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Enhanced Stability and Functionality with Basal Implants in Complex Edentulous Patients: A Case Report

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Abstract

Restoring lost teeth in patients with severe bone loss can be difficult with conventional implants, often requiring bone grafts or other complex procedures. Basal implants offer a promising solution as they anchor into the strong basal bone, allowing for immediate loading and quicker rehabilitation. This case report describes the successful treatment of a 42-year-old female with significant bone loss and multiple missing teeth restored using basal implants. The implants were placed without the need for bone grafting, and prosthetic crowns were delivered within 72 hours, restoring function and esthetics. Over a one-year follow-up, the implants remained stable with no complications, and the patient reported high satisfaction. This report highlights the effectiveness of basal implants as a minimally invasive and reliable option for complex cases with atrophic jaws.

Keywords: Basal implants, edentulous rehabilitation, immediate loading, atrophic jaw, implant stability, case report

INTRODUCTION

Restoring the edentulous maxilla or mandible with dental implants has evolved into a routine, predictable procedure. However, successful implant placement depends critically on the availability of sufficient bone structure, with the ideal criteria being at least 13-15mm in length and 5-7mm in width of the alveolar bone. When these dimensions are insufficient due to bone loss, treatment planning becomes more complex, and restoring lost alveolar dimensions becomes essential for achieving predictable treatment outcomes [(1)].

In cases of significant bone resorption, conventional implant placement may not be feasible without extensive surgical interventions such as inlay or onlay bone grafts, nerve repositioning, sinus lifts, or even nasal lifts. While these procedures are often effective, they come with specific indications, contraindications, and added patient risks [(2)]. To circumvent these challenges, alternative implant designs, such as Mini Dental Implants (MDIs) and Basal Implants, have emerged as viable solutions for patients with atrophic jaws [(3)].

Basal implants, also known as lateral or disk implants, represent a significant advancement in implantology. These implants engage the basal cortical bone, an area resistant to infection and resorption, providing a stable foundation for implant retention. Unlike conventional implants that rely on the alveolar bone, which tends to resorb following tooth extraction, basal implants utilize the stress-bearing cortical bone, which maintains its structural integrity throughout life [(4)].

The cortical bone, due to its superior load-bearing capacity, offers exceptional support for these implants. As a result, basal implants can be placed in areas where conventional implants would typically be unsuitable. Furthermore, basal implants allow for immediate loading of teeth, enhancing the treatment's efficiency. This principle mirrors orthopedic practices, where joint replacements, such as hip or knee implants, are used immediately after surgery. As a result, basal implants are sometimes referred to as “orthopedic implants” in the field of dental implantology, reflecting their robust foundation and ability to immediately restore function [(5)].

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This case report presents the successful rehabilitation of an edentulous patient using basal implants, demonstrating their effectiveness in enhancing stability and functionality in complex clinical scenarios.

Patient Information

A 42-year-old female patient presented to the department with the primary complaint of mobility in her upper front tooth (tooth #11) for the past one year. The patient reported that the mobility had progressively worsened over time, affecting her ability to eat and speak comfortably. She mentioned undergoing an extraction of the affected tooth approximately one year ago, followed by the placement of a removable partial denture (RPD) provided by a non-professional, which did not offer adequate retention or stability.

The patient has no significant medical history, and her general health is unremarkable. She follows a regular oral hygiene routine, brushing her teeth twice daily with a toothbrush and toothpaste, using both vertical and horizontal strokes. The patient's diet is mixed, with no specific preference for particular food groups. There is no relevant family history of systemic or dental conditions.

In terms of her past dental history, the patient had a previous tooth extraction and received a suboptimal RPD from an unqualified practitioner. However, no additional significant dental treatments or interventions have been noted.

