

CASE REPORT

Soft Tissue Stabilization Using Zirconia Abutment Post Guided Bone Regeneration: A Case Report

Diksha Singh^a, Reshu Sanan^b, Bhupender Kumar Yadav^c, Ananya Kothe^d

ABSTRACT

Making a restoration that is functional over time and matches seamlessly with neighbouring natural teeth is one of the most difficult challenges in meeting the patient's aesthetic expectations.¹In the anterior maxilla, the prosthetic perfection is often challenging as ideal overall esthetic outcomes of pink and white must be achieved to get optimal esthetics. All-ceramic restorations showed a significantly better colour match to unrestored neighbouring teeth than porcelain-fused-to-metal restorations on titanium or gold abutments. Notable clinical differences were observed in comparison with the contralateral tooth in a recent study using titanium or gold abutment with PFM Crown or aluminium oxide abutment with all-ceramic crown. This case report presents a case with good esthetic results with the use of zirconia abutment in anterior esthetic zone.

Key words: anterior esthetic zone, pink esthetic score, titanium abutment, white esthetic score zirconia abutment

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INTRODUCTION

In contemporary dentistry, implant therapy to restore an edentulous site has grown in demand. Adequate alveolar ridge is required for successful implant placement since it is necessary to house the implant and provide both aesthetics and function. The absence of horizontal and/or vertical bone in implant sites must be rectified before or with implant placement as it may lead to clinical complications or unesthetic results. A ridge augmentation procedure is frequently needed to regenerate enough bone for proper implant placement. Guided Bone Regeneration is one of the methods of ridge augmentation. Barrier membranes are used in GBR procedure, together with or instead of particulate bone grafts or bone substitutes. The migration of pluripotent and osteogenic cells (such as osteoblasts from the periosteum and/or neighbouring bone and/or bone marrow) to the site of the bone defect and the

exclusion of cells inhibiting bone formation (such as epithelial cells and fibroblasts) are prerequisites for osseous regeneration by GBR. The rate of osteogenesis extending inward from the neighbouring bony borders must be greater than the rate of fibrogenesis growing in from the surrounding soft tissue to successfully regenerate a bone defect. The effectiveness of ridge augmentation is frequently difficult to predict in a therapeutic setting. Exclusion of epithelium and connective tissue, space maintenance, fibrin clot stability, and initial wound closure are the four requirements for effective GBR.

Bone substitutes with a high demineralized bone matrix composition and mechanical stability should be chosen in order to accomplish successful GBR. Furthermore, the barrier membrane must be applied correctly. Only osteoconductive healing potential and a modest rate of resorption are present in

^a Assistant Professor, Department of Prosthodontics, SGT University, Gurugram, India.

^b Professor, Department of Prosthodontics, SGT University, Gurugram, India,

^c Professor & HOD, Department of Prosthodontics, SGT University, Gurugram, India,

^d Assistant Professor, Department of Prosthodontics, SGT University, Gurugram, India.

xenografts and alloplastic bone replacements, indicating excellent space management with volumetric stability.¹

It is difficult to undergo rehabilitation in the aesthetic zone when there is a direct visual comparison with the neighbouring natural teeth, particularly in cases involving a high lip line.

The dull greyish colour of titanium abutments may cause the soft tissue to appear abnormally bluish. Because the thin gingival biotype cannot obstruct reflecting light from the metallic abutment surface, there may be a grey gingival discolouration.² It has been proposed to switch the gingival biotype when using a metal abutment to thicken the gingiva. This thicker gingiva will prevent reflecting light from shining through the abutment's surface and enhance the aesthetic result. However, biotype change necessitates a second surgical treatment, which most patients find uncomfortable.

Given this, implant restorative materials have consistently exhibited a tendency towards aesthetic improvements in recent years, which has greatly aided in the creation of a new generation of ceramic abutments.

Despite being a metal, zirconia has a noticeable aesthetic appeal because of its "white colour," and this feature alone makes it a highly desirable option for an implant abutment in the anterior region. In terms of mechanical qualities, aesthetics, bacterial adherence, biocompatibility, and general dependability, zirconia has, after all, proven to be just as reliable as some rival elements and materials, if not more so.

CASE PRESENTATION

A 22-year-old male patient reported to the Department of prosthodontics with complaint of discoloration of anterior tooth for the past 1 year and wanted cap on that tooth. CBCT was advised. On radiographic evaluation, vertical root fracture was observed. Extraction of the tooth and implant placement was advised. (Fig. 1 & 2). Informed consent was taken from the patient before doing all the procedures. The tooth was extracted, and socket preservation was done with collagen plug (Zimmer Collaplug). Sutures were placed.

