

Complete Denture Management In A Full Edentulous Patient With Mandibular Exostosis : Case Report

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Abstract

Full edentulism significantly impairs masticatory, phonetic, and esthetic functions, necessitating rehabilitation through Complete Dentures (CD). However, the functional success of a CD is often hindered by anatomical conditions such as exostosis, which can cause pressure pain and compromise the retention and stabilization of the prosthesis. This case report aims to describe the role of preprosthetic surgery, specifically alveoloplasty, in preparing an ideal supporting base for a CD. A 45-year-old female patient presented with total edentulism in both jaws for 3 years, with primary complaints of difficulty in chewing and speaking. Intraoral examination revealed a bony prominence (exostosis) in region 4, which could act as a pathological undercut. Management was performed through an alveoloplasty procedure using the envelope flap technique to reconstruct the alveolar contour to be smooth and atraumatic. Following tissue healing, a CD made of acrylic resin was fabricated to restore speech function and prevent further atrophy of the alveolar process. Preprosthetic surgical intervention proved to be crucial in achieving stability and functional comfort in the use of complete dentures.

Keywords: Radicular cyst, Enucleation, Histopathology.

INTRODUCTION

Chewing ability is an aspect of oral health that significantly impacts an individual's comfort. When someone has difficulty chewing due to tooth loss or jaw disorders, activities such as eating tend to be disrupted, ultimately impacting their diet and the risk of malnutrition. Therefore, maintaining chewing function is an important part of holistic health. This is significantly influenced by various factors, particularly tooth loss. With age, the risk of tooth loss in adulthood increases. This is usually caused by tooth extraction due to severe caries, loss of tooth support due to periodontal disease, a history of physical trauma, or complications from systemic diseases. Complete tooth loss (full edentulousness) not only causes masticatory disorders but also impacts speech function, facial aesthetics, and psychosocial well-being, such as reduced self-confidence and quality of life. Recent research shows that edentulous patients have a higher risk of declining nutritional quality and oral function compared to individuals with complete dentition (Sajjan et al., 2022; Emami et al., 2021). Furthermore, long-term tooth loss can accelerate alveolar bone resorption, complicating prosthodontic rehabilitation in elderly patients (Mendes et al., 2023; Khandelwal et al., 2022).

Complete dentures are prostheses that replace all missing natural teeth and supporting tissues to restore masticatory, phonetic, and aesthetic functions. The success of complete dentures depends heavily on the anatomical condition of the oral cavity, the quality of the supporting tissues, and the patient's neuromuscular adaptation. One clinical challenge frequently encountered in fully edentulous patients is the presence of mandibular exostosis, or prominence of the alveolar bone, which can interfere with the retention and stabilization of the denture. Exostosis can cause excessive pressure on the mucosa beneath the denture base, leading to pain, ulceration, and discomfort during chewing and speaking. This condition often makes it difficult for patients to adapt to the denture and reduces the success of prosthodontic treatment. Research by Alzarea et al. (2023) and Patil et al. (2021) stated that a suboptimal alveolar ridge is a major factor in the failure of retention and stabilization of complete dentures, especially in patients with severe ridge resorption and anatomical abnormalities such as exostosis. Furthermore, a sharp or prominent alveolar ridge also increases the risk of soft tissue trauma during denture use (Singh et al., 2024; Sharma & Rao, 2022).

Alveoloplasty is a preprosthetic surgical procedure that aims to improve the alveolar bone contour to create a more ideal denture base. This procedure is performed by reducing bony prominences, undercuts, and sharp bony areas to improve the denture base's adaptation to the supporting tissues. In patients with mandibular exostosis, alveoloplasty plays a crucial role in creating a smoother and more stable ridge surface, significantly improving denture retention and comfort. This technique is generally performed atraumatically using round burs, rongeurs, and bone files to preserve as much healthy alveolar tissue as possible. Recent research shows that preprosthetic surgery before complete denture fabrication can improve prosthesis stability, reduce soft tissue trauma, and accelerate patient adaptation to denture use (Kumar et al., 2024; Shahroom et al., 2022). Furthermore, alveoloplasty is also known to improve the distribution of occlusal forces on the supporting tissues, thereby increasing masticatory comfort in edentulous patients (Verma et al., 2023; Alhammadi et al., 2021).

The functional success of complete dentures is determined by factors such as retention, stabilization, and support from the supporting tissues. Retention holds the denture in place during gravitational forces and functional oral activities, while stabilization ensures that the denture does not shift during chewing, speaking, or swallowing. Denture bases, generally made of acrylic resin, remain the primary choice due to their relatively low cost, aesthetic resemblance to gingival tissue, light weight, and ease of laboratory manipulation. However, the success of acrylic resin is also greatly influenced by the quality of the supporting tissues and the accuracy of mucodynamic impressions to achieve an optimal border seal. Research by Bhat et al. (2021) and Jain et al. (2023) showed that good functional impressions and accurate jaw relation recording.

