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Pre-Prosthetic Management: Mandibular Alveoloplasty With Local Anesthesia

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Abstract

Pre-prosthetic surgery is essential to restore normal oral cavity function by reshaping and smoothing bone margins prior to denture fabrication. Alveoloplasty is a common surgical procedure performed to eliminate sharp bony projections and smooth the bone surface. This case report aims to present the management of mandibular alveoloplasty performed under local anesthesia prior to denture fabrication. A 52-year-old male patient presented to Soelastri Dental Hospital requesting denture fabrication. A prosthodontist referred the patient to an oral surgeon to address sharp bony projections in the left mandibular gingival region. Clinical intraoral examination revealed alveolar exostosis without signs of inflammation, though the area was tender upon palpation. Panoramic radiographic evaluation confirmed the presence of alveolar bone projections in the left mandibular region. The alveoloplasty procedure was performed using a mandibular inferior alveolar nerve block combined with local infiltration anesthesia. Bony projections and sharp alveolar ridges were smoothed and contoured to enhance denture retention and stability, as sharp ridges can cause irritation during denture wear. The incision on the alveolar ridge and the elevation of the mucoperiosteum were kept minimal to preserve vestibular depth. Irregular and sharp bone edges were trimmed and smoothed (reducing the height by 1–2 mm) using rongeurs, bone files, or bone burs, and the wound was closed with silk sutures. Alveoloplasty is a crucial oral surgery procedure for reshaping jawbone contours to ensure functional, aesthetic, and comfortable outcomes prior to denture fabrication.

Keywords: Radicular cyst, Enucleation, Histopathology

INTRODUCTION

Tooth loss is one of the most common oral health problems and may impair masticatory function, speech, esthetics, and overall quality of life. Following tooth extraction, physiological alveolar bone remodeling occurs and is accompanied by progressive bone resorption, particularly in the mandible. These alterations in alveolar ridge morphology may result in bony prominences, bone spicules, exostoses, or a *knife-edge ridge*, which compromise the retention, stability, and comfort of removable dentures. If left uncorrected before prosthesis fabrication, these conditions represent one of the leading causes of prosthodontic rehabilitation failure (Badr et al., 2025; Terheyden, 2023).

Pre-prosthetic surgery comprises a series of surgical procedures designed to prepare both hard and soft oral tissues to provide optimal biological and mechanical support for prosthodontic rehabilitation. One of the most commonly performed procedures is alveoloplasty, which involves reshaping the alveolar bone by eliminating sharp bony prominences and irregular ridge contours while preserving as much alveolar bone as possible. The primary objective of alveoloplasty is to create a smooth, stable, and physiologically contoured alveolar ridge that enhances denture retention, stability, and patient comfort while minimizing mucosal trauma caused by prosthetic loading (Badr et al., 2025; Terheyden, 2023).

Contemporary concepts in pre-prosthetic surgery have shifted from simply removing bony irregularities to emphasizing the preservation of alveolar bone volume in order to support long-term prosthodontic rehabilitation and maintain future treatment options, including dental implant placement. Consequently, alveoloplasty should be performed using a conservative approach that considers the anatomy of the alveolar ridge, vestibular depth, mucoperiosteal thickness, and the patient's prosthodontic requirements. In addition to conventional techniques employing bone rongeurs, bone files, and rotary burs, recent advances in digital technology, including the use of three-dimensional (3D)-printed surgical guides, have been introduced to improve the precision of alveolar bone reduction in selected cases (Badr et al., 2025; Terheyden, 2023).

In patients with good general health, alveoloplasty can generally be performed under local anesthesia using an inferior alveolar nerve block combined with local infiltration anesthesia. This approach provides adequate pain control while reducing the risks associated with general anesthesia, facilitating faster postoperative recovery, and improving cost-effectiveness. The success of the procedure largely depends on meticulous preoperative planning, atraumatic surgical technique, adequate irrigation during bone reduction, and proper wound closure to promote optimal healing before denture fabrication (Badr et al., 2025; Terheyden, 2023).