After three months, CBCT was done and evaluated for available bone. The remaining alveolar bone

before implant surgery was 4.8 mm in width. The Implant surgery was planned. Adin implant was placed w.r.t 11 (Fig 2). And GBR procedure was performed along with implant placement. For GBR, Bio-oss bone replacement graft was placed along with non-resorbable membrane. (Fig. 3 & 4) Sutures were removed after 1 week. The membrane (Cytoplast™) removed non-surgically using tissue forceps and topical anesthetic after 28 days.



Figure 1: Missing tooth 11



Figure 2: Implant placed 11



Figure 3: BIO-OSS Bone graft placed



Figure 4: Cytoplast Membrane placed

The patient was recalled after 6 months. Radiographic examination was done. (Fig 5). The osseointegration of the implant was successful and second stage surgery was performed.

Healing abutment was placed for two weeks. After two weeks, implant level impression was made in a stock tray taken using addition silicone. The jig trial was done. Castable zirconia abutment (Fig.6) with layered zirconia crown was fabricated for enhanced esthetics. (Fig 7) The patient was recalled for follow up after 1 month and 3 months. Post follow-up biological and esthetic outcomes were very good.



Figure 5: Radiographic image after implant placement w.r.t 11



Figure 6: Zirconia abutment placed w.r.t 11



Figure 7: Layered Zirconia crown placed w.r.t 11



Figure 8: Post-operative Extra-oral view

DISCUSSION

The case report discussed about the use of zirconia abutment in anterior esthetic zone following guided bone regeneration. The most advanced procedure of replacing missing teeth in today's era are dental implants. Restoring a patient's tooth to their original shape, function, comfort, appearance, and health throughout the duration of their life is the ideal outcome of modern dentistry. The ability of implants to accomplish this objective irrespective of the state of the stomatognathic system is what makes them a versatile treatment option. An implant-retained prosthesis blends well with the surrounding natural structures since it is largely supported by the remaining hard and soft tissues in the mouth cavity. The implant survival rate (ISR) for GBR in maxillary bone augmentation surgeries typically ranges from 96% to 100%. When implants are implanted in native bone and GBR is done concurrently, higher ISR values are achieved.³ Most often, membrane exposure occurs with this kind of intervention. No problems were noted during the follow-up visits in this study. Selection of prosthetic components plays a major role in achieving optimum esthetics in anterior region. Both, the abutment material, and crown material are important for esthetics. Abutment selection for an anterior implant prosthesis should consider several parameters, including visibility of the area, gingiva biotype, neighbouring tooth colour, and patient expectations for aesthetics. Prior until recently, metal abutments were the preferred material; however, as the need for aesthetic rehabilitation has grown, zirconia abutments have been developed.⁴ Titanium abutments are the most often utilised abutments to restore implants because of their superior mechanical qualities and great biocompatibility. However, poor aesthetic outcomes result from the grey tone of titanium that is visible through the gingival tissues, particularly

in thin biotype cases. When soft tissue recession and minor bone loss occur after definitive restoration, or when soft tissue height is higher than implant level, metal should not be visible.⁵

Like titanium, zirconia abutments are also biocompatible with the added advantage of improved health of surrounding soft tissues. Its ivory colour, which resembles natural teeth, is important because it permits light to pass through at all implant contacts between prosthetic components and marginal gingiva, especially in patients with high lip lines.⁵⁻⁷

Because of its special stress-induced transformation toughening mechanism, zirconia exhibits good mechanical qualities like flexural strength and fracture toughness.⁸⁻⁹ In addition, because zirconia has a lower surface energy than titanium, it is known to develop less biofilm.¹⁻¹¹ Compared to titanium abutments, zirconia increases peri-implant health by lowering plaque buildup and bleeding on probing.¹² Bone loss associated with implant prosthesis treatment might range from millimetres in the first year. Additionally, crestal bone loss and plaque buildup have been shown in clinical investigations to positively correlate. Inflammatory changes in the implant surface or abutments brought on by plaque accumulation resemble those in the gingival or alveolar mucosa of natural teeth.

