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MINIMALLY INVASIVE ESTHETIC AND FUNCTIONAL REHABILITATION WITH EXTRA-NARROW IMPLANTS IN THE ANTERIOR MAXILLA: A ONE-YEAR CASE REPORT

Dental Science

Dr Jaswanthi Yadav — 3rd Year Post Graduate, Department of Prosthodontics, Crown Bridge and Implantology, Navodaya Dental College & Hospital, Raichur

Dr Rakshit BM — Assistant Professor, Department of Prosthodontics, Crown Bridge and Implantology, Navodaya Dental College & Hospital Raichur Karnataka

Dr. Harsha. R. H — Professor, Department of Prosthodontics, Crown Bridge and Implantology, Navodaya Dental College & Hospital Raichur Karnataka

Dr. Satyanarayana Naik — Professor, Department of Prosthodontics, Crown Bridge and Implantology, Navodaya Dental College & Hospital Raichur Karnataka

ABSTRACT

Background: Narrow-diameter implants (≤3.5 mm), especially 3.0–3.5 mm ones, are effective in areas with limited bone, thin crests, or narrow tooth gaps, offering results similar to wider implants. However, evidence for extra-narrow types (2.0–3.0 mm) is still sparse. **Case Presentation:** Two patients received BRIGHT® extra-narrow-diameter implants: an 18-year-old male received a 2.0 × 13 mm implant in region 21, and a 23-year-old female received implants of 3.0 × 11 mm in region 12 and 2.5 × 13 mm in region 22. Customized abutments and cement-retained prostheses were delivered after three months. A one-year follow-up confirmed clinical and radiographic success of the rehabilitation. **Conclusion:** Placing extra-narrow implants (2.0–3.0 mm) in the maxillary anterior region is a reliable option for restoring function and esthetics in cases with limited bone or space, offering effective and visually pleasing results.

KEYWORDS

Extra-Narrow Implants, Maxillary Anterior Region, Esthetics, Limited Bonevolume, Clinical Success

INTRODUCTION

Osseointegrated implants have proven highly successful in restoring fully or partially edentulous arches. However, in single-tooth sites especially central and lateral incisors limited bone volume and interdental space make placement more challenging.[1]

Narrow-diameter implants are a practical, minimally invasive solution for areas with limited crest bone or tight mesiodistal spacing, such as the upper anterior region. Their smaller size reduces trauma and cost, avoiding the need for grafting while enabling effective restoration in constrained spaces.[2]

Narrow-diameter implants (≤ 3.75 mm) deliver high survival rates, minimal marginal bone loss, and improved patient satisfaction—comparable to standard implants—making them a reliable option in constrained spaces[3]. They are categorized into two groups. Extra-narrow implants measure < 3.0 mm, while narrow implants range from ≥ 3.0 mm to < 3.75 mm.

Single tooth implants require careful mesiodistal spacing to preserve bone and papilla. Key guidelines include maintaining ≥ 1.5 mm between the implant and adjacent natural teeth to prevent proximal bone loss and papilla resorption, and maintaining ≥ 3 mm between adjacent implants to safeguard inter-implant bone and soft tissue. With these constraints, particularly in narrow anterior spaces, using extra-narrow (2.0–2.5 mm) or narrow (3.0 mm) implants is often necessary to respect functional and aesthetic parameters.

This approach supports optimal preservation of bone and soft tissues while enabling effective oral rehabilitation in tight spaces.[4-5]

Two-piece narrow implants offer superior prosthetic flexibility, better soft tissue management, and the option for custom abutments, making them more versatile and clinically adaptable than single-piece implants, despite being less cost-effective and more complex surgically.

This case uniquely demonstrates the successful use of extra-narrow implants in maxillary anterior region of young patients with limited bone volume, avoiding grafting. One-year follow-up confirmed stable integration, esthetics, and function demonstrating a minimally invasive, patient-centered solution in a challenging anterior zone.

Case History:

Case Report - 1

An 18-year-old healthy male patient presented to the department seeking replacement of a maxillary left central incisor lost in trauma six months earlier. Distressed by the esthetic and social impact, he preferred a fixed, minimally invasive solution. CBCT (figure – 1A) revealed inadequate orofacial bone (width – 2mm) volume for standard implants, and he declined both removable options and adjacent tooth preparation. He consented to extra-narrow implant rehabilitation to preserve surrounding structures and restore esthetics.

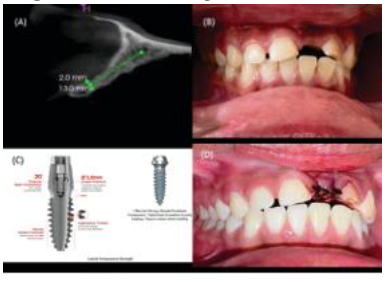

Figure 1: Patient's initial situation, (A)CBCT images of regions 21 showing reduced bone orofacial width, (B)Frontal initial photographs, (C) specific features of bright tissue level implants, (D)Frontal view of implants final position.