This case report aims to describe the management of mandibular alveoloplasty as a pre-prosthetic surgical procedure performed under local anesthesia in a patient with post-extraction alveolar exostosis and to present the clinical outcomes achieved in preparation for subsequent prosthodontic rehabilitation.

RESEARCH METHODS

This study was designed as a descriptive case report involving a single patient who underwent pre-prosthetic alveoloplasty under local anesthesia at Rumah Sakit Gigi Soelastri. The case report was prepared following the CARE (CAse REport) guidelines to ensure systematic and comprehensive reporting of clinical findings, treatment procedures, and outcomes.

A 52-year-old male patient presenting with a mandibular alveolar exostosis following extraction of teeth 34 and 35 was included in this report. The patient sought prosthodontic rehabilitation but was unable to proceed due to the presence of a sharp bony prominence on the left posterior mandibular alveolar ridge. Written informed consent was obtained from the patient prior to treatment and publication of the clinical data and photographs. Ethical principles of patient confidentiality and anonymity were maintained throughout the preparation of this report.

Clinical evaluation consisted of comprehensive history taking, extraoral and intraoral examinations, palpation of the alveolar ridge, and radiographic assessment using panoramic radiography to determine the extent of the bony prominence and to exclude other pathological lesions. Routine preoperative laboratory investigations, including complete blood count, random blood glucose, immunoserology, and coagulation profile, were performed to assess the patient's suitability for minor oral surgery under local anesthesia.

The surgical procedure was performed under local anesthesia using an inferior alveolar nerve block combined with buccal and lingual infiltration of 2% lidocaine containing epinephrine. Following aseptic preparation, a trapezoidal mucoperiosteal flap was carefully elevated to expose the alveolar bone. Alveolar recontouring was carried out conservatively using a combination of bone rongeur, rotary bur, and bone file to eliminate sharp bony projections while preserving as much alveolar bone as possible. Continuous saline irrigation was used during bone reduction to prevent thermal injury. The surgical site was inspected by palpation to ensure a smooth and physiologic alveolar ridge before flap repositioning and closure with interrupted silk sutures.

Postoperative management included prescription of amoxicillin 500 mg, diclofenac sodium 50 mg, and oxygenating oral gel, accompanied by instructions regarding oral hygiene maintenance, avoidance of mechanical trauma to the surgical site, and dietary modification. Clinical follow-up was conducted seven days after surgery for wound evaluation and suture removal, followed by a one-month postoperative assessment to evaluate soft tissue healing, alveolar ridge contour, and readiness for prosthodontic rehabilitation. Outcome assessment was based on clinical examination and panoramic radiographic findings, focusing on wound healing, absence of postoperative complications, and achievement of a smooth, stable, and physiologic alveolar ridge suitable for denture fabrication.

RESULTS AND DISCUSSION

Case

A 52-year-old male patient presented to Soelastri Dental Hospital with the chief complaint of requiring a mandibular removable denture. The patient reported having undergone extraction of teeth 34 and 35 approximately two months prior to presentation. Although the extraction sites had healed uneventfully, he noticed a hard bony prominence on the left mandibular gingiva that caused discomfort, particularly upon pressure. This condition interfered with prosthodontic rehabilitation, as the patient was unable to undergo impression making for denture fabrication.

The patient's medical history was unremarkable, with no history of systemic diseases such as hypertension, diabetes mellitus, cardiovascular disease, or bleeding disorders. He also denied any history of drug, food, or environmental allergies. There was no history of previous hospitalization or surgical procedures other than the tooth extractions performed two months earlier. No similar condition was reported among family members. The patient reported daily tea consumption but denied smoking and alcohol use. Based on the medical history, the patient's general health was considered satisfactory, with no systemic contraindications to minor oral surgery under local anesthesia.