RESEARCH METHODS

This study used a case report design to describe the stages of prosthodontic treatment in a fully edentulous patient with alveoloplasty prior to complete denture (FMD). The subject was a 45-year-old woman who presented to the Faculty of Dentistry Clinic at Muhammadiyah University of Surakarta complaining of chewing and speech difficulties due to the loss of all upper and lower teeth for the previous three years. The examination included a history taking, intraoral clinical examination, and evaluation of the oral hard and soft tissues. The examination revealed a fully edentulous condition accompanied by a bony prominence in the lower right region, potentially interfering with denture retention and stabilization. Based on the Nallaswamy (2003) classification, the patient's alveolar ridge was classified as Class II with an inverted "U" shape and a flat ridge crest.

Treatment began with alveoloplasty in the bony prominence area using local anesthesia of 2% lignocaine hydrochloride with 1:200,000 adrenaline. The procedure involved creating an alveolar crest incision, opening a full-thickness flap, bone reduction using a carbide round bur, and bone alignment using a rongeur and bone file. After evaluating the ridge contour, the wound was closed using 3-0 silk sutures, and the patient was given antibiotics, analgesics, and oral hygiene education. After tissue healing was complete, functional impressions were taken using mucodynamic elastomeric materials to create working models and denture bases. Subsequent clinical steps included fabrication of the base plate, bite rim, recording the maxillo-mandibular relationship (MMR), try-in of the dental elements, and insertion of the upper and lower complete dentures. Evaluations included retention, stabilization, occlusion, phonetics, mastication, and aesthetics during the post-insertion follow-up period.

RESULTS AND DISCUSSION

Case

A 45-year-old middle-aged woman sought prosthodontic treatment at the Faculty of Dentistry Clinic at Muhammadiyah University of Surakarta due to discomfort when chewing and speaking due to missing teeth. This complaint had been present for the past three years, but the patient had never had dentures. Clinically, the patient was diagnosed as fully edentulous in the upper and lower jaws. Furthermore, a bony prominence was found in the lower right jaw (region 4), which required consideration in the treatment plan.

Management

Treatment was performed with the patient's consent. A complete examination was performed and information regarding the length of the visit and the materials used was provided.



Before alveoloplasty

A bony prominence was observed in the lower right region, which could contribute to poor denture retention and stabilization. Prior to surgery, the surgical area was medicated with chlorhexidine solution. A local anesthetic (2% lignocaine hydrochloride with Adrenaline 1:200,000) was then injected into the mucobuccal fold over the bony prominence.



Incision

Based on clinical findings, the procedure begins with an incision at the apex of the alveolar crest, followed by a release incision to open the full-thickness flap.



Bone contouring

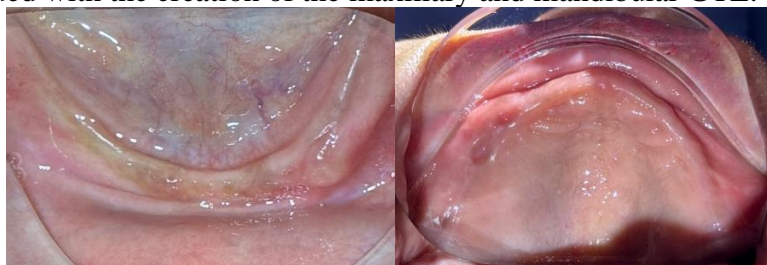
Bone reduction was performed using a 2mm carbide round bur under adequate irrigation. Next, the bone surface was smoothed using a rongeur and bone file.

After bone contouring, a final evaluation was performed using digital palpation to ensure the entire ridge surface was smooth and symmetrical before suturing.



Suturing

After controlling the bleeding, the wound was closed with sutures using 3-0 silk suture. The patient was then prescribed antibiotics and analgesics for 5 days, along with oral hygiene education. The sutures were removed on the 8th day. One-month follow-up showed optimal healing without complications. After the hard and soft tissue maturation process was complete, the procedure continued with the creation of the maxillary and mandibular GTL.



Intraoral photo

The intraoral examination revealed alveolar ridge resorption in the posterior regions of the upper and lower jaws. Based on the Nallaswamy classification (2003), the patient's alveolar ridge was Class II, characterized by an inverted "U" shape with a flat apex and low height. Meanwhile, the surrounding mucosal tissue and supporting structures were observed to be normal and healthy.

