



Case report

Transient facial nerve paralysis following inferior alveolar and lingual nerve block: Clinical case and management review

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Abstract: Transient facial nerve paralysis (TFNP) is an uncommon but clinically significant complication associated with mandibular nerve blocks, typically resulting from the inadvertent diffusion of anesthetic solution into the parotid gland. This report presents the case of a 49-year-old female patient who underwent extraction of the lower left second molar under local anesthesia with 4% articaine and 1:100,000 epinephrine, subsequently developing immediate unilateral facial paralysis with full recovery within six hours. The likely etiology was posterior needle insertion and anesthetic deposition in the parotid region. This case emphasizes the importance of technical precision in identifying bony landmarks, anatomical knowledge, and proper execution of the inferior alveolar nerve block to prevent transient neurological complications.

Keywords: transient facial nerve paralysis; local anesthesia; dentistry; anesthesiology

1. Introduction

The inferior alveolar nerve block (IANB) is an essential procedure in dental practice for achieving anesthesia during mandibular interventions. Despite its widespread use and well-established safety

profile, rare neurological complications may occur, including transient facial nerve paralysis (TFNP), which is generally transient and benign in nature. TFNP associated with IANB has been reported to occur either immediately, within minutes after injection, or in a delayed form, developing hours to up to two days later, with recovery typically occurring within hours to weeks [1–4].

In immediate-onset cases, the most widely accepted hypothesis involves posterior diffusion of the anesthetic solution into the parotid gland parenchyma or retromandibular space, resulting in temporary blockade of the branches of the facial nerve (CN VII). Excessive anesthetic volume and overly posterior or medial deposition, particularly when bone contact is not achieved or when the needle positioning is incorrect, significantly increase the risk of this complication [4,5]. In delayed-onset cases, the clinical presentation may resemble Bell's palsy, suggesting viral reactivation or localized neuritic inflammation as possible mechanisms that may explain the slower recovery and the need for prolonged clinical follow-up [2].

Although the true incidence of TFNP following dental anesthesia remains uncertain due to probable underreporting, recent studies continue to report it as uncommon among the complications associated with IANB and intraoral infiltrations [6,7]. Neuro-ophthalmic complications related to dental anesthesia, such as diplopia, ptosis, and amaurosis, although distinct from FNP, share similar mechanisms involving inadvertent anesthetic diffusion or injection into adjacent anatomical spaces. These findings reinforce the importance of precise anesthetic technique, aspiration, and slow deposition of the anesthetic solution [8,9]. Comprehensive reviews addressing neurological complications following dental local anesthesia further support their rarity and predominantly transient nature [10–12].

Technical factors associated with increased risk include excessively posterior needle placement, failure to achieve bone contact, multiple punctures, inadequate depth of penetration, and inappropriate anesthetic volume or injection rate [6]. Recommended preventive strategies include mastery of anatomical landmarks, confirmation of bone contact before anesthetic deposition, careful aspiration, and slow injection of appropriate volumes of anesthetic [7,12]. In the differential diagnosis of peripheral facial paresis following IANB, it is essential to distinguish between immediate self-limiting TFNP, delayed Bell's palsy-like presentations, and other neuro-ophthalmic complications. Immediate management should prioritize ocular surface protection by using lubricating drops, nighttime ointment, and eyelid occlusion when necessary, followed by close clinical monitoring, since functional recovery is expected in most cases [1–4,10,13].

This case report contextualizes TFNP following IANB, drawing on case reports, case series, and literature reviews published over the past two decades, emphasizing proposed mechanisms, technical risk factors, preventive measures, and clinical management strategies to ensure patient safety during routine anesthetic procedures [1,2,4,7,10].

2. Case report

The present case report was approved by the Institutional Research Ethics Committee. Written informed consent was obtained from the patient for publication of clinical information and images. A 49-year-old female melanoderma patient was referred to the Oral Surgery Clinic of the School of Dentistry for the extraction of the lower left second molar due to non-restorable coronal destruction caused by dental caries. The patient signed the informed consent permitting the use of the pictures.

During anamnesis and initial clinical examination, the patient presented no relevant systemic alterations and was deemed clinically fit for the surgical procedure. As part of the anesthetic–surgical

plan, left inferior alveolar (IA), lingual, and buccal nerve blocks were selected, using a long 27G needle of 32 mm (DFL®, Rio de Janeiro, RJ, Brazil) and 4% articaine with 1:100,000 epinephrine (DFL®, Rio de Janeiro, RJ, Brazil), with a maximum dosage equivalent to one and a half cartridges (2.7 mL). The exact distribution of anesthetic volume among the inferior alveolar, lingual, and buccal nerve blocks was not recorded at the time of treatment, representing a limitation of this report. Following biosafety protocols, intraoral antiseptics was performed with 0.12% chlorhexidine gluconate solution for 1 min, followed by extraoral antiseptics with 2% chlorhexidine soap on the perioral region, and sterile surgical draping was applied.

