

Preservation of Peri-Implant Phenotype in Anterior Esthetic-Zone Using Partial Root Retention Technique: A Report of two cases

Ön Estetik Bölgede Kısmi Kök Tutma Tekniği Kullanılarak Peri-Implant Fenotipinin Korunması: İki Olgu Sunumu

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ABSTRACT

In the era of esthetic dentistry, several protocols have been introduced that bring down the ill effects of tooth loss. Replacement of teeth with thin buccal bone is challenging in maxillary anterior region. In the last decade partial root retention technique also known as socket shield technique (SST) has gained attention in preserving buccal bone while placement of implants. Hereby presenting 2 cases that describe partial root retention technique in grossly destructed anterior teeth with immediate implant placement. Prosthesis loading was completed after 4-5 months. Patients were followed up to 1 year and at the end of 1 year peri-implant phenotype was recorded and compared with baseline values. SST requires precision and when cautiously implemented results in promising outcomes. Periodontal phenotype was preserved adequate till 1 year follow-up in both the cases.

Keywords: Socket shield technique (SST), immediate implant, peri-implant phenotype

ÖZ

Estetik diş hekimliği çağında, diş kaybının olumsuz etkilerini azaltan çeşitli protokoller tanıtıldı. İnce bukkal kemikli dişlerin değiştirilmesi maksiller ön bölgede zordur. Son on yılda, soket kalkanı tekniği (SST) olarak da bilinen kısmi kök tutma tekniği, implantların yerleştirilmesi sırasında bukkal kemiğin korunmasında ilgi görmüştür. Burada, büyük ölçüde tahrip olmuş ön dişlerde anında implant yerleştirme ile kısmi kök tutma tekniğini tanımlayan 2 vaka sunulmaktadır. Protez yüklemesi 4-5 ay sonra tamamlandı. Hastalar 1 yıla kadar takip edildi ve 1 yılın sonunda peri-implant fenotip kaydedildi ve başlangıç değerleriyle karşılaştırıldı. SST hassasiyet gerektirir ve dikkatli bir şekilde uygulandığında umut verici sonuçlar verir. Periodontal fenotip her iki vakada da 1 yıllık takibe kadar yeterli şekilde korundu.

Anahtar kelimeler: Soket kalkanı tekniği (SST), hemen implant, peri-implant fenotip

INTRODUCTION

The role of a periodontist in re-restoration of lost hard and soft tissues is of immense value. Negative effects of tooth loss include volumetric changes in alveolar bone morphology. These effects can be minimized by following protocols such as immediate implant placement, palatally directed implant, platform switching, socket preservation, ridge augmentation and partial extraction therapy (PET)¹ After extraction the bone resorption is more pronounced on buccal aspect compared to palatal.² Socket shield technique (SST) is a part of PET that involves preservation of bundle bone on buccal aspect.¹

The term peri-implant phenotype consists of soft tissue and osseous component dimensions, i. e. peri-implant mucosal thickness, keratinized mucosa width, supracrestal tissue height and thickness of bone surrounding the implant.³ In 2012 Chu et al.⁴ introduced a therapeutic concept that determined the emergence profile (contour changes) called dual zone that included 2 zones; tissue zone and bone zone. The tissue zone consists of vertical labio- palatal dimension change from marginal gingiva to crest and bone zone comprises of tissue apical to crest. Hence to enhance esthetics in anterior zone of grossly destructed teeth, we hereby present two cases treated with SST and immediate implant placement with preservation of peri-implant phenotype.

Geliş Tarihi/Received 15.02.2024
Revizyon Talebi/Revision Requested 12.03.2024
Son Revizyon/Last Revision 22.03.2024
Kabul Tarihi/Accepted 14.05.2024
Yayın Tarihi/Publication Date 21.07.2026

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Cite this article: Bhatsange AG, Kamble SP, Kulkarni SN, Baviskar DA. Preservation of Peri-Implant Phenotype in Anterior Esthetic-Zone Using Partial Root Retention Technique: A Report of two cases. *Curr Res Dent Sci* 2026; 36(3):259-262. DOI: 10.17567/currresdentsci.1437777



