

Two and a Half Years Follow of the Pontic Site Development with Root Submergence Technique: A Case Report

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Abstract

A soft tissue drape that is formed around the tooth, as it emerges from the bone, has both esthetic and functional significance. Post-extraction soft and hard tissue changes are inevitable and it leads to a buccal concavity. The pontics for tooth or implant supported fixed partial denture in such cases appear longer. Preservation of a part of root preserves the periodontal apparatus and hence facilitate the optimal region for the pontic site development. This case report describes root submergence technique for pontic site development in maxillary anterior tooth supported FPD with a follow up of two and a half years.

Key words: Root submergence, Pontic site, Partial extraction

Introduction

Esthetics is a prime concern when we are restoring or replacing teeth in esthetic zone, especially in the maxillary anterior region. An esthetic smile is based on harmony between facial and dentogingival components. Dentogingival parameters include the position of the marginal gingiva, color, shape, surface texture of the gingiva, and length of the gingival papilla.¹

Post-extraction soft tissue and bony changes are inevitable and continue throughout the patient's lifetime leading to the atrophy of the alveolar ridge and collapsed papilla, which presents a suboptimal condition for restoration with a conventional prosthesis. The resulting tooth form in fixed partial dental prosthesis (FPDP)

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becomes longer and narrower than the natural tooth proportions, the collapsed arch form may reduce lip support and change facial profile. As a result, both dental and facial esthetics may be compromised.²

Various procedures such as socket preservation, hard and soft tissue augmentation, or immediate implant placement have been used to alleviate the problem. However, none of the techniques ensure predictable results in terms of achieving an optimum esthetic outcome.³⁻⁵

Root Submergence Technique (RST) is one of the modalities in Partial Extraction Therapy (PET) that utilizes a part of the natural tooth to prevent the extraction-related changes at the pontic site in case of the tooth or implant-supported FPDP.⁶ The advantage of this technique is that it preserves the periodontal apparatus of the tooth and hence the papillary height and alveolar ridge dimensions, without the need for any extensive surgical procedure or expensive substitutes.

RST was introduced in the 1950s to maintain the alveolar ridge under complete removable dental prosthesis (CRDP) to enhance retention

and resistance.⁷ Its use in FPDPs was reported at the beginning of the 2000s.^{8,9} The non-restorable tooth crowns with the absence of apical pathology, the tooth with have healthy amputated pulp or completed endodontic treatment are good candidates for RST.⁸ The contraindications include apical pathologies, root caries, root resorption, endo-perio lesions, and soft tissue perforations.² This case report describes RST for pontic site development in maxillary anterior FPDP and presents a follow-up of two and a half years.

Clinical Report

A 52-year-old male presented with a fractured non-restorable tooth in the maxillary anterior teeth region. He is a smoker and had medical history of hypertension and diabetes mellitus. Clinical examination revealed a post-core treated fractured crown with respect to maxillary right central incisor, and crowns in relation to maxillary right lateral incisor and left central incisor. (Fig. 1A, 1B) He also had missing left first and second molar and slight discoloration at marginal gingiva level with respect to maxillary left central incisor.

After discussing different treatment options, the patient opted for RST followed by the replacement of the missing anterior tooth with FPDP. The treatment plans included oral prophylaxis and oral hygiene instructions, removal of crowns with respect to 21 and 12, development of emergence profile with a provisional prosthesis, followed by FPDP in relation to 12,11,21.

Treatment was started with proper extraoral asepsis with 2% povidone-iodine and 0.2% chlorhexidine intraoral rinses. A putty index (Fig. 2) was made with the fractured tooth in position for the fabrication of provisional FPDP. Crowns 12 and 21 were split with a carbide bur and removed. Root submergence was started with a large round diamond. The tooth

was reduced to slightly below the level of the alveolar crest buccally and palatally. (Fig. 3) At the periphery, an end-cutting diamond was used for reduction to prevent injury to the soft tissue. The putty index was used to fabricate the provisional prosthesis. The pontic was relined with a flowable composite (Beautiful flow; Shofu) to form an ovate design. The labial surface was stained and relined with flowable composite to impart a more natural appearance. (Fig. 4) It was finished, polished, and inserted into the patient mouth (Fig. 5). An intraoral peri-apical radiograph (IOPA-R) was taken to evaluate the gap between the submerged root and the apical portion of the pontic. (Fig. 6) There should be a minimum of 2 mm of space between them for the optimum soft tissue profile.