Clinical Findings

Upon extra-oral examination, the patient's face appeared symmetrical, with no visible asymmetries or deformities. The lips were competent and showed no signs of abnormalities. The temporomandibular joints (TMJ) were assessed, and there were no indications of pain, deviation, or clicking sounds, suggesting normal TMJ function. Palpation of the lymph nodes revealed no tenderness or palpable abnormalities, and the patient showed no signs of systemic infection or inflammation.

Intra-orally, the patient's gingiva was characterized by a generalized bluish-red colour with melanin pigmentation, particularly in the maxillary anterior region. The gingival contour was scalloped, with blunt interdental papillae noted around tooth #11. The consistency of the gingiva was soft and edematous, especially in the region of tooth #11, which exhibited increased inflammation (Figure 1). The surface texture of the gingiva lacked stippling, and the gingival biotype was thick, indicating a tendency for greater resistance to trauma. The frenulum in both the maxillary and mandibular regions was mucosal. A generalized bleeding on probing (BOP) was observed, particularly in the anterior maxillary region, further suggesting active periodontal inflammation. The patient's oral hygiene was fair, as reflected in the Simplified Oral Hygiene Index (OHI-S), and probing depths of 10 mm were recorded in relation to tooth #11, indicating significant periodontal destruction.

Regarding the examination of the hard tissues, the patient had 26 teeth in total. Missing teeth were noted at positions 21, 31, 41, 35, 36, and 46, with grade I mobility observed in teeth #12 and #22. In contrast, tooth #11 showed grade III mobility, which was indicative of advanced periodontal involvement and compromised tooth stability. No signs of dental trauma were noted during the hard tissue examination. The lower anterior teeth exhibited signs of attrition, and the proximal contacts were tight. The patient's occlusion was classified as Angle's Class I on both sides, with an anterior open bite, indicating malocclusion in the anterior region. No trauma from occlusion was observed.

Overall, the patient demonstrated signs of generalized chronic periodontitis, with advanced periodontal involvement in the maxillary anterior region, particularly around tooth #11. The clinical findings included significant mobility, deep probing depths, and generalized BOP, indicating an active state of periodontal disease.

Figure 1: Pre-operative clinical and Radiographic image

Diagnostic Assessment

The diagnostic workup for this patient included a combination of clinical examination, hematological tests, and radiographic imaging. A thorough physical examination (PE) was performed, revealing generalized periodontal inflammation with deep probing depths, particularly in relation to tooth #11. Routine hematological investigations were conducted to assess the patient's systemic health status, and all blood parameters were found to be within normal limits, indicating the absence of any underlying systemic conditions that might contraindicate implant therapy or surgical intervention.

Radiographic evaluation played a crucial role in the diagnostic process. An initial intraoral periapical radiograph revealed severe bone loss in the maxillary anterior region, particularly around tooth #11. To gain a comprehensive understanding of the alveolar bone status and plan for implant placement, a Cone Beam Computed Tomography (CBCT) scan was performed. The CBCT imaging provided detailed three-dimensional views of the maxillary and mandibular arches, confirming significant horizontal and vertical bone resorption in the anterior maxilla. However, it also revealed the presence of adequate basal bone in the posterior and lateral regions, making the patient a suitable candidate for basal implant placement.

There were minimal diagnostic challenges in this case, as the clinical findings and imaging results clearly indicated advanced periodontal destruction leading to tooth mobility and bone loss. However, careful assessment was required to differentiate between treatable periodontitis and cases requiring full extraction and rehabilitation with implants. Other possible diagnoses such as aggressive periodontitis or localized periodontitis were considered but ruled out based on the generalized involvement and patient history.

The final diagnosis was established as generalized chronic periodontitis with severe alveolar bone loss in the maxillary anterior region, rendering certain teeth non-salvageable and necessitating extraction followed by implant-supported rehabilitation. The CBCT findings and the availability of healthy basal bone provided a favourable prognosis for successful treatment using basal implantology, allowing for immediate loading and restoration of function (Figure 2).

