ACTA SCIENTIFIC DENTAL SCIENCES
Case Report

Clinical Management of Soft Tissue Contours Around a Single-Tooth Implant in the Anterior Maxilla: A Case Report

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Abstract

Loss of the interdental papilla, often due to adjacent bone resorption, may lead to black triangles, food impaction, and phonetic issues, thereby negatively affecting oral health–related quality of life and requires careful management. A 45-year-old systemically healthy female patient presented with non-restorable maxillary right central incisor (#11) due to mobility. Immediate implant placement (Medentika GmbH, Hügelsheim, Germany) with bone grafting was performed in the Oral and Maxillofacial Surgery Department. Due to insufficient primary stability, the extracted tooth's crown was splinted to adjacent anterior teeth to ensure patient's esthetic comfort and support gingival contouring. After three months of osseointegration, a provisional polymethyl methacrylate crown was fabricated using Computer Aided Design and Computer Aided Manufacturing technology and screw-retained on a polyether-ether-ketone abutment to better shape the emergence profile in the anterior esthetic region. This case report demonstrates an effective approach to soft tissue shaping in situations where immediate implant loading is not indicated.

Keywords: Dental Papilla; Single-Tooth Dental Implant; Emergence Profile; Peek Abutment; Provisional Crown

Abbreviations

CAD/CAM: Computer Aided Design/Computer Aided Manufacturing; CTG: Connective Tissue Graft; CM: Collagen Matrix; EP: Emergence Profile; IIP: Immediate Implant Placement; PEEK: Polyether-Ether-Ketone; PMMA: Polymethyl Methacrylate

Introduction

The absence of interdental papillae, also known as a black triangle, is an open gingival embrasure that occurs when the embrasure apical to proximal contact point is not filled by soft tissue, which may compromise esthetic outcomes and reduce patient satisfaction [1]. For the supra-crestal soft tissue management around implants, the bone level is the base, forming the foundation of the biological width similar to natural teeth [2]. After tooth extraction, resorption of up to 50% of the alveolar ridge can be expected within the first year [3]. Immediate placement (type 1) of dental implants can help reduce post-extraction alveolar resorption [4, 5]. Other factors that influence the position and esthetics of the soft tissue in implant-supported restorations are crown morphology, the location of the contact point, tooth–implant distances and implant diameter [6]. The other factor that affects the papilla management is gingival phenotype, classified as thick-flat or thin-scalloped, with the thin phenotype being more prone to gingival recession [7]. For implant restorations, especially immediate single-tooth implants, the gingival biotype has been identified as a key determinant of treatment success. In particular, the presence of interdental papilla between implants and adjacent teeth has been significantly associated with a thick-flat biotype [8]. In patients with a thin-scalloped gingival biotype, the loss of gingival embrasure form following tooth extraction may lead to collapse of the interproximal papilla. Therefore, maintaining the interproximal papilla at the time of extraction is critical and is largely influenced by prosthetic considerations [9]. In addition to maintaining the interdental papilla, establishing a proper emergence profile (EP) is a critical component of soft tissue management. For optimal esthetic outcomes in the anterior zone, several factors must be carefully evaluated in each clinical case, including the condition of the hard and soft tissues, implant position, and the design of the EP. A carefully designed EP plays a decisive role in achieving implant-supported restorations that mimic natural dentition, making it a central consideration for clinicians aiming to achieve the highest esthetic standards [10].

The purpose of this paper was to present a case of gingival recontouring aimed at developing an optimal EP and preparing optimal soft and hard tissue for the definitive implant restoration in a situation where immediate implant loading was not indicated.

Case Report

A 45-year-old female patient with no systemic disease presented to the Department of Oral and Maxillofacial Surgery, Faculty of Dentistry, Gazi University, with a chief complaint of pain and mobility in tooth #11. Clinical and radiographic examinations revealed external root resorption of tooth #11. Considering the patient's high esthetic expectations, immediate flapless implant placement with a provisional restoration was planned following tooth extraction.

After sterile draping and surgical field preparation, local infiltrative anesthesia (Maxicaine Fort) was administered to the region. The tooth was atraumatically extracted without raising a flap and without compromising the buccal alveolar bone. Using a periosteal elevator, a limited flap release was performed by gently stretching the mucosa to include the adjacent teeth (#12 and #21) without injuring the buccal gingiva. Immediate implant placement (Medentika GmbH, Hügelsheim, Germany) was performed so that

the prosthetic EP aligned with the cingulum level of the neighboring teeth (Figure 1a-). Because the buccal plate was very thin, xenograft material (Bio-Oss® 0.5 cc) and a collagen membrane (Bio-Oss® 25 × 25 mm) were applied to the buccal aspect of the implant to prevent potential concavity and to meet esthetic requirements. The membrane was stabilized with 4-0 Prolene sutures.