Zirconia abutments provide a statistically significant advantage over titanium ones in establishing a positive response of alveolar bone, according to a meta-analysis by Linkevicius T. and Vaitelis J.. A variety of ceramic nanomaterials are being developed which provides better biologic response in comparison to metal abutments.¹⁴ So, in this case we used zirconia abutment in anterior esthetic zone which gave excellent results as no black hue was seen in gingiva and also pink and white esthetic scores obtained were good.

CONCLUSION

Based on the results that were obtained on comparison of biologic and esthetic outcome of zirconia vs titanium abutments it can be concluded that: Zirconia abutments have a better esthetic result than titanium abutments. Zirconia abutments show a better biological response than titanium abutments. Patient satisfaction achieved is more when zirconia abutments are used. So, within the

limitations, it can be concluded that zirconia abutments and zirconia crowns should be used in anterior esthetic zone. Titanium abutments and zirconia crowns can be used in cases where cost is a limiting factor.

REFERENCES

1. Kim YK, Ku JK. Guided bone regeneration. J Korean Assoc Oral Maxillofac Surg. 2020 Oct 31;46(5):361-366.
2. Totou D, Naka O, Mehta SB, Banerji S. Esthetic, mechanical, and biological outcomes of various implant abutments for single-tooth replacement in the anterior region: a systematic review of the literature. Int J Implant Dent. 2021 Sep 8;7(1):85.
3. Hong JY, Shin EY, Herr Y, Chung JH, Lim HC, Shin SI. Implant survival and risk factor analysis in regenerated bone: results from a 5-year retrospective study. J Periodontal Implant Sci. 2020 Dec;50(6):379-391
4. Becker W, Ochsenbein C, Tibbetts L, Becker BE. Alveolar bone anatomic profiles as measured from dry skulls. Clinical ramifications. J Clin Periodontol. 1997;24:727-731.
5. Sailer I, Zembic A, Jung RE, Hämmerle CH, Mattioli A. Single-tooth implant reconstructions: esthetic factors influencing the decision between titanium and zirconia abutments in anterior regions. Eur J Esthet Dent. 2007; 2(3):296-310.
6. Lops D, Stellini E, Sbricoli L, Cea N, Romeo E, Bressan E. Influence of abutment material on peri-implant soft tissues in anterior areas with thin gingival biotype: a multicentric prospective study. Clin Oral Implants Res. Oct 28(10):1263-1268.
7. Gehrke SA, Poncio da Silva PM, Calvo Guirado JL, Delgado-Ruiz RA, Dedavid BA, Aline Nagasawa M, Shibli JA. Mechanical behavior of zirconia and titanium abutments before and after cyclic load application. J Prosthet Dent. 2016 Oct;116(4):529-535.
8. Ahmad I. Yttrium-partially stabilized zirconium dioxide posts: an approach to restoring coronally compromised nonvital teeth. Int J Periodontics Restorative Dent. 1998 Oct;18(5):454-65
9. Gehrke P, Riekeberg U, Fackler O, Dhomm G. Comparison of in vivo visual,

- spectrophotometric and colorimetric shade determination of teeth and implant-supported crowns. *Int J Comput Dent*.2009;12(3): 247-63.
10. Yilmaz H, Aydin C, Gul BE. Flexural strength and fracture toughness of dental core ceramics. *J Prosthet Dent*. 2007 Aug;98(2):120-8. doi: 10.1016/S0022-3913(07)60045-6
11. Chai J, Chu FC, Chow TW, Liang BM. Chemical solubility and flexural strength of zirconia-based ceramics. *Int J Prosthodont*. 2007 Nov-Dec;20(6):587-95.
12. Stadlinger B, Hennig M, Eckelt U, Kuhlisch E, Mai R. Comparison of zirconia and titanium implants after a short healing period. A pilot study in minipigs. *Int J Oral Maxillofac Surg*. 2010 Jun;39(6):585-92
13. Abu Al-Faraj T M, Alsubhi B M, Almarhoon A N, et al. (July 30, 2024) Comparison of Peri-Implant Soft Tissue Around Zirconia and Titanium Abutments in the Aesthetic Zone: A Narrative Review. *Cureus* 16(7): e65782.
14. Linkevicius T, Vaitelis J. The effect of zirconia or titanium as abutment material on soft peri-implant tissues: a systematic review and meta-analysis. *Clin Oral Implants Res*. 2015 Sep;26 Suppl 11:139-47.

Corresponding Author Details: Dr. Diksha Singh, Assistant Professor, SGT University, Gurugram, India. Pin Code-122006

Email ID; diksha_fdsc@sgtuniversity.org Ph No: 8800581146,

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