Review Article

Basal Implant Rehabilitation of Anterior Maxillary Ridge Defect Following Trauma: A Case Report

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Abstract:

Restoring aesthetics is a key priority in dental rehabilitation, particularly when managing trauma to the anterior maxilla. Teeth in this region are frequently lost due to avulsion or must be removed because of severe fractures. Reconstructing such cases is complex due to cosmetic expectations and anatomical challenges. Conventional dental implants often require sufficient bone support, and in cases of deficient bone, additional surgical interventions like grafting or sinus augmentation may be necessary. However, these procedures are not always practical. Basal implants provide an alternative, engaging the dense basal bone for stability, allowing immediate placement of prostheses, and minimizing the need for augmentation procedures. This case report highlights the use of a single-piece basal implant to rehabilitate an anterior maxillary ridge defect following trauma, achieving rapid functional and esthetic restoration.

Keywords: Basal implant, Anterior maxilla, Trauma, Immediate loading, Ridge defect, Oral rehabilitation

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INTRODUCTION:

The anterior maxilla plays a critical role in both function and appearance. Trauma in this region not only impairs oral function but also has a profound psychosocial impact, influencing self-confidence and social interactions [1]. The loss of anterior teeth at a young age particularly affects speech articulation, smile dynamics, and social acceptability. The visibility of this region during communication and expression makes its rehabilitation one of the most demanding areas in dentistry.

Trauma is a leading cause of tooth loss in the anterior maxilla, with avulsion, root fractures, and alveolar bone fractures being common sequelae [2]. Children and young adults are especially vulnerable due to road traffic accidents, sports injuries, and falls. Early

loss of anterior teeth also disturbs alveolar bone development, often leading to long-term ridge defects [3]. In addition, psychosocial studies have shown that missing anterior teeth are strongly correlated with negative self-perception, social withdrawal, and reduced employability [4].

Over the past few decades, dental implants have revolutionized tooth replacement, offering superior long-term outcomes compared to removable or fixed partial dentures [5]. Osseointegrated implants, as popularized by Brånemark, are regarded as the gold standard for tooth replacement due to their high survival rates and ability to preserve adjacent tooth structure [6]. However, their success largely depends on the quantity and quality of alveolar bone available for implant placement [7]. In trauma cases where bone loss is common, conventional implants often necessitate ridge augmentation, sinus lift, or guided bone regeneration to create adequate bone volume [8].

While effective, these adjunctive procedures present several drawbacks. They are invasive, increase treatment cost and duration, and may cause donor site morbidity when autogenous grafts are used [9]. Moreover, they are contraindicated in patients with systemic conditions such as diabetes, smoking, or poor compliance [10].

Basal implantology offers a distinct advantage in cases where conventional implants are limited by ridge deficiency or the need for augmentation. Unlike traditional systems that rely on crestal alveolar bone, basal implants engage the dense cortical basal bone, which remains relatively unaffected by trauma, resorption, or infection [11]. This provides excellent primary stability even in severely atrophic ridges [12]. Furthermore, their single-piece design with polished surfaces reduces the risk of peri-implantitis and facilitates immediate prosthetic loading, thereby shortening treatment duration and enhancing patient comfort [13].

This paper presents the case of a young male rehabilitated with a basal implant in the anterior maxilla following trauma, highlighting its advantages in immediate esthetic and functional recovery.

CASE PRESENTATION:

A 19-year-old male reported to the Department of Oral and Maxillofacial Surgery with the chief complaint of a missing upper front tooth. The patient had sustained a road traffic accident (RTA) two years earlier, which led to the loss of teeth 11 and 12. He expressed dissatisfaction with his appearance and sought a fixed replacement that could be delivered immediately.

HISTORY:

The patient's medical history was non-contributory, with no significant systemic illness, and he reported being a non-smoker and non-alcoholic. Dental history revealed extraction of the traumatized upper central and lateral incisors at a private clinic following an accident, with no attempt made for prosthetic replacement thereafter. Psychosocially, the patient expressed reduced self-confidence, avoidance of smiling, and difficulty in social interactions, primarily due to the absence of anterior teeth

CLINICAL EXAMINATION:

On extraoral examination, no facial asymmetry was observed, and the patient exhibited normal lip competency. Intraorally, edentulism was noted in relation to 11 and 12, associated with a horizontal ridge defect. The adjacent teeth, 21 and 13, were intact and demonstrated a healthy periodontium, although the edentulous ridge contour appeared deficient in buccolingual width. Soft tissue examination revealed an adequate band of keratinized gingiva with no signs of active pathology.