The anesthetic block was performed as planned, using a reflux dental syringe (Rhosse®, Ribeirão Preto, SP, Brazil) along with the aforementioned needle and anesthetic solution. After approximately 15 min, complete anesthesia of the innervated regions was achieved, allowing extraction of the lower left second molar, which was completed in about 20 min without intraoperative complications. However, immediately after the surgical drapes were removed, the patient reported an inability to close her left eyelid. Upon immediate clinical evaluation, transient facial nerve paralysis was observed, affecting the motor branches of the ipsilateral facial nerve (CN VII) (Figure 1).



Figure 1. Clinical presentation immediately after anesthetic administration demonstrating unilateral facial asymmetry characterized by loss of forehead wrinkling, inability to completely close the eyelid, flattening of the nasolabial fold, and deviation of the oral commissure. Findings suggest transient dysfunction involving the branches of the facial nerve.

The patient was promptly informed of the event and advised regarding the transient nature of the paralysis, with an expected recovery time of 6–8 h, corresponding to the duration of articaine action. Eyelid taping was applied to provide ocular protection, and the patient was instructed to apply 0.9% saline solution five times daily for 24 h. The incident was documented in the dental record. The clinician maintained hourly follow-up calls, and approximately 6 h post-anesthesia, complete recovery of facial motor function was noted.

The patient was re-evaluated at 24, 48, 72, and 96 h post-procedure, with no neurological sequelae or abnormalities noted (Figure 2). Subsequently, the operating surgeon reported that during the inferior alveolar and lingual nerve blocks, bone contact with the mandibular ramus was not perceived, suggesting excessive posterior needle insertion and possible penetration into the left parotid gland. Thus, the diffusion of the anesthetic into the facial nerve region likely caused the observed transient paralysis. Follow-up communication at one and two weeks confirmed complete resolution of symptoms without recurrence or residual neurological deficits.



Figure 2. A sequence of photographs showing the patient 24 h after the transient facial nerve paralysis, demonstrating full recovery of facial movements. Progressive restoration of facial muscle function with complete resolution of deficits.

3. Discussion

TFNP following an inferior alveolar nerve block remains a rare but clinically relevant complication in contemporary dental practice [1,3]. The literature demonstrates that the most widely accepted pathophysiological mechanism in immediate-onset cases involves the diffusion of the anesthetic solution into the deep lobe of the parotid gland, resulting in a temporary blockade of the facial nerve branches [2,4,14,15]. This hypothesis is supported by several clinical reports in which complete symptom resolution occurs as the anesthetic effect subsides, usually within a few hours [5,13].

Under ideal conditions, during the administration of an inferior alveolar nerve block, the tip of the needle should gently contact the medial cortical surface of the mandibular ramus near the mandibular foramen [1,3,4,13,15]. When bone contact is not achieved, there is a greater possibility that the needle has been positioned too posteriorly, allowing inadvertent deposition of the anesthetic solution into the parotid gland region, where the facial nerve divides into its main motor branches. Consequently, the anesthetic agent may temporarily affect these neural structures, resulting in immediate transient facial paralysis.

Recent anatomical studies [16,17] further support the hypothesis that transient facial nerve paralysis is primarily related to inaccurate needle positioning rather than the anesthetic solution itself. Cone-beam computed tomography investigations have demonstrated that the mandibular lingula, a key landmark for inferior alveolar nerve block, exhibits considerable anatomical variability according to sex, age, skeletal pattern, and mandibular morphology. The lingula is generally positioned posterior and superior within the mandibular ramus, and inaccurate estimation of its location may lead to excessive posterior advancement of the needle. Importantly, Jang and Han [17] reported that posterior needle positioning may permit anesthetic diffusion into the parotid gland, resulting in transient facial nerve paralysis. In the present case, the absence of perceived bony contact during needle advancement strongly suggests that the needle bypassed the medial ramus and entered a posterior anatomical position, supporting the hypothesis of inadvertent anesthetic deposition adjacent to the facial nerve. Therefore, the complication was most likely related to technical positioning errors rather than the pharmacological properties of articaine.

Importantly, this complication may occur with any type of local anesthetic solution. The problem is not directly related to the anesthetic agent itself but rather to the anatomical location where the solution is deposited, specifically into an inappropriate anatomical space adjacent to a motor nerve structure that should not be anesthetized during the procedure. In the present case, the clinician reported that mandibular bone contact was not achieved during the anesthetic technique, which represents an important technical error. In this situation, the correct approach would have been to partially withdraw the needle and reposition it properly before depositing the anesthetic solution [2,4,14,15].