The healing was uneventful and after six weeks the soft tissue contour and papillary length were optimal (Fig. 7A, 7B). The provisional FPDP was removed, discoloration irt 21 was masked with opaque composite resin (Beautiful Opaquer; Shofu), and tooth preparation was modified for monolithic zirconia FPDP. The one-step putty and a light body impression was made (Elite putty and light body; Zhermack). (Fig. 8A, 8B)

The cast was made in Type IV dental stone and scanned with a lab scanner to obtain a digital STL file. The final prosthesis was designed in computer-assisted designing (CAD) software (inLab CAD Software; Dentsply Sirona) (Fig. 9) and milled in monolithic zirconia (Ucera evolve functional; Fabendent Dental) with computer-assisted milling (CAM) (inLab MC X5; Dentsply Sirona). It was then sintered, stained, and glazed to produce the final prosthesis. The fit of the prosthesis was evaluated intraorally, occlusion was optimized and then cemented (Fig. 10) with luting resin-modified glass ionomer cement (Fujicem; GC America). Patient was instructed to maintain proper oral

hygiene and scheduled for subsequent follow ups. At two and a half years of follow-up, the

soft tissue contours and papillary lengths were well maintained. (Fig. 11A, 11B, 11C)

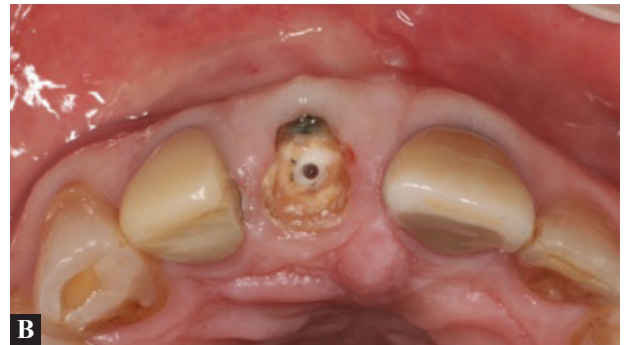


Figure 1A, 1B: Preoperative intraoral view before treatment



Figure 2: Putty index for fabrication of provisional FPDP



Figure 3: Preparation of fractured root for the root submergence



Figure 4: Fabrication of provisional FPDP



Figure 5: Intraoral view of provisional in place

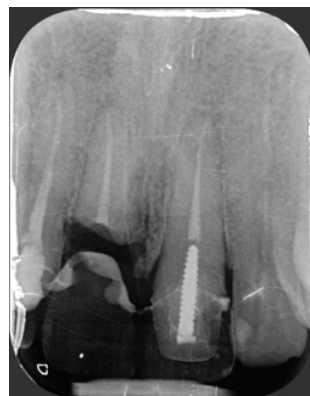


Figure 6: Periapical radiograph of submerged root and provisional



Figure 7A, 7B: Six weeks follow-up with the provisional

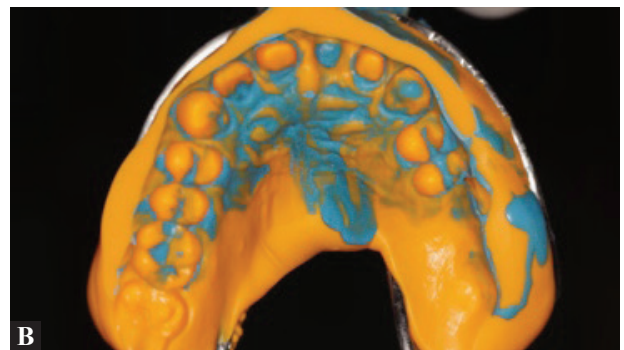


Figure 8A, 8B: Final impression

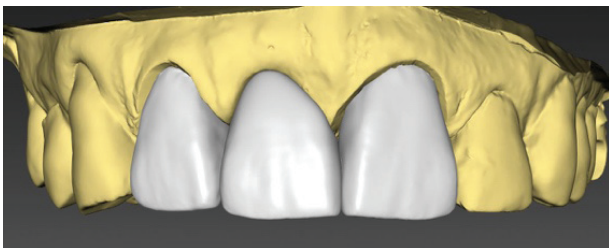


Figure 9: Planning in CAD



Figure 10: Final prosthesis immediately after cementation



Figure 11A, 11B, 11C: Two and a half year follow up

Discussion

RST is an established, evidence-based treatment approach to preserve the alveolar ridge, especially at the pontic sites, and adjacent to implants.¹⁰ It can be done for both vital and

non-vital roots. In non-vital root submergence, endodontic treatment is completed before submergence. While in the case of vital roots, the root is submerged keeping the pulp intact and ensuring it is covered with a flap.¹¹ Vital

submerged roots have better repair potential compared to endodontically treated roots.¹² A similar technique by Choi et al has revealed a successful treatment for over five years period.¹³ The most common documented complication with RST is the exposure of roots mainly because of incorrect decoronation level, improper soft tissue management, and excessive pressure due to a removable denture. Complete closure with soft tissue manipulation or connective tissue graft is advised to avoid the exposure.¹⁰

In this case report, an endodontically treated tooth was decoronated slightly below the alveolar crest level, a provisional FPD with an ovate pontic design, and convex cervical ridge on the pontic to support marginal gingiva was placed which sealed the extraction socket and hence stabilized the blood clot. This procedure can be used to avoid the use of connective tissue graft. At two and a half years of follow-up, the outcomes revealed a favorable soft and hard tissue stability around the pontic.

Conclusion

The case report describes how RST and provisional prostheses can be used for pontic site development in tooth-supported FPD. The main advantages of this procedure are the preservation of soft tissue architecture and the alveolar bone without any complex surgical interventions or artificial substitutes.

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