Site preparation followed manufacturer guidelines for Type II bone, using 1,200 rpm with irrigation. A BRIGHT tissue level 13 mm × 2 mm extra-narrow implant with an aggressive thread design and a 20° external taper connection(figure – 1C) was placed at the crestal level, first with a handpiece and finished with a torque wrench of 30NCM. A comfort cap secured the implant, and sutures closed the wound(figure-1D). Post-placement radiographs confirmed accurate positioning. The patient received antibiotics, analgesics, and oral hygiene instructions; sutures were removed after 10 days with no complications.

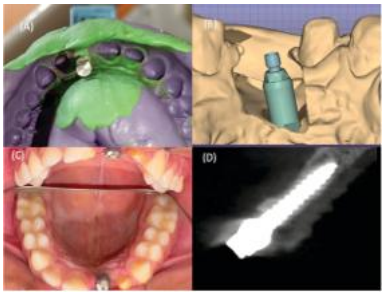

Figure 2: (A)open tray impression with analogue, (B) customized the

straight abutment using CAD-CAM, (C)abutment screwed in position with implant, (D)three months postoperative CBCT images of implant in region 21

Three months post-placement, all parameters confirmed good secondary stability of the extra-narrow implant. Clinically, there was no mobility, pain, or inflammation, and radiographs showed stable bone levels without radiolucency. An ISQ value above 60 supported successful osseointegration, with healthy soft tissues and patient comfort indicating readiness for prosthetic loading. An open-tray impression was taken with addition silicone, along with opposing arch and bite registrations(figure-2). A CAD-CAM–fabricated custom abutment was screwed into the implant, followed by an alginate impression to capture soft tissue contours. A cement-retained porcelain-fused-to-metal (PFM) prosthesis was then fabricated and delivered(figure-3) The one-year follow-up showed stable implant conditions, with no mobility, inflammation, or bone loss. Radiographs confirmed integration, and prosthetics were intact and functional. Continued monitoring is advised to ensure long-term stability and esthetic success.

Figure 3: (A) intra oral view of cement retained PFM prosthesis given irt 21 implant, (B)extra oral view.

Case Report– 2

A 23-year-old female patient presented to the department with concern over congenitally missing maxillary lateral incisors, seeking a fixed and esthetic replacement. She had previously undergone orthodontic treatment to create adequate interdental space, demonstrating strong psychological motivation and emotional investment in improving her smile. CBCT imaging(figure-4A,B) revealed insufficient bone volume (width – 4mm in 12 region and 3mm in 22 region) for conventional implants, leading to the decision to place extra-narrow implants following detailed planning and informed consent.

Site preparation followed Type II bone protocols using 1200 rpm with irrigation. Two BRIGHT tissue-level implants—3.0 × 11 mm (region 12) and 2.5 × 13 mm (region 22) were placed at the crestal level. Each had a 3.8 mm coronal platform, conical apex, 20° taper connection, and aggressive threading for stability. Implants were inserted with a handpiece, torqued manually to 30NCM, and covered with comfort caps(figure-4C). Radiographs confirmed accurate placement. Post-op care included antibiotics, analgesics, and oral hygiene, with sutures removed after 10 days.

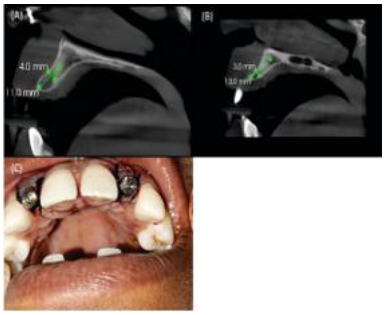

Figure 4: (A) Patient's initial situation. CBCT images of regions 12 and (B)22 showing agenesis of maxillary lateral incisors and reduced bone orofacial width, (C)final position of implants showing comfort caps screwed and sutured.

At three months, clinical and radiographic assessments showed stable peri-implant bone and healthy soft tissues. An open tray impression with addition silicone, opposing arch, and bite registration guided fabrication. A CAD/CAM custom abutment was torqued in, followed by alginate capture of soft tissue contours. A cement-retained zirconia crown was delivered, achieving an esthetic and functional outcome(figure-5). One-year follow-up confirmed sustained bone and soft-tissue health.

Figure 5: (A)open tray impression with analogues, (B) customized abutment screwed in position with implants in 12 and 22 implants, (C)three months post operative CBCT after placing the abutments in 12, (D)in 22, (E)cement retained zirconia prosthesis given irt 12 and 22.

DISCUSSION

This case report presents the successful use of extra-narrow implants (2.0–3.0 mm) in the anterior maxilla for patients with limited bone volume who declined augmentation. CBCT revealed only 2–4 mm of orofacial bone width, guiding the choice of narrow implants. Despite the reduced surface area for osseointegration, both cases showed favorable one-year results with stable marginal bone levels, healthy peri-implant tissues, and high patient satisfaction.