RADIOGRAPHIC FINDINGS:

Cone-beam computed tomography (CBCT) examination revealed a residual cystic lesion in the region of 11 and 12. The buccolingual ridge width measured approximately 2 mm, which was inadequate for conventional implant placement. However, the palatal cortical bone was found to be intact, providing a suitable site for bicortical engagement.

TREATMENT PLANNING:

Various treatment options were considered for rehabilitation. The first option was placement of a

conventional implant following ridge augmentation with an autogenous chin graft; however, this was declined due to the longer treatment duration and the patient's preference for an immediate esthetic solution. The second option, a fixed partial denture, was also refused by the patient as it required preparation of the adjacent natural teeth. Consequently, the third option, placement of a basal implant with immediate loading, was selected. This approach was deemed most suitable considering the buccolingual ridge deficiency, its minimally invasive nature, and the advantage of providing an immediate prosthetic outcome.

SURGICAL PROCEDURE:

Under local anesthesia (2% lignocaine with adrenaline 1:80,000), "Following flap elevation, the residual cystic lining was carefully enucleated in toto to ensure complete removal and minimize recurrence risk.

Fig 1: Flap elevation followed by cyst enucleation

The defect was thoroughly debrided, and primary stability of the implant site was confirmed. Subsequently, endosseous implants were placed within the same surgical session, taking advantage of the prepared site and reducing the need for a second intervention. This approach not only shortened the overall treatment duration but also facilitated early functional rehabilitation for the patient. Sequential osteotomy preparation was carried out with careful engagement of both the palatal and nasal cortical plates. A single-piece bicortical screw basal implant measuring 2.7 × 13 mm was placed in relation to 11, achieving satisfactory primary stability. Intraoperatively, the implant angulation was adjusted to facilitate proper prosthetic alignment.

Fig 2: Placement of implants followed by resorbable suture placement

In the prosthetic phase, an impression was recorded immediately following implant placement using addition silicone material to ensure accuracy and dimensional stability. A definitive metal-ceramic crown was fabricated within 72 hours, allowing for immediate functional and esthetic rehabilitation. The crown was cemented using Type I luting glass ionomer cement, providing optimal retention and biocompatibility. Careful occlusal adjustments were performed to eliminate premature contacts and minimize functional stresses, thereby protecting the implant during the critical osseointegration period. The immediate loading protocol not only addressed the patient's esthetic concerns but also contributed to improved psychological well-being and early functional recovery.

Fig 3: Placement of crown

Postoperative follow-up demonstrated favorable outcomes. At one week, healing was uneventful with no reports of pain or implant mobility. At the one-month review, the crown remained in place and the

patient expressed satisfaction with the esthetic outcome. By the third month, the implant exhibited excellent stability, with satisfactory gingival adaptation and a natural esthetic appearance. At the six-month follow-up, functional integration was confirmed, with no clinical signs of inflammation or peri-implant complications observed.

DISCUSSION:

Rehabilitation of anterior maxillary ridge defects remains one of the most challenging aspects of implantology, primarily due to the dual concerns of high esthetic demands and compromised bone availability. The present case highlights the clinical applicability of basal implants in overcoming these limitations by providing a minimally invasive, graftless, and immediately loadable solution.

PROSTHETIC ALTERNATIVES:

Several treatment modalities are available for anterior edentulism. Removable partial dentures, while economical, often compromise esthetics, phonetics, and patient comfort [7]. Fixed partial dentures (FPDs) offer better stability but at the expense of sacrificing adjacent healthy teeth and carry a risk of secondary caries and periodontal breakdown [8]. Conventional implants, considered the gold standard when bone availability is adequate, require a minimum ridge width of 5–7 mm and are frequently associated with adjunctive grafting procedures [9].

LIMITATIONS OF CONVENTIONAL IMPLANTOLOGY:

Conventional implant placement is highly dependent on sufficient alveolar bone and often necessitates augmentation techniques such as sinus lift, guided bone regeneration, or block grafts [10] These procedures are associated with increased morbidity, extended healing periods of 3–6 months before prosthetic loading, and higher overall treatment costs.