Intraoral examination revealed a localized bony prominence consistent with alveolar exostosis in the left posterior mandibular region corresponding to the previous extraction sites of teeth 34 and 35. The overlying mucosa appeared intact and pink, with no clinical signs of inflammation such as erythema, edema, ulceration, or purulent discharge. Palpation revealed a hard, irregular bony mass associated with tenderness on pressure. The alveolar ridge exhibited an uneven contour with sharp bony edges that were expected to compromise the retention, stability, and comfort of the planned removable denture if left untreated. No other significant abnormalities were observed in the surrounding soft tissues.

Figure 1. Clinical view showing a sharp bony prominence in the left posteriomandibular region.

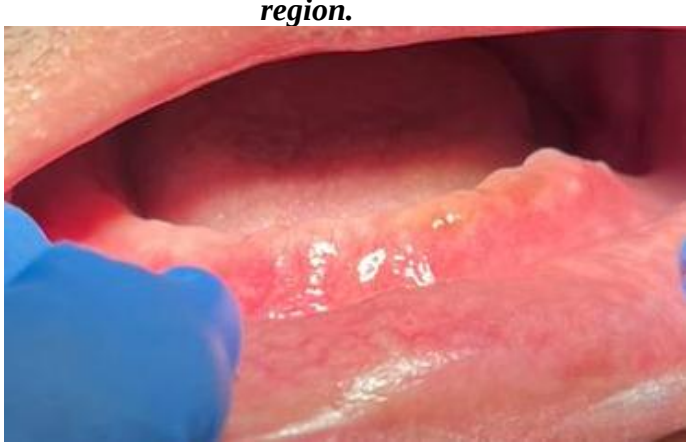

Figure 2. Clinical view of the alveolar exostosis.

Panoramic radiography was performed to evaluate the underlying alveolar bone. The radiograph demonstrated a localized bony prominence in the left posterior mandible, consistent with the clinical findings, without evidence of fracture, radiolucent lesions, or bone destruction suggestive of other pathological conditions.

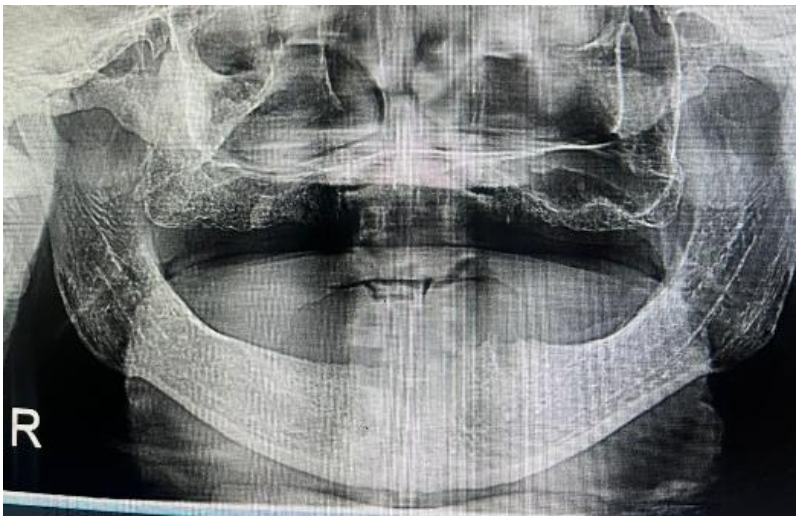

Figure 3. Preoperative panoramic radiograph.

Preoperative laboratory investigations, including a complete blood count, random blood glucose level, immunoserological examination, and coagulation profile, were all within normal limits, confirming the patient's suitability for alveoloplasty under local anesthesia. Based on the patient's history, clinical examination, and radiographic findings, a diagnosis of post-extraction alveolar exostosis of the left mandible associated with teeth 34 and 35 was established. Pre-prosthetic alveoloplasty was therefore indicated to optimize the alveolar ridge prior to removable denture rehabilitation.

Before surgery, the patient received a comprehensive explanation regarding the diagnosis, treatment objectives, surgical procedure, expected benefits, potential risks, possible complications, and postoperative instructions. Written informed consent was subsequently obtained. Standard aseptic and antiseptic protocols were performed before administration of local anesthesia.