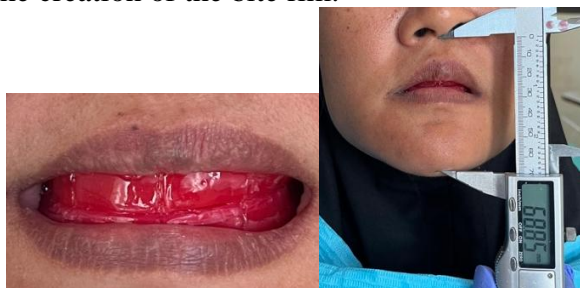


Working Model Printing



Print result (working model)

Functional impressions were made using a light-body elastomer material using a mucodynamic impression technique to achieve accurate tissue detail. The impressions were then processed in the laboratory to fabricate the denture base plate using acrylic resin. On the third visit, a try-in phase was conducted to evaluate the retention and stabilization of the maxillary and mandibular bases, followed by the creation of the bite rim.

**Try in base plate and bite rim of upper jaw and lower jaw**

The denture base insertion stage involves a thorough inspection of retention and stabilization. Retention is evaluated by instructing functional cheek and lip movements to ensure there is no dislodgement or detachment of the base from the alveolar ridge. Next, a stabilization check is performed to ensure the base remains in a constant position and does not shift when the oral cavity is activated for normal function.

**Perform alignment and recording of Maxillo-mandibular relationship (MMR)**

The next clinical stage is the Maxillo-Mandibular Relationship (MMR) assessment, which begins with determining the vertical dimension. Resting vertical dimension (DVR) is measured by equating the distance from the pupil to the corner of the mouth with the distance from the base of the nose to the chin. Furthermore, the Vertical Dimension of Occlusion (VOC) is determined by subtracting the DVR value from the free way space by 2-4 mm by reducing the occlusal surface of the mandibular bite ridge. Validation of the vertical dimension is performed through phonetic testing by pronouncing the letter "S" and evaluating the patient's swallowing movements until they feel comfortable and unimpeded.

Centric relation is recorded to position the condyloid process at its most posterior position within the glenoid fossa. This procedure is achieved by tilting the patient's head back or instructing them to perform repeated swallowing movements until a fixed position is found, which is then marked on the bite ridge. Simultaneously with this step, the median line aligned with the philtrum, the canine line at the corner of the mouth, and the smile line (laugh line) are determined. After fixation and implantation of the cast in the articulator, the selection of dental elements is determined based on harmony with the patient's facial shape, skin color, age, and gender to achieve optimal aesthetics.



MMR-based biterim fixation

The clinical phase continued with a try-in of the anterior dental elements in the upper and lower jaws. Evaluations were conducted on aesthetic and functional aspects, including the smile line, canine line, midline, and overjet and overbite adjustment. Additionally, phonetic testing was performed by instructing the patient to pronounce the letters "f" and "s" to ensure that the teeth position did not interfere with articulation. Once the anterior parameters were achieved, the procedure continued with the alignment of the posterior teeth.

At the next visit, a posterior tooth try-in was performed to evaluate the accuracy of occlusion, stability, and retention of the prosthesis. Further in-depth phonetic functional testing was conducted by asking the patient to pronounce the letters "S, D, O, M, R, A, T" to ensure clarity of speech without mechanical interference. After all components were assessed, the final stage of the clinical process was completed with gingival contouring before proceeding to the laboratory.



Try-in elements

At the next visit, the complete denture (GTL) was inserted into the patient's oral cavity, with a comprehensive evaluation of retention, occlusion, and stabilization. Retention was assessed through functional lip and cheek movements, as well as oral activities such as opening, closing, chewing, and speaking, to ensure the denture remained secure. Occlusion was examined using articulating paper to detect trauma or occlusal disturbances. If irregularities were found, selective grinding or adjustments were performed to achieve harmonious occlusion. Stabilization was ensured by observing the performance of the denture during mastication, swallowing, and facial expressions to ensure there was no shifting. Once all functional parameters were deemed optimal, the denture was final polished.

As a final step, patients are given detailed instructions on denture adaptation and care. They are advised to remove the dentures while sleeping and soak them in clean water to maintain soft tissue health, and to regularly clean the dentures after meals. Patients are also advised to seek immediate medical attention if they experience pain or difficulty speaking or chewing during the adaptation period.



Before and after insertion photos

One week after insertion, the patient returned for a follow-up visit. Based on subjective examination, the patient reported no pain or functional impairment while wearing the denture. Objectively, the clinical examination revealed healthy oral mucosa, palate, lingual, and gingival tissues with no signs of inflammation or irritation. Evaluation of the denture revealed excellent retention, stabilization, and positioning of the denture relative to the supporting tissues. Furthermore, occlusion and masticatory function were observed to be harmonious, along with satisfactory phonation (pronunciation of the letters r, d, t, s, b, p, m) and aesthetics. The patient was also able to maintain good hygiene of the denture during the initial adaptation period.