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CASE PRESENTATION

CASE 1

Thirty-seven-year-old female patient reported to department of Periodontics with chief complaint of grossly destructed front tooth. Her medical history was non-contributory and past dental history revealed root canal treatment and restoration of the same tooth 2 years back. Intraoral examination revealed horizontally fractured tooth at gingival level (Figure 1A). An Intraoral periapical radiograph (IOPA) was advised to assess extent of fracture with #11 (Figure 1B). After evaluating satisfactory endodontic treatment and based on the present dental condition different treatment options such as tooth supported prosthesis and immediate implant placement procedure were explained to the patient along with their risk and benefits. As the patient opted for immediate implant procedure, further investigations were advised that included hemogram and cone beam computed tomography (CBCT) (Figure 1C and 1D). CBCT assessment revealed thin bone on buccal aspect of #11 (<2 mm). Along with that, periodontal phenotype measurements that included keratinized tissue width and gingival thickness were also recorded on buccal aspect.

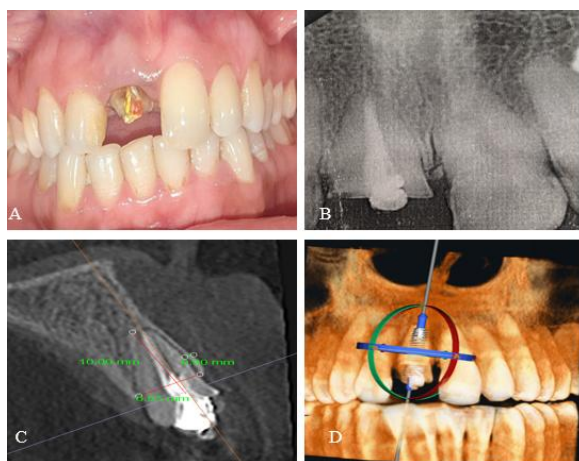


Figure 1. (A) Grossly destructed 11 (B) IOPA showing RCT with 11 (C) CBCT showing bucco-palatal dimensions and root length (D) Virtual implant planning.

Surgical procedure: After obtaining a written informed consent from the patient, the anterior tooth site was infiltrated with local anaesthesia, and a mucoperiosteal flap was reflected (Figure 2A). Horizontal decoronation up to the crest was carried out with straight fissure diamond bur (Figure 2B). Later, vertical sectioning of the root in mesiodistal direction was carried out using long shank tapered fissure bur (Figure 2C). Further, periodontal ligament attachment was severed and palatal root fragment was luxated by periosteum (Figure 3A and 3B). The remaining buccal fragment was reduced just below the crest followed by removal of the obturated material. The thickness of buccal shield was reduced to 1.5 mm with round bur and was bevelled (Figure 3C). Protecting the shield with shield protector, osteotomy was performed using sequential drills. An implant of 3x10mm was placed with 35 N cm and covered by cover screw (Figure 3D and E). The jumping distance was grafted with calcium phosphosilicate with GTR membrane was secured on incisal aspect (Figure 3F). The flap was approximated with.



Figure 2. Clinical procedure (A) Flap reflection (B) Horizontal decoronation (C) Vertical sectioning.

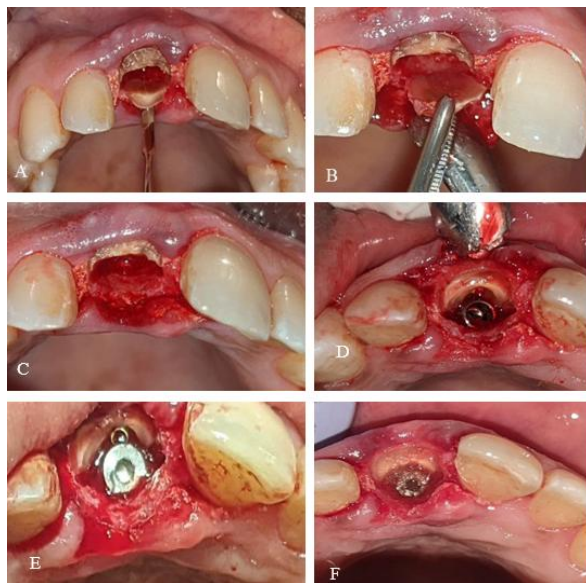


Figure 3. (A) Periosteal luxation of palatal fragment (B) Removal of palatal fragment (C) Prepared buccal shield (D) Placement of immediate implant (E) Placement of cover screw (F) Placement of bone graft.