Local anesthesia was achieved using a left inferior alveolar nerve block with 2% lidocaine containing epinephrine, followed by buccal and lingual infiltration around the surgical site to provide adequate soft tissue anesthesia. After confirming profound anesthesia, a trapezoidal mucosal incision was made over the alveolar ridge, followed by careful elevation of a full-thickness mucoperiosteal flap using a periosteal elevator to expose the underlying alveolar bone while minimizing soft tissue trauma. Flap elevation was kept as conservative as possible to preserve vestibular depth and facilitate future prosthodontic rehabilitation.

Following exposure of the alveolar bone, alveolar recontouring was performed using a combination of a bone rongeur, rotary bur, and bone file. Sharp bony prominences were gradually removed until a smooth, regular, and physiologically contoured alveolar ridge was achieved. Continuous saline irrigation was maintained throughout bone reduction to prevent thermal injury associated with rotary instrumentation and to remove bone debris. Once satisfactory bone contour had been obtained, the surgical field was thoroughly irrigated and inspected by palpation to ensure complete elimination of residual bone spicules and sharp bony edges. The mucoperiosteal flap was then repositioned to its original anatomical position and secured using interrupted silk sutures, achieving tension-free adaptation of the soft tissues.

Following surgery, the patient was prescribed amoxicillin 500 mg, diclofenac sodium 50 mg, and oxygenating oral gel. Postoperative instructions included maintaining proper oral hygiene, avoiding hot and spicy foods, preventing mechanical trauma to the surgical site, and returning for follow-up seven days after surgery.

At the one-week postoperative follow-up, the surgical wound demonstrated satisfactory healing without signs of infection or wound dehiscence, allowing uncomplicated suture removal. One month after surgery, clinical evaluation revealed a smooth, stable, and physiologically contoured alveolar ridge suitable for prosthodontic rehabilitation and removable denture fabrication. These findings indicate that pre-prosthetic alveoloplasty performed under local anesthesia provided favorable clinical outcomes and successfully established an optimal alveolar ridge foundation for subsequent prosthodontic treatment.

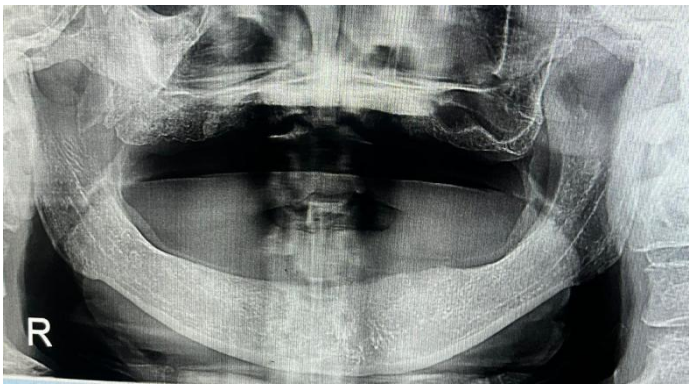

Figure 4. Panoramic radiograph obtained one month after alveoloplasty.

Figure 5. Clinical photograph of the alveolar ridge one month after alveoloplasty.

Discussion

Alveoloplasty is one of the most frequently performed pre-prosthetic surgical procedures for preparing the hard tissues of the oral cavity before rehabilitation with removable dentures or implant-supported prostheses. The primary objective of this procedure is not merely to eliminate bony prominences but to create a physiologically contoured alveolar ridge with a smooth surface free of undercuts and bone spicules, thereby providing optimal mechanical support for prosthesis retention, stability, and load distribution. Contemporary concepts of pre-prosthetic surgery also emphasize maximal preservation of both hard and soft tissues, as excessive alveolar bone removal may compromise the long-term prognosis of prosthodontic rehabilitation. In the present case, the patient developed post-extraction mandibular alveolar exostosis following the extraction of teeth 34 and 35, resulting in a sharp bony prominence that interfered with the fabrication of a complete removable denture. This condition represents one of the classic indications for alveoloplasty as described in current pre-prosthetic surgical guidelines. Terheyden (2023) stated that the principal objective of modern alveoloplasty is to achieve an optimal balance between creating an ideal ridge contour and preserving alveolar bone volume to ensure long-term prosthodontic function. This concept is further

supported by Hillerup (1994), who emphasized the importance of preserving supporting tissues during pre-prosthetic surgical procedures.