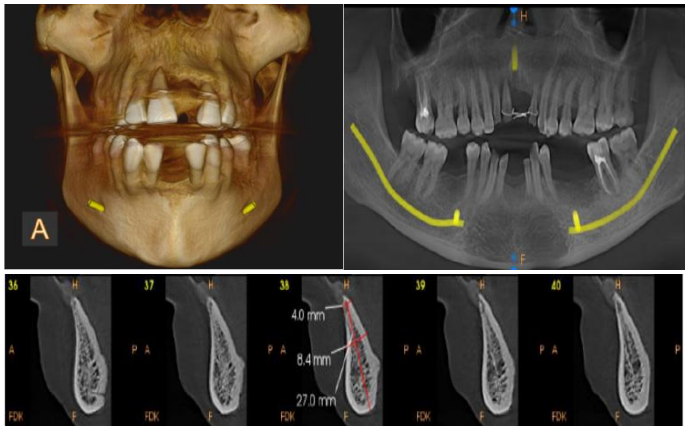

Figure 2: CBCT Findings

Therapeutic Intervention

The treatment plan for this patient involved a surgical and prosthetic intervention aimed at restoring esthetics and function through basal implant-supported rehabilitation. Under local anesthesia administered via infiltration technique, extraction of the maxillary central incisor (#11) and lateral incisor (#22) was performed. The procedure was carried out using a minimally invasive, flapless technique to reduce post-operative morbidity and preserve soft tissue architecture.

Following extractions, implant placement was initiated. A single pilot osteotomy was created using a "Pathfinder Drill" to guide the precise positioning of the implants. Post-operative radiographs were obtained to confirm the correct angulation and depth of the osteotomies. A total of three basal implants measuring 3.5 mm in diameter and 17 mm in length were placed in the maxillary anterior region, specifically at sites corresponding to teeth #11, #21, and #22. Additionally, two implants measuring 2.7 mm in diameter and 20 mm in length were inserted in the mandibular anterior region, at sites corresponding to teeth #31 and #41(Figure 3&4).

Impressions of both the upper and lower arches were taken shortly after implant placement to facilitate the fabrication of the final prosthesis. In line with the principles of basal implantology, which allows for immediate functional loading, prosthetic crowns were fabricated and inserted within 72 hours of the surgical procedure. This early loading protocol was chosen to quickly restore esthetics and masticatory function, enhancing patient satisfaction and minimizing the treatment timeline.

No modifications in the therapeutic approach were required during the course of treatment, as the primary stability of the implants was satisfactory, and the healing progressed without complications. The patient was prescribed standard post-operative medications, including analgesics and antibiotics, to prevent infection and manage discomfort, although specific dosages and duration were adjusted based on clinical judgment and patient response.

Figure 3: Drilling for Implant placement

Figure 4: Placement of implant clinical and radiographic images

Follow-up and Outcomes

The patient was followed up regularly at intervals of one week, one month, three months, six months, and one year post-operatively to monitor healing, implant stability, and prosthetic function. Both clinician- and patient-assessed outcomes were recorded during these visits.

Clinically, the implants demonstrated excellent primary and secondary stability throughout the follow-up period. There were no signs of implant mobility, peri-implant inflammation, or infection at any follow-up visit. Radiographic evaluations, including periapical radiographs and a CBCT scan at three months, confirmed the maintenance of crestal bone levels and appropriate osseointegration around the implants. At the one-year follow-up, radiographs showed stable bone levels with no evidence of peri-implant bone loss, further confirming the long-term success of the implants.

From the patient's perspective, the treatment outcome was highly satisfactory. She reported sustained improvement in chewing efficiency, speech clarity, and esthetics, which contributed to her increased confidence and overall quality of life. The immediate loading of the prosthesis was well tolerated, and she adapted quickly to the fixed crowns without complications.