These findings emphasize the importance of proper anesthetic technique, since this is a complication that is potentially preventable when the anesthetic technique is performed correctly. Several authors have reported that the main causes associated with transient facial nerve paralysis include excessively posterior needle insertion, inadequate depth of penetration, incorrect syringe angulation, and failure to properly identify anatomical landmarks. In addition, individual anatomical variations may further complicate the correct execution of the anesthetic technique, particularly in pediatric patients, elderly individuals, or patients with mandibular anatomical alterations. The authors agree with the literature that these factors may significantly increase the risk of complications during mandibular nerve block procedures. Therefore, both students and clinicians should remain constantly

aware of these anatomical variations, which are commonly encountered in daily dental practice.

On the other hand, some delayed-onset cases have been attributed to inflammatory processes or viral reactivation, particularly herpes simplex virus type 1 (HSV-1), producing clinical manifestations similar to Bell's palsy and consequently requiring longer follow-up [9]. Although this was not observed in the present case, there are situations in which clinicians must consider alternative therapeutic approaches in order to improve patient recovery.

This type of complication usually does not result in major local sequelae, since it typically resolves within a few hours. Depending on the anesthetic solution injected, the duration of symptoms may be short, intermediate, or long-lasting. In the present case, 4% articaine was used, which is considered an intermediate-duration anesthetic, with pulpal anesthesia lasting approximately 3–4 h, and soft tissue anesthesia lasting approximately 4–6 h.

The main concern arises when ophthalmologic complications occur and/or are neglected by the professional. In such situations, the patient may develop significant ocular injuries, especially if adequate eye protection and clinical follow-up are not promptly provided. The clinical relevance of this complication becomes even greater due to the possibility of associated ophthalmologic manifestations such as diplopia, mydriasis, and ptosis, which share similar anesthetic diffusion mechanisms and require immediate differential diagnosis [8]. Early recognition of the condition and clear communication with the patient are essential to reduce anxiety and ensure appropriate management. Most cases resolve spontaneously without permanent sequelae as the local anesthetic is metabolized; however, continuous clinical follow-up remains essential [1,3,4].

Special attention should be directed toward eyelid closure in order to prevent corneal injury and ocular dryness, as recommended by several authors [5,18–20]. The present findings are consistent with previous reports, since inadequate eyelid closure may result in significant ophthalmologic complications and, in severe situations, even irreversible corneal damage. In addition, the clinician should maintain close contact with the patient throughout the postoperative period, considering the anxiety and emotional stress commonly associated with this type of complication. In the present case, the professionals maintained continuous follow-up and performed reassessments for a longer period than usually described in the literature, as they believed this approach would provide greater reassurance and comfort to the patient, which is considered an important aspect in the management of these cases.

4. Conclusions

The prognosis of TFNP is generally excellent. Although rare, TFNP following an inferior alveolar nerve block represents a clinically important anesthetic complication in dental practice. In most cases, complete recovery occurs within a few hours without permanent sequelae. Nevertheless, special attention should be given to technical accuracy during anesthetic administration, prevention of recurrence, and prompt symptomatic management when the complication occurs.

Clinicians should recognize that failure to establish appropriate bony contact during an inferior alveolar nerve block may indicate excessive posterior needle placement, increasing the risk of anesthetic diffusion into the parotid region and subsequent transient facial nerve paralysis. Moreover, clinicians should always ensure correct needle positioning with adequate bone contact before anesthetic deposition and remain aware of possible anatomical variations that may increase the risk of anesthetic diffusion into adjacent spaces. Early recognition of the condition, prevention of

ophthalmologic injuries, clear communication with the patient, and close postoperative follow-up are essential to achieving favorable clinical outcomes and reducing patient anxiety during recovery.

Use of AI tools declaration

The authors declare they have not used Artificial Intelligence (AI) tools in the creation of this article.

Authors' contributions

Conceptualization: R.F.B.R., J.Z., G.V.O.F., M.J.P.U., P.R.; Methodology: R.F.B.R., J.Z., G.V.O.F., M.J.P.U.; Formal analysis and investigation: R.F.B.R., J.Z., G.V.O.F., M.J.P.U., P.R.; Writing - original draft preparation: R.F.B.R., J.Z., G.V.O.F., M.J.P.U., P.R.; Writing - review and editing: R.F.B.R., J.Z., G.V.O.F., M.J.P.U., P.R.; Supervision: R.F.B.R.

Conflict of interest

Gustavo Vicentis Oliveira Fernandes is an editorial board member for *Journal of Dentistry and Multidisciplinary Sciences* and was not involved in the editorial review or the decision to publish this article. The authors declare no conflict of interest.

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