Discussion

In this case, a 45-year-old female patient presented to the Dental and Oral Hospital Clinic (RSGM) FKG UMS complaining of complete tooth loss in both upper and lower jaws. The prognosis for complete dentures (GTL) in this patient was considered good, considering her age, which was still in the early/middle adulthood category, her good general health, and her cooperative attitude and high motivation to restore chewing function and aesthetics. This is in line with research by Mendes et al. (2023), which stated that the success of prosthodontic rehabilitation in fully edentulous patients is influenced not only by the anatomical condition of the oral cavity, but also by the patient's systemic condition, motivation, and ability to adapt to the use of prostheses. Emami et al. (2021) also explained that complete denture rehabilitation can improve the quality of life of edentulous patients by improving masticatory function, phonetics, and facial aesthetics. Although the prognosis is generally good, clinical challenges were identified on objective examination in the form of a bony prominence or exostosis in region 4. The presence of this exostosis can create an undercut that interferes with denture fitting and carries the risk of pain due to pressure from the denture base (Wulandary, 2025). Therefore, preprosthetic surgery in the form of alveoloplasty is necessary. Alveoloplasty aims to reconstruct and refine the contour of the alveolar ridge to obtain an ideal support base, thus achieving maximum denture retention and stabilization (Musmarihan, 2025). These findings align with research by Alhammadi et al. (2021), which found that the alveoloplasty procedure is effective in correcting suboptimal alveolar ridge contours before complete denture fabrication. Furthermore, Kumar et al. (2024) reported that preprosthetic surgery can improve patient comfort and improve the adaptation of the denture base to the supporting tissues, especially in patients with exostosis or sharp ridges. Retention and stabilization are two interrelated factors that significantly determine the success of GTL (Rahajoe, 2021). Retention is influenced by physical factors, such as the contact area between the mucosa and the denture base, as well as muscular factors involving the coordination of the cheek, lip, and tongue muscles (Lubis, 2020). In this case, alveoloplasty in region 4 ensures intimate contact between the denture base and the supporting tissues without anatomical obstructions, thus creating an accurate border seal. Research by Patil et al. (2021) explains that the quality of the denture-bearing area is directly related to the success of retention and stabilization of complete dentures. A smooth, undercut-free alveolar ridge allows for better pressure distribution, resulting in greater stability of the denture during mastication and phonation. Alzarea et al. (2023) also stated that good retention provides a sense of security and increases patient confidence when using complete dentures in daily activities.

Meanwhile, stabilization relates to the ability of the denture to remain in place during function (mastication and phonetics). Factors that significantly influence stability are the height of the residual ridge and the adaptation of the base to the basal tissue (Koesmanginasti, 2014). Performing alveoloplasty to flatten the ridge crest can improve prosthesis stability because the chewing load can be distributed more evenly across the smooth, pressure-free bone surface. This is supported by research by Verma et al. (2023), which showed that alveoloplasty can improve masticatory efficiency and prosthesis comfort by reducing excessive pressure on sharp bony areas. Singh et al. (2024) also stated that eliminating pressure points through preprosthetic surgery is important to prevent mucosal trauma, ulceration, and prosthesis instability during long-term use.

The challenges encountered in this case lay in post-surgical management and the impression stage. The patient, who had been edentulous for three years, experienced changes in facial muscle

tone, necessitating a precise mucodynamic impression technique using a light-body elastomer material. This aimed to accurately capture functional anatomical details despite changes in the mucobuccal fold. Furthermore, careful alignment of the teeth in these patients must be performed within the neutral zone to ensure balanced occlusion, preventing trauma to the supporting tissues and slowing the process of alveolar bone atrophy. With the appropriate combination of preprosthetic surgery and prosthodontic procedures, optimal rehabilitation of the patient's masticatory function, speech, and aesthetics can be achieved. Bhat et al. (2021) explain that the impression technique.

CONCLUSION

Oral rehabilitation in this case was performed using complete dentures made of acrylic resin, which has been proven to significantly restore the patient's masticatory, phonetic, and aesthetic functions. The treatment results showed optimal success, characterized by patient comfort, good retention and stabilization of the prosthesis, and the harmonious return of stomatognathic function. Alveoloplasty, as a preprosthetic surgical procedure, plays a crucial role in improving the contour of the alveolar ridge, thus creating an ideal supporting base for the complete denture. The overall success of this procedure is largely determined by the accuracy of each clinical stage, starting from preprosthetic surgery, functional impressions, recording the maxillo-mandibular relationship (MMR), and the insertion of the prosthesis. Furthermore, synergistic collaboration between the dentist, patient cooperation, and the precision of the dental laboratory technician are crucial factors in achieving optimal oral rehabilitation results. With proper management, the use of conventional complete dentures remains an effective rehabilitation option for fully edentulous patients with mandibular exostosis.

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