6-month postoperative follow-up, these regions were re-evaluated, and the sensory changes were documented with illustrations (Figure 6).

From a clinical perspective, in addition to pain and paresthesia outcomes, data on prosthetic/implant treatments—including the number and location of implants, success rates, and follow-up periods—were evaluated, along with patient-reported outcomes such as masticatory function, satisfaction, and quality of life. The clinical and radiographic findings demonstrated that the augmented areas provided sufficient bone volume for planned prosthetic and implant treatments (Figure 7).

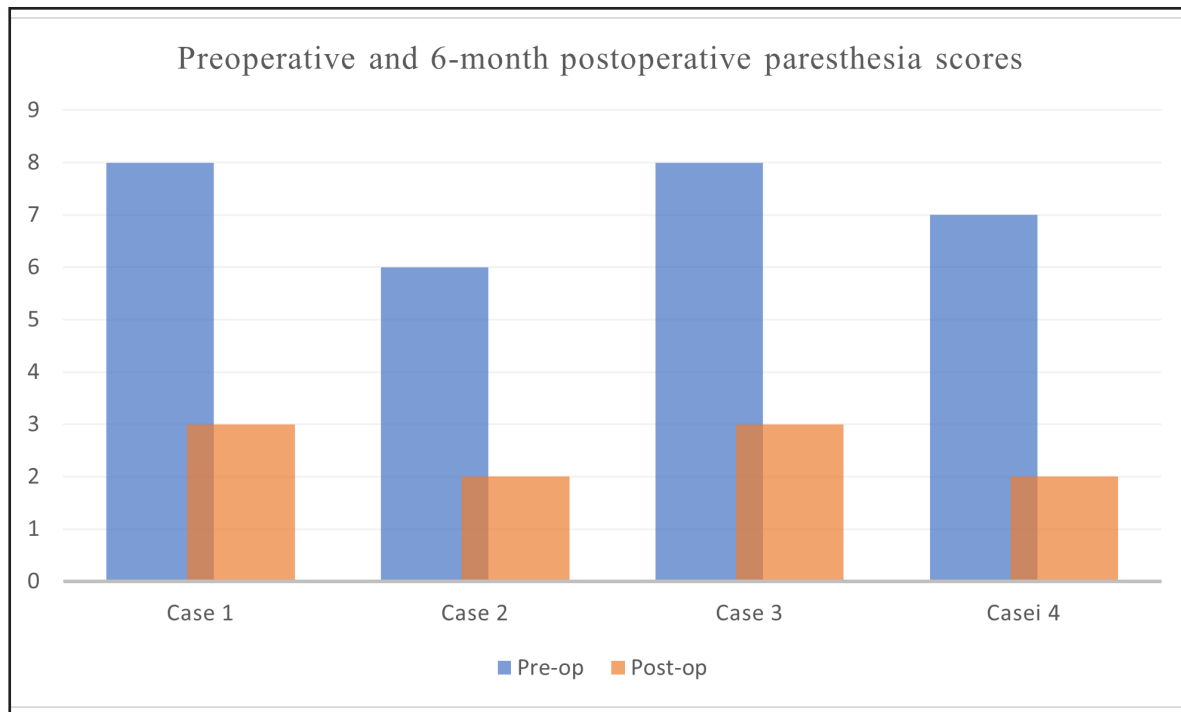
**Table 1.** Clinical characteristics and treatment approaches of the four cases

Case	Age	Gender	Symptom	Donor Site	Follow-Up Findings
1	72	Female	Pain, paresthesia	Mandibular ramus	Symptoms resolved and dental implant placement was performed
2	44	Female	Burning sensation, pain, inability yo use prosthesis	Anterior iliac crest	Symptoms regressed, and implant placement was performed.
3	54	Female	Bilateral pain, paresthesia	Bilateral mandibular ramus	Symptoms regressed, and an overdenture was planned.
4	65	Male	Pain on the left side, paresthesia	Left mandibular ramus	Pain and paresthesia decreased

**Table 2.** Preoperative and postoperative VNS score (0-10)

Patient	Preoperative VNS score	Postoperative VNS score	Comment
1	7	3	Pain decreased
2	5	2	Mild pain reduced
3	8	4	Significant pain relief
4	6	2	Pain decreased

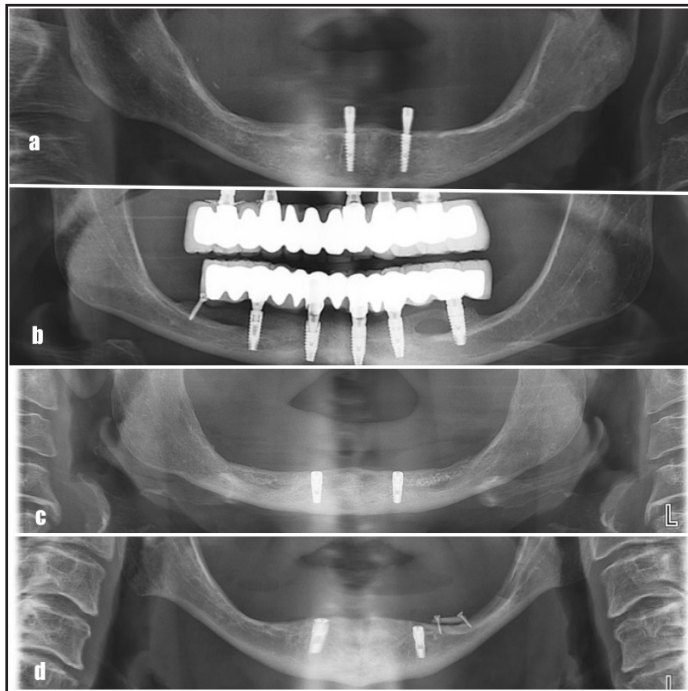
**Table 3.** Preoperative and 6-month postoperative subjective assessment test for paresthesia