Bone augmentation procedures are associated with early implant failures due to patient-related factors (e.g., diabetes, smoking, poor bone quality), surgical variables (clinician experience, osteogenesis techniques, graft materials), and implant-specific issues (insufficient primary stability, improper implant dimensions). These failures typically occur within the first year, underscoring the need for careful case selection and optimized grafting protocols.[6] According to the systematic review and meta-analysis by Memenga-Nicksch et al. (2025), implants placed in augmented and pristine sites show comparable long-term marginal bone loss, with no clinically significant differences.[7] Cheechi et al. (2019) provide a clinically relevant classification of augmentation failures in the esthetic anterior maxilla, distinguishing partial from complete failures; while partial failures may be corrected surgically, complete failures often require full retreatment and may still yield suboptimal esthetic outcomes. Given this unpredictability, thorough preoperative counselling is essential, particularly for patients with high esthetic expectations[8].

Studies comparing osseodensification with bone expansion techniques report that bone expansion yields significantly lower primary stability, particularly in type IV bone, with only 50% of cases achieving ≥35 N·cm insertion torque versus 91.7% with osseodensification. Bone expansion is also more technique-sensitive, with greater risks of microfractures and cortical plate damage, leading to reduced implant stability. Patients additionally experience increased discomfort due to malleting forces, and outcomes are less predictable in challenging anatomical sites[9].

Two-piece implants offer key advantages in narrow ridge situations, as their modular design accommodates narrow-diameter fixtures without the need for extensive augmentation. Unlike single-piece implants, which require greater ridge width due to their integrated abutment, two-piece systems allow platform switching, customized abutment angulation, and independent abutment replacement, thereby preserving crestal bone and improving prosthetic outcomes. Considering the complications associated with bone grafting and bone expansion—such as reduced primary stability, microfractures, and patient discomfort—extra-narrow implants provide a predictable alternative, enabling functional and esthetic rehabilitation in anatomically constrained sites without invasive augmentation.

CONCLUSION

Despite the challenges of restoring maxillary incisors in confined spaces, this case demonstrates that extra-narrow implants with a 3.8 mm coronal platform, conical apices, 20° taper connection, and aggressive threading provide a dependable alternative with favorable hard and soft tissue outcomes. While early results are promising, further long-term studies are needed to confirm their predictability.

REFERENCES

1. Thomé G, Vianna CP, Caldas W, Bernardes SR, Uhlendorf J, Cartelli CA, et al. Clinical and radiographic outcomes of maxillary lateral incisors rehabilitation using Morse taper connection extra-narrow implants at 12-month follow-up: a case report. Clin Case Rep. 2022;10(8):e6248.
2. Mattos CF, de Carvalho MA, de Carvalho JJ, dos Santos PG, Pires JL, Brum ID. Use of extra-narrow-diameter implants in reduced alveolar ridge: a case report. J Biomater Nanobiotechnol. 2020;11(2):101-8.
3. Andersen E, Saxegaard E, Knutsen BM, Haanæs HR. A prospective clinical study evaluating the safety and effectiveness of narrow-diameter threaded implants in the anterior region of the maxilla. Int J Oral Maxillofac Implants. 2001;16(2):217-24.
4. Tarnow D, Cho SC, Wallace SS. The effect of inter-implant distance on the height of inter-implant bone crest. J Periodontol. 2000;71(4):546-9.
5. Corcuera-Flores JR, Pérez-Fierro M, Blanco-Carrión A, Torres-Lagares D, Castellanos-Cosano L, Machuca-Portillo G. Bone loss around narrow implants versus standard diameter implants: retrospective 2-year case-control study. J Clin Exp Dent. 2020;12(1):e79-e84.
6. Munakata M, Kataoka Y, Yamaguchi K, Sanda M. Risk factors for early implant failure and selection of bone grafting materials for various bone augmentation procedures: a narrative review. Bioengineering (Basel). 2024;11(2):192.
7. Memenga-Nicksch S, Marschner F, Thomas NH, Holzwart D, Staufenbiel I. Systematic review and meta-analysis on marginal bone loss of dental implants placed in augmented or pristine bone sites: findings from clinical long-term studies. J Dent. 2025;105808.
8. Checchi V, Gasparro R, Pistilli R, Canullo L, Felice P. Clinical classification of bone augmentation procedure failures in the atrophic anterior maxillae: esthetic consequences and treatment options. Biomed Res Int. 2019;2019:4386709.
9. Orth C, Haas AN, Peruzzo DC, Carvalho da Silva R, Mesquita de Carvalho PF, de Barros Carrilho GP, et al. Primary stability of dental implants installed using osseodensification or bone expansion drilling systems: a comparative clinical study. J Int Acad Periodontol. 2022;24:165-74.