Adherence to post-operative care instructions was excellent. The patient maintained regular follow-up visits and followed the recommended oral hygiene practices, as evidenced by consistently fair oral hygiene scores and the absence of peri-implant disease. Tolerability of the intervention remained high, with no reports of discomfort or complications beyond the initial post-operative period. Standard post-operative medications were well tolerated, and no adverse drug reactions or systemic issues were noted.

Importantly, no adverse or unanticipated events occurred during the entire one-year follow-up period. Healing progressed uneventfully, and the prosthetic rehabilitation remained stable, functional, and esthetically pleasing at the one-year mark, indicating a successful long-term therapeutic outcome (Figure 5).

Figure 5: Post-operative clinical and Radiographic images (one year follow up)

DISCUSSION

The rehabilitation of patients with severe ridge resorption using implant-supported prostheses remains a significant challenge in dental practice. In this case, the use of basal implants provided a successful and minimally invasive solution for restoring esthetics and function in a patient with multiple missing teeth and significant periodontal compromise. One of the strengths of this approach was the avoidance of complex bone grafting procedures, which are often associated with increased morbidity, cost, and extended treatment time. Additionally, immediate loading was feasible, leading to faster functional and psychological rehabilitation for the patient. The major limitation, however, is that while short-term outcomes are promising, the long-term success and survival rates of basal implants still require further robust clinical evidence [6].

The rationale behind using basal implants is well supported by the unique characteristics of basal bone, which is denser, less prone to resorption, and offers superior load-bearing capacity compared to the alveolar or crestal bone. Literature indicates that the basal bone's corticated structure allows for stable anchorage (primary stability), making it ideal for immediate loading protocols. Furthermore, studies have shown that basal implants can effectively rehabilitate cases where conventional implants would necessitate extensive augmentation, thereby reducing patient morbidity and treatment cost.

An important factor contributing to the success of basal implants is the achievement of adequate secondary stability, which complements the high initial mechanical stability obtained from engaging the dense basal bone. Secondary stability results from biological integration and bone remodelling at the implant-bone interface over time. Although basal implants rely primarily on cortical engagement for immediate function, long-term success is enhanced by the bone's adaptive remodelling under functional load, reinforcing the stability and integration of the implant [7].

Our approach aligns with findings from *Zitzmann and Marinello, Gurgel* et al [8], and Annibali et al [9], all of whom reported significant improvements in patient satisfaction post-implant therapy. Patients experienced better comfort, esthetics, mastication, speech, and general satisfaction, validating the functional and psychosocial benefits of implant-based rehabilitation. This case also reinforces the concept of "osseoadaptation" in basal implantology, where bone remodels dynamically under continuous functional load, differing from the static osseointegration seen in conventional implants.

The primary take-away from this case is that basal implant-supported prostheses offer a viable and efficient treatment option for patients with severe ridge atrophy, providing immediate functional restoration without the need for grafting. While promising in terms of patient satisfaction, comfort, and treatment efficiency, continued long-term studies are necessary to fully establish their comparative success and reliability.

Patient Perspective

The patient expressed great satisfaction with the overall treatment experience. She was particularly pleased with the improvement in the appearance of her smile and reported feeling more confident in social situations. She also noted that her ability to chew food had improved significantly, making daily eating more comfortable. The patient appreciated the fact that the treatment was completed quickly, with minimal discomfort, and without the need for complicated surgical procedures like bone grafting. At her one-year follow-up, she continued to report satisfaction with both the function and esthetics of the implants, with no complaints of pain or discomfort.

Informed Consent

Written informed consent was obtained from the patient for the treatment and for the publication of this case report, including the use of clinical photographs and radiographs. The patient was informed about the nature of the procedure, possible risks, benefits, and alternative treatment options, and she agreed to proceed with the basal implant treatment plan.

CONCLUSION

Basal implants proved to be a reliable and minimally invasive solution for rehabilitating severe bone loss without the need for bone grafting. Immediate loading enabled rapid functional and esthetic restoration, with stable outcomes and high patient satisfaction observed over one year.

Conflicts of Interest

The author reports no conflicts of interest.

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