



CASE REPORT

Implant Placement in the Maxillary Anterior Region after Orthodontic Treatment in a Compromised Ridge: Rehabilitation with a Customised Abutment for Enhanced Aesthetic Outcome – Case Report

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ABSTRACT

Anterior tooth replacement remains a key concern for patients desiring both aesthetic and functional restoration. Among various prosthodontic options such as fixed partial dentures, removable prostheses, and dental implants- implant-supported restorations are preferred for their superior aesthetics, longevity, and ability to restore natural function. A 23-year-old female patient presented with a missing maxillary left lateral incisor following orthodontic treatment. After clinical and radiographic evaluation, cone-beam computed tomography (CBCT) revealed inadequate bone volume at the intended implant site. To avoid bone grafting which would increase cost and treatment duration- osseodensification was performed using a Densah bur system to achieve sufficient primary stability. The implant was successfully placed, but minor buccal positioning resulted in potential aesthetic and prosthetic alignment challenges. To address this, a customized abutment was fabricated, effectively correcting the implant angulation and enhancing soft-tissue contours and aesthetic integration. This case highlights the significance of meticulous treatment planning, the use of osseodensification techniques in compromised ridges, and the role of customized abutments in achieving superior aesthetic and functional outcomes in anterior implant restorations.

Keywords: Dental implant; Castto abutment; Customized abutment; Aesthetic region

1 INTRODUCTION

Various prosthodontic options are available for replacing missing anterior teeth, including dental implants, fixed partial dentures, removable partial dentures, and resin-bonded bridges. These options help restore function, aesthetics, and stability, with the choice depending on factors such as durability, cost, and patient preference^(1,2). In modern implant dentistry, treatment success is defined not only by implant survival and restoration longevity but also by parameters such as dentogingival aesthetics, bone stability, mechanical performance, and peri-implant soft tissue health. This is particularly crucial in the anterior maxillary and mandibular regions, where aesthetics play a key role. To achieve optimal mechanical, biological, and aesthetic outcomes, various implant systems, abutments, and restorative materials have been developed⁽³⁾. Single-tooth replacement with dental implants has gained increasing

popularity due to superior aesthetic results and long-term success. With high survival rates, implant therapy is often the preferred choice among younger patients compared to other prosthetic options⁽⁴⁾. The UCLA castable abutment is a widely used option for implant-retained prostheses because of its versatility and customization potential. It consists of a plastic cylinder that attaches directly to the implant and can be modified through waxing and casting with base metal alloys such as cobalt–chromium. Its advantages include affordability, suitability for limited inter-occlusal space and narrow interproximal space, and correction of implant angulation errors, making it a practical and effective solution⁽⁵⁾. The rationale of this case report lies in demonstrating that the success of an implant depends not only on achieving osseointegration but also on accurate implant placement and a well-integrated prosthesis. In the aesthetic zone, challenges such as misaligned implants and limited

inter-arch space can complicate restoration. Therefore, a customized approach is essential to achieve functional and aesthetic success, ensuring patient satisfaction with the final prosthesis⁽⁶⁾. In the maxillary anterior region, ideal implant alignment is often difficult due to the natural 15° inclination of anterior teeth. In cases with ridge deficiency, implant placement at the ideal angulation may not be possible without bone augmentation, as bone resorption patterns can compromise the aesthetic outcome. To minimize the cost and time associated with grafting, osseodensification can be performed to optimize bone density, while prosthetic corrections can be achieved using a customized abutment.

2 CASE REPORT

A 23-year-old female patient reported to the Department of Prosthodontics after completing orthodontic treatment for the replacement of a missing maxillary left lateral incisor (tooth number 22) Figure 1 (A), (B). For the rehabilitation of the missing tooth, both fixed and removable prosthetic options were discussed with the patient. However, she preferred a fixed solution. Three fixed options were suggested: a Maryland bridge, a fixed partial denture (FPD), and a dental implant. The patient consented to implant therapy, and a treatment plan was formulated for implant placement and rehabilitation at the site of the missing lateral incisor in the second quadrant.