3.0 silk suture. The patient was then discharged with prescription of medications. On 10th day sutures were removed and satisfactory healing was noted. After 4-month second stage implant surgery was carried out and healing abutment placed (Figure 4A). Emergence profile was assessed at 2 weeks during which time digital impression was recorded using intraoral scanner (with mini scan body) (Figure 4B and 4C). After 1 week screw retained crown was inserted intraorally and screw access hole was sealed with composite resin (Figure 4D). The patient was followed up for a year during which no complications were noted. At the end of 1 year peri-implant phenotype measurement was recorded clinically and by CBCT analysis (Figure 5).



Figure 4. (A) Placement of healing abutment (B) Emergence profile (C) Digital impression without scan body (D) Digital impression with scan body (E) Implant prosthesis with 11.



Figure 5. (A) CBCT image after 1 year showing bucco-palatal dimensions (B) Clinical view depicting peri-implant mucosal width on buccal aspect (C) Clinical view depicting peri-implant mucosal thickness.

CASE 2

A 48-year-old female reported to department of Periodontics with complaint of broken restoration in upper front tooth region of jaw and wanted restoration of the same. Detailed clinical examination revealed non-mobile fractured left lateral incisor (#22) at gingival level. An IOPA was advised that revealed endodontically treated tooth with no periapical pathology (Figure 6A). Among different treatment modalities explained, the patient opted for immediate implant placement procedure. A CBCT was then advised that revealed thin bone on buccal aspect (<2 mm). Hence SST with immediate implant placement was explained and executed after obtaining written informed consent from the patient. The patient was treated similarly procedures were followed as described in case 1 but with placement of implant of 3.6 x12mm dimensions (Figure 6B-6F and Figure 7A-7E). After 4 months second stage surgery was carried out with placement of healing abutment. Following evaluation of emergence profile after 3 weeks impression was recorded using addition silicone impression material and transfer impression copings. Close tray pick up impression technique was opted. After 1 week screw retained prosthesis was inserted (Figure 8A-8D). Patient was re-evaluated for the following next 1 year during which there were no untoward complications. Peri-implant phenotype measurement was recorded at baseline and follow up.

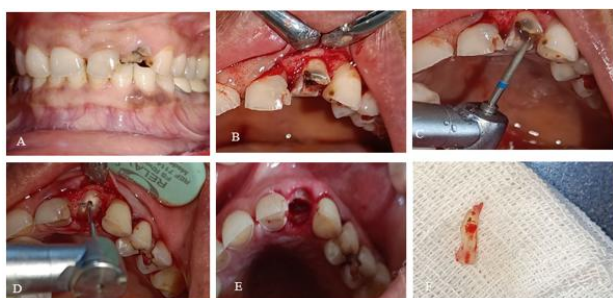


Figure 6. CASE 2 (A) Grossly destructed 22 (B) Flap reflection (C) Horizontal decoronation (D) and (E) Vertical root sectioning (F) Palatal root fragment.



Figure 7. (A) Prepared buccal shield (B) Placement of implant and cover screw (C) Placement of bone graft (D) Placement of GTR membrane (E) Suture.

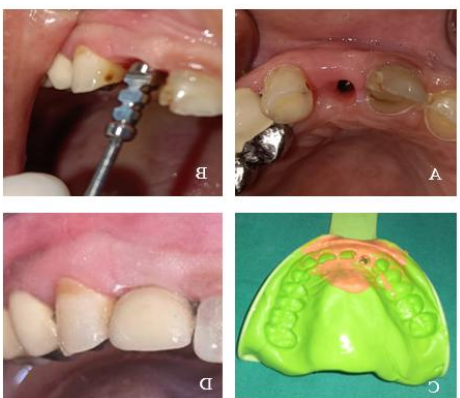


Figure 8. (A) Emergence profile (B) Placement of transfer impression coping (C) Closed tray impression (D) Implant prosthesis with 22.