ADVANTAGES OF BASAL IMPLANTS:

Basal implantology offers several advantages in compromised situations. The engagement of basal cortical bone provides excellent primary stability and resists resorption [12] Immediate loading is achievable, allowing impressions and prosthetic rehabilitation within 72 hours [12]. The flapless approach minimizes surgical trauma, preserves periosteal blood supply, and accelerates healing [13]. Additionally, the polished implant surface reduces biofilm accumulation and lowers the risk of peri-implantitis [12]. Basal implants are particularly indicated in challenging cases such as trauma, atrophic jaws, advanced periodontitis, or failure of conventional implants

LITERATURE SUPPORT:

Ihde [6] described basal implantology as a graftless alternative, eliminating the need for augmentation procedures. A Cochrane review [5] emphasized the invasiveness and unpredictable outcomes associated with bone grafting in conventional implantology. Furthermore, clinical studies have consistently demonstrated survival rates exceeding 95% for basal implants, even in severely resorbed ridges [12]. Kim et al. [13] further highlighted the benefits of flapless placement, including reduced postoperative morbidity.

ESTHETIC CONSIDERATIONS:

The anterior maxilla presents unique esthetic challenges, where implant angulation, gingival contour, crown morphology, and smile line must be carefully managed [4]. In the present case, intraoperative correction of implant angulation ensured harmonious crown placement, while the flapless approach contributed to the preservation of soft tissue architecture, enhancing the final esthetic outcome.

PSYCHOSOCIAL IMPACT:

Beyond functional rehabilitation, the psychosocial aspect plays a pivotal role, particularly in young patients. Immediate esthetic restoration significantly improves self-confidence, social interactions, and psychological well-being. In this case, basal implantology provided a patient-centered solution by delivering rapid esthetic and functional rehabilitation while avoiding the prolonged treatment duration associated with conventional protocols.

CONCLUSION:

Basal implants present a reliable and efficient alternative to conventional implantology, particularly in cases of severe ridge deficiency and post-traumatic defects. By engaging the cortical basal bone, they provide excellent primary stability without the need for augmentation procedures. The advantage of immediate prosthetic loading allows for rapid functional and esthetic recovery, which is especially valuable in young patients with high esthetic expectations.

The present case reinforces the significance of basal implantology as a practical, minimally invasive, and patient-centered approach in modern oral rehabilitation. However, long-term clinical studies with larger sample sizes are warranted to further validate their success rates and establish their role as a mainstream treatment modality.

REFERENCES:

1. Andreasen JO, Andreasen FM, Andersson L. Textbook and Color Atlas of Traumatic Injuries to the Teeth. 4th ed. Wiley-Blackwell; 2007.
2. Glendor U. Epidemiology of traumatic dental injuries—a 12-year review of the literature. Dent Traumatol. 2008;24(6):603–11.
3. Misch CE. Contemporary Implant Dentistry. 3rd ed. Mosby Elsevier; 2008.
4. Buser D, Martin W, Belser UC. Optimizing esthetics for implant restorations in the anterior maxilla: anatomic and surgical considerations. Int J Oral Maxillofac Implants. 2004;19(Suppl):43–61.
5. Esposito M, Grusovin MG, Felice P, Karatzopoulos G, Worthington HV, Coulthard P. Interventions for replacing missing teeth: bone augmentation techniques for dental implant treatment. Cochrane Database Syst Rev. 2008;(3):CD003607.
6. Ihde S. Principles of BOI: Clinical, Scientific, and Practical Guidelines to 4-D Dental Implantology. Springer; 2005.
7. Shillingburg HT, Hobo S, Whitsett LD, Jacobi R, Brackett SE. Fundamentals of Fixed Prosthodontics. 4th ed. Quintessence Publishing; 2012.
8. Goodacre CJ, Bernal G, Rungcharassaeng K, Kan JY. Clinical complications in fixed prosthodontics. J Prosthet Dent. 2003;90(1):31–41.
9. Lekholm U, Zarb GA. Patient selection and preparation. In: Brånemark PI, Zarb GA, Albrektsson T, editors. Tissue-Integrated Prostheses: Osseointegration in Clinical Dentistry. Quintessence; 1985. p. 199–209.
10. Chiapasco M, Casentini P, Zaniboni M. Bone augmentation procedures in implant dentistry. Int J Oral Maxillofac Implants. 2009;24 Suppl:237–59.
11. Albrektsson T, Zarb G, Worthington P, Eriksson AR. The long-term efficacy of currently used dental implants: a review and proposed criteria of success. Int J Oral Maxillofac Implants. 1986;1(1):11–25.
12. Ihde S, Sipic O. Clinical application of the Strategic Implant® system. Ann Maxillofac Surg. 2018;8(1):138–45.
13. Kim YK, Kim SG, Kim JH, Yi YJ. Flapless implant surgery: advantages and limitations. Implant Dent. 2009;18(4):319–23.