One of the most important considerations in alveoloplasty is the timing of the procedure. Alveoloplasty may be performed simultaneously with tooth extraction (*primary alveoloplasty*) or as a secondary procedure after soft tissue healing has occurred (*secondary alveoloplasty*). In the present case, alveoloplasty was performed approximately two months after tooth extraction and was therefore classified as secondary alveoloplasty. This approach was selected because the bony prominence became clinically evident only after physiological bone remodeling had occurred and subsequently interfered with prosthodontic rehabilitation. Although secondary alveoloplasty requires an additional surgical intervention, it allows a more accurate evaluation of the residual ridge morphology, enabling conservative bone reduction while preserving alveolar bone volume. Conversely, primary alveoloplasty is generally indicated when bone spicules or ridge irregularities are identified during tooth extraction and are expected to compromise future prosthetic treatment. A retrospective study by Lone et al. (2019) demonstrated that alveoloplasty performed concurrently with tooth extraction shortened the overall prosthodontic rehabilitation period by reducing the need for additional surgical procedures and facilitating earlier denture fabrication. Nevertheless, in cases where alveolar bone remodeling has not yet stabilized, secondary alveoloplasty remains a rational and effective treatment option when appropriate clinical indications are present (Ephros & Klein, 2020).

Changes in alveolar ridge morphology following tooth extraction are a physiological consequence of bone remodeling. After extraction, the bundle bone loses its periodontal ligament blood supply and undergoes resorption, followed by cortical and trabecular bone remodeling that results in horizontal and vertical dimensional changes of the alveolar ridge. In some patients, this remodeling process is uneven, leading to the formation of bone spicules, *knife-edge ridges*, or exostoses that may cause tenderness on palpation and chronic mucosal trauma during denture use. The mandible generally exhibits greater residual ridge resorption than the maxilla because of its denser cortical bone and the pattern of masticatory force distribution. In the present case, clinical examination revealed a hard bony prominence without signs of inflammation, accompanied by tenderness on palpation. Panoramic radiography demonstrated localized bony prominence without evidence of pathological bone destruction, consistent with post-extraction alveolar exostosis requiring surgical correction before prosthodontic rehabilitation. These findings are consistent with the preoperative assessment principles described in *Peterson's Principles of Oral and Maxillofacial Surgery* (Miloro et al., 2012), which recommend a comprehensive evaluation based on clinical inspection, palpation, and radiographic examination before alveolar ridge recontouring.

The choice of local anesthesia using an inferior alveolar nerve block combined with buccal and lingual infiltration was appropriate for the limited mandibular alveoloplasty performed in this case. The inferior alveolar nerve block provided profound anesthesia of the mandibular teeth and supporting bone on the operative side, whereas local infiltration ensured adequate anesthesia of the surrounding soft tissues, thereby improving patient comfort during flap elevation and bone reduction. Compared with general anesthesia, local anesthesia offers several advantages, including reduced systemic risk, shorter operative time, faster postoperative recovery, and greater cost-effectiveness without compromising clinical outcomes in cooperative patients. The patient had no systemic disease, coagulation disorders, or contraindications to local anesthesia, allowing the procedure to be safely performed on an outpatient basis. This approach is consistent with current principles of oral and maxillofacial surgery, which recommend local anesthesia as the preferred option for most minor pre-prosthetic surgical procedures.