**Figure 5.** The preoperative anatomical region of localized pain and paresthesia in the patient



**Figure 6.** The area where pain and paresthesia findings were localized in the patient after the operation



**Figure 7.** The patients’ postoperative radiographic evaluation of the dental implants

**DISCUSSION**

Superficialization of the inferior alveolar and mental nerves in mandibular atrophy leads to chronic pain and paresthesia, impairing oral function and complicating prosthetic rehabilitation. In this study, the use of autogenous block grafting resulted in both symptom regression and adequate bone volume gain, without the need for more invasive procedures such as nerve transposition.

Although short implants may be placed in atrophic mandibles to avoid nerve transposition or bone augmentation, and favorable outcomes have been reported in the literature, this approach is generally unsuitable in cases of severe mandibular atrophy, where the residual bone height above the mandibular canal typically ranges between 0.5 and 1.5 mm [4].

IAN lateralization or transposition is a more invasive procedure, and the integrity of the nerve may be compromised during mobilization and repositioning. Consequently, the risk of paresthesia or nerve injury increases, and these complications may be temporary or permanent [5]. Postoperative paresthesia, hypoesthesia, or neuropathic pain are common with this technique [6]. Long healing periods may be required, and the outcomes are not always predictable. Nerve transposition can

be effective for enabling implant placement in cases with severe bone loss; however, careful patient selection is essential due to the high risk of complications.

The All-on-Four treatment concept provides a predictable approach for managing atrophic jaws, particularly in patients who prefer to avoid regenerative procedures that increase morbidity and treatment costs. Reported outcomes indicate a survival rate of 99.8% beyond 24 months [7]. While the All-on-Four concept is considered an effective method for prosthetic rehabilitation in atrophic mandibles, the authors believe it does not directly address neurological issues such as nerve superficialization.

The autogenous grafting procedure can be used to reduce pressure on the inferior alveolar nerve (IAN), alleviate pain and paresthesia, and enable prosthetic rehabilitation. Autogenous bone grafts are considered the gold standard in bone regeneration procedures due to their inherent properties and lack of immunological reactions [8,9]. They have been reported to be a reliable technique for alveolar ridge reconstruction, providing bone gain ranging from 1.5 mm to 5.5 mm [10]. However, autogenous grafts also have certain limitations, including donor site morbidity, unpredictable graft resorption, limited graft quantity, and the need for additional surgical sites [11].

The authors’ findings suggest that autogenous block grafting may be a safe and effective option for nerve superficialization associated with severe mandibular atrophy. A comparative analysis of nerve lateralization/transposition and autogenous grafting techniques is presented in Table 4.

**Table 4.** Comparative analysis of nerve lateralization/transposition and autogenous grafting techniques

Evaluation Criteria	Nerve Lateralization/transposition	Autogenous Grafting
Invasiveness	High	Moderate
Risk of nerve injury	High	Low
Relief of pain/paresthesia	Variable	Effective
Nerve position	Direct nerve dissection and repositioning	Unchanged – Indirect decompression
Risk of complication	High	Low
Graft resorption	None	Moderate (predictable)

This report has some limitations, including the small number of patients and the absence of a control group. Although the limited sample size restricts the generalizability of the authors findings, the consistent improvements observed indicate the value of this approach as a low-risk alternative. Further studies involving larger patient cohorts are warranted.

## CONCLUSION

The authors' observations suggest that autogenous block grafting may represent an effective and low-risk option for the management of pain and paresthesia associated with nerve superficialization in cases of severe mandibular atrophy. The authors believe that this technique can offer a practical solution for clinicians in situations where prosthetic rehabilitation or dental implant treatment is insufficient.

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**Conflicts of Interest:** The authors confirm that they have no conflicts of interest.

**Author Statement Regarding the Use of Artificial Intelligence-Enhanced Tools:** Artificial intelligence–assisted technologies, including ChatGPT (OpenAI), were used during the preparation of this manuscript for state purpose clearly, , improving expression, language editing, grammar checking and formatting references. The authors have thoroughly reviewed and verified the accuracy and integrity of all AI-generated content. No content was generated entirely by AI without human review and correction. AI tools were not used for generating scientific ideas, interpretations, or conclusions. All authors take full responsibility for the content of this manuscript.

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**Author Contributions:** Emel Yardımcı: Data collection, manuscript writing, data interpretation. Sezai Çiftçi: critical review, supervision.

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