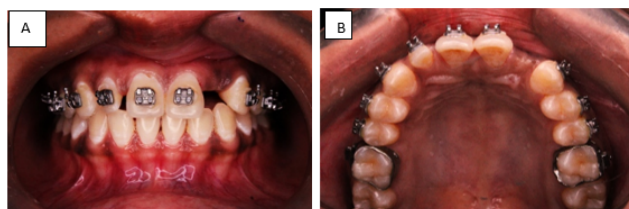


Fig. 1: (A) Pre – op – Frontal view (B) Pre – op – Occlusal view

A comprehensive preoperative assessment was carried out, including diagnostic casts and radiographic evaluation. Cone-beam computed tomography (CBCT) revealed inadequate bone volume at the planned implant site Figure 2 (A), (B). To enhance bone density and improve implant stability, an osseodensification procedure using a Densah® bur was planned. The patient had no significant medical history, and her primary concern was aesthetics. The surgical procedure was performed under aseptic conditions. Local infiltration anesthesia with 2% lignocaine was administered on both the buccal and palatal aspects of the implant site.

A midcrestal incision was made, and a full-thickness mucoperiosteal flap was raised to expose the underlying bone Figure 3 (A). Pilot drilling was performed, and the angulation was verified with adjacent teeth using an intraoral periapical (IOPA) radiograph. Osseodensification was carried out using Densah® burs to achieve adequate bone condensation and width around the implant site.

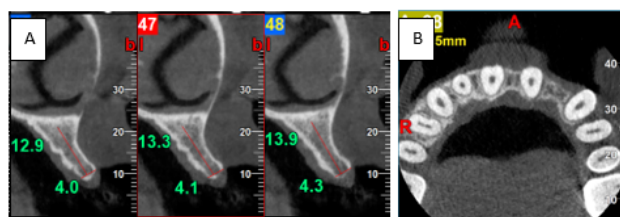


Fig. 2: (A) CBCT section wrt left lateral incisor (Tooth no. 22) (B) CBCT section – Occlusal view

Following final drilling, a 3.75 × 11.5 mm implant (Adin Dental Implant Systems Ltd., Israel) was placed Figure 3 (B), (C) Simple interrupted sutures were placed to achieve primary closure Figure 3 (D). Postoperative instructions were given, and antibiotics were prescribed for five days. The patient was recalled after one week for suture removal.

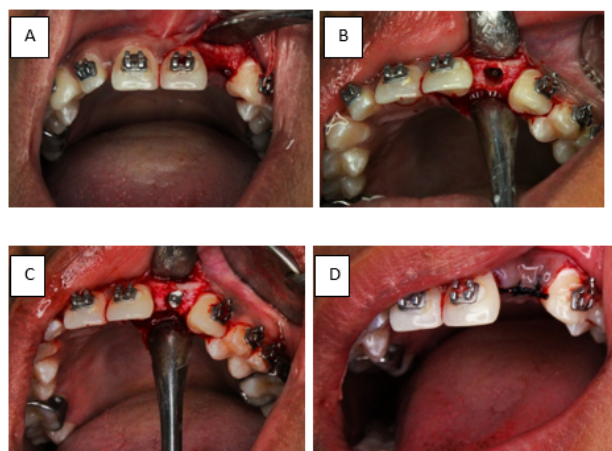


Fig. 3: (A) Flap reflection (B) Osteotomy made using Densah bur (C) Implant placement (D) Suturing of implant site

Four months later, she returned for evaluation. Osseointegration was confirmed radiographically using an IOPA radiograph, and a Stage II procedure was performed with placement of a gingival former Figure 4 (A). An implant-level open-tray impression technique was used, followed by verification of the impression using a jig. A customized abutment was fabricated using a castable plastic sleeve abutment (cast-to) to correct the implant angulation. A cement-retained porcelain-fused-to-metal (PFM) crown was fabricated and cemented onto the customized abutment Figure 4 (B)–(D).

The patient expressed satisfaction with the final outcome, which provided both functional and aesthetic rehabilitation. Regular follow-up visits were scheduled to monitor implant health and peri-implant soft tissue status.