DISCUSSION

SST concept was put forward by Hurzeler et al. in 2010 and later human histological studies by Schwimer et al. evidenced bone formation between implant surface and dentin shield.⁵⁻⁷ In these 2 reported cases partial root retention technique was employed on buccal aspect because of thin buccal cortical plate of less than 2 mm. At 1 year follow up the results of this study states that preservation of root fragment on buccal aspect not only prevents bone resorption but also maintains the peri-implant phenotype as revealed on preoperative and postoperative CBCT analysis. The 2017 World Workshop of “periodontal and peri-implant disease classification” has shown that, the evidence regarding the effect of presence or absence of keratinized mucosa on long-term health of the peri-implant tissues is equivocal although keratinized mucosa shows advantages of patient comfort and ease of plaque removal.⁸ Animal and human experimental studies by Hurzeler and associates have showed the morphology of gingiva to be stable at 6 months following SST.⁵ However, a recent systematic review concluded that, SST could be helpful in achieving buccal soft and hard tissue contours and achieve better aesthetic outcomes.⁹

Another important factor in achieving aesthetic success is either conservation or reconstruction of the interdental papilla.¹⁰ Though it is based on factors like anatomical height of the papilla or the alveolar crest level of the adjacent teeth, our findings suggest that SST can help to maintain the position of the interdental papilla. On similar lines, a study by Abadzhiev et al. showed minimal soft tissue and bone loss with high aesthetic fulfilment in socket-shield group compared to conventional immediate implant.¹¹

In the present study, bone loss of 0.11-0.37mm on buccal aspect at 1 year follow up was seen in both cases when analysed through CBCT, however in a study by Chen et al. showed that horizontal mean buccal bone loss was 0.83.¹²

Though controversy exists regarding retention of the root fragment due to complications like failure of osseointegration, shield exposure, infection or migration of implant as reported by Gluckman et al.¹³ these were not encountered in the present report. Oliva and coworkers justified 98.6% implant survival rate with SST.² Tooth extraction with/without immediate implant can lead to buccal bone plate resorption owing to biological response of tissue to extraction. SST preserves PDL and supracrestal attachment on buccal aspect. Few histological studies have revealed a cementum layer with presence of collagen fibers.^{5,7} However, due to ethical reasons histological examination could not be justified in the present study.

CONCLUSION

The present report favours SST along with technical precision can result in promising outcomes. Periodontal phenotype was maintained for 1 year in both cases. However, more randomised controlled trials and case control studies are warranted.

Informed Consent: Informed consent was obtained from the patients for publication of this report.

Peer-review: Externally peer-reviewed.

Author Contributions: Concept – A.G.B.; Design – A.G.B.; Supervision – A.G.B.; Materials – S.P.K., S.N.K., Data Collection and/or Processing – S.P.K., S.N.K., Analysis and/or Interpretation – S.N.K.; Literature Search – S.N.K., D.A.B.; Writing Manuscript – A.G.B., S.P.K., S.N.K.; Critical Review – D.A.B.

Conflict of Interest: There is no conflict of interest among the authors.

Financial Disclosure: No financial resources were used in the study.

Use of Artificial Intelligence: No AI-powered tools, models, or technologies were used to create the scientific content. All analyses, interpretations, and writing were performed by the authors.

Hasta Onamı: Bu raporun yayınlanması için hastalardan bilgilendirilmiş onam alınmıştır.

Hakem Değerlendirmesi: Dış bağımsız.

Yazar Katkıları: Fikir – A.G.B.; Tasarım – A.G.B.; Denetleme – A.G.B.; Malzemeler – S.P.K., S.N.K., Veri Toplanması ve/veya İşlenmesi – S.P.K., S.N.K., Analiz ve/veya Yorumlama – S.N.K.; Literatür Taraması – S.N.K., D.A.B.; Makale Yazımı – A.G.B., S.P.K., S.N.K.; Eleştirel İnceleme – D.A.B.

Çıkar Çatışması: Yazarlar arasında çıkar çatışması yoktur.

Finansal Destek: Çalışmada finansal destek kullanılmamıştır.

Yapay Zeka Kullanımı: Bilimsel içerik oluşturmak için yapay zeka destekli hiçbir araç, model veya teknoloji kullanılmamıştır. Tüm analizler, yorumlama ve yazım işlemleri yazarlar tarafından gerçekleştirilmiştir.

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