The surgical technique employed in this case also reflected the principles of contemporary conservative alveoloplasty. Elevation of the mucoperiosteal flap was minimized to preserve periosteal vascularity and maintain vestibular depth. Bone reduction was performed gradually using a combination of a bone rongeur, rotary bur, and bone file until a smooth alveolar ridge contour was achieved while avoiding unnecessary removal of supporting bone. Continuous saline irrigation was

maintained throughout the procedure to prevent thermal injury associated with rotary instrumentation. Following bone recontouring, the entire ridge was carefully palpated to confirm the absence of residual bone spicules or sharp bony edges before flap repositioning and suturing. This conservative approach is essential because excessive bone reduction decreases the denture-bearing surface area, accelerates residual ridge resorption, and may compromise future prosthodontic rehabilitation. Consequently, the current philosophy of alveoloplasty has shifted from aggressive removal of all bony prominences toward minimal ridge recontouring with maximal preservation of alveolar bone (Ephros & Klein, 2020; Musmarihan et al., 2025).

The success of alveoloplasty depends not only on the surgical technique but also on the biological process of postoperative wound healing. Healing begins with blood clot formation, followed by inflammatory, proliferative, angiogenic, collagen deposition, and bone remodeling phases. Tension-free adaptation of the mucoperiosteal flap and adequate irrigation during surgery are critical for preserving periosteal blood supply and promoting soft tissue healing. In the present case, the one-week postoperative evaluation demonstrated satisfactory wound healing without infection or wound dehiscence, while the one-month follow-up revealed a smooth and stable alveolar ridge. These findings are consistent with the biological principles of wound healing following oral surgery, which indicate that atraumatic tissue handling, effective hemostasis, and complete elimination of bone spicules contribute to faster healing and reduce the risk of mucosal trauma during denture use (Emam, 2024; Pandey et al., 2022).

The favorable clinical outcomes observed in this case included uncomplicated wound healing one week after surgery and the formation of a smooth, physiologically contoured alveolar ridge one month postoperatively, providing an appropriate foundation for prosthodontic rehabilitation. These successful outcomes were likely influenced by several factors, including the patient's good systemic health, atraumatic surgical technique, adequate hemostasis, tension-free flap adaptation, and adherence to postoperative instructions. Optimal soft tissue healing is particularly important because the quality of the denture-bearing mucosa is a major determinant of denture retention, stability, and patient comfort. Furthermore, elimination of sharp bony prominences reduces the risk of prosthesis-induced mucosal ulceration and promotes a more favorable distribution of masticatory forces across the alveolar ridge. Therefore, the clinical findings in this case are consistent with previous reports demonstrating that pre-prosthetic alveoloplasty significantly improves the quality of the denture-bearing foundation and enhances patient comfort following prosthodontic rehabilitation (Pandey et al., 2022; Wei et al., 2025).

Recent advances in pre-prosthetic surgery have incorporated digital technologies to improve the precision of alveoloplasty. Badr et al. (2025) reported the use of three-dimensional (3D)-printed surgical guides designed from digital jaw scans to accurately determine the amount of alveolar bone reduction required before immediate denture placement. This digital approach enables clinicians to preserve as much alveolar bone as possible while achieving an ideal ridge contour according to the planned prosthodontic treatment. Although such technology was not required in the present case because the bony prominence was localized, the underlying principle of maximal bone preservation was successfully applied through conservative alveolar ridge recontouring. These findings suggest that although conventional alveoloplasty remains the standard technique in most clinical settings, adherence to evidence-based surgical principles and meticulous operative technique can still produce predictable and favorable clinical outcomes (Badr et al., 2025; Terheyden, 2023).

CONCLUSIONS

Alveoloplasty is an essential pre-prosthetic surgical procedure for preparing the alveolar ridge prior to prosthodontic rehabilitation with removable dentures. The procedure aims to reshape the alveolar bone to achieve a smooth, stable, and physiologically contoured ridge, thereby improving prosthesis retention, stability, and patient comfort. Successful alveoloplasty depends on an accurate diagnosis, comprehensive clinical and radiographic evaluation, the selection of a conservative surgical technique, and optimal preservation of both hard and soft tissues.

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