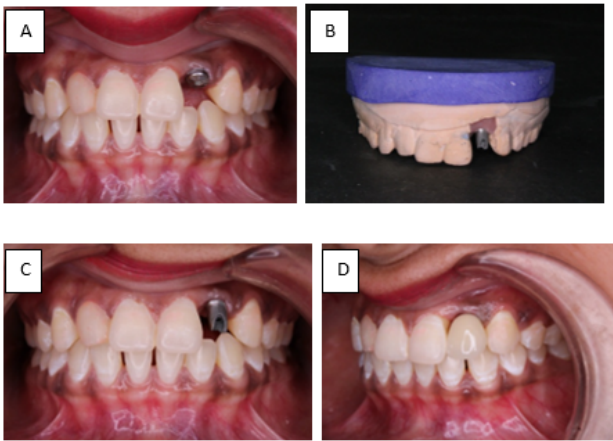


Fig. 4: (A) After Stage II surgery (B) Customised abutment (C) Customised abutment intraorally (D) Final prosthesis

3 DISCUSSION

The precise placement of a dental implant is essential to achieve both functional efficiency and aesthetic harmony. Comprehensive treatment planning and accurate diagnosis are critical steps in ensuring long-term success. Prosthodontists often face significant challenges when placing implants in the anterior region, where aesthetic demands are particularly high⁽⁵⁾. Several factors influence implant positioning, including the use of surgical stents, radiographic evaluation, soft tissue anatomy, abutment selection and prosthesis design. The present case involved a patient who had previously undergone orthodontic treatment. A pertinent consideration in such cases is whether orthodontic tooth movement affects the bone architecture and soft tissue levels in the edentulous region. A study on animal models demonstrated that orthodontic tooth movement within surgically induced periodontal bone defects promotes improved bone healing and increased bone apposition⁽²⁾. The findings indicated that orthodontic movement may limit epithelial downgrowth and reduce pocket depth in surgically altered bone. Furthermore, it can induce coronal gingival displacement and vertical bone apposition, even in edentulous areas adjacent to the moved teeth. Consequently, the gingival margin may remain level with adjacent teeth, reducing the need for additional soft tissue augmentation procedures⁽⁶⁾. In the present case, the implant was positioned slightly buccally relative to the adjacent teeth, resulting in aesthetic concerns. In such situations, prosthodontists can use prefabricated or customized angled abutments (cast-to abutments) to improve implant alignment, function, and aesthetics. These components help compensate for malpositioned implants and enhance the final prosthetic outcome^(1,3). To overcome aesthetic discrepancies, treatment options may include the use of crowns with artificial gingiva, angled abutments, customized porcelain coatings, or secondary grafting procedures. Misalignment of

maxillary anterior implants poses an additional challenge in maintaining the natural mucogingival architecture, thereby increasing the complexity of aesthetic restoration⁽⁴⁾. Ideally, the implant body should align perpendicularly to the curves of Wilson and Spee to distribute occlusal forces along its long axis. Proper axial alignment minimizes biomechanical complications such as abutment fracture and screw loosening. However, anatomical variations, including maxillary bone concavities and lingual surface irregularities, may necessitate angulated implant placement⁽⁷⁾. When the implant angulation exceeds 25°, customized abutments are often required to achieve functional and aesthetic success. Despite advances in computer-aided design and manufacturing (CAD/CAM) technology, cast abutments remain a practical and cost-effective alternative. When the implant angulation exceeds 30° or inter-occlusal space is limited, cast abutments can be used. These are available in two types: cast-to and castable abutments. Cast-to abutments provide a more precise fit at the implant–abutment interface, whereas castable abutments are relatively less accurate due to casting distortions. Both serve as viable prosthetic solutions for managing implant angulation while maintaining long-term function^(8,9). In the present case, a cast-to abutment was used to correct the implant misalignment and ensure an accurate connection. The limitations of the present report include the absence of long-term follow-up and evaluation of soft tissue parameters. The successful restoration of implant-supported prostheses depends on accurate diagnosis, precise surgical placement, and appropriate prosthetic management. In cases of malpositioned implants, customized cast-to abutments provide an effective solution for aesthetic and functional rehabilitation. However, long-term clinical studies are required to assess the survival and stability of customized abutments in anterior implant restorations.

4 CONCLUSION

Precise planning and prosthetic customization are essential for successful anterior implant rehabilitation. In cases of suboptimal implant angulation, customized cast-to abutments offer a reliable and cost-effective solution to correct alignment discrepancies, underscoring the importance of individualized and multidisciplinary management for predictable aesthetic outcomes.

5 DISCLOSURE

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Conflict of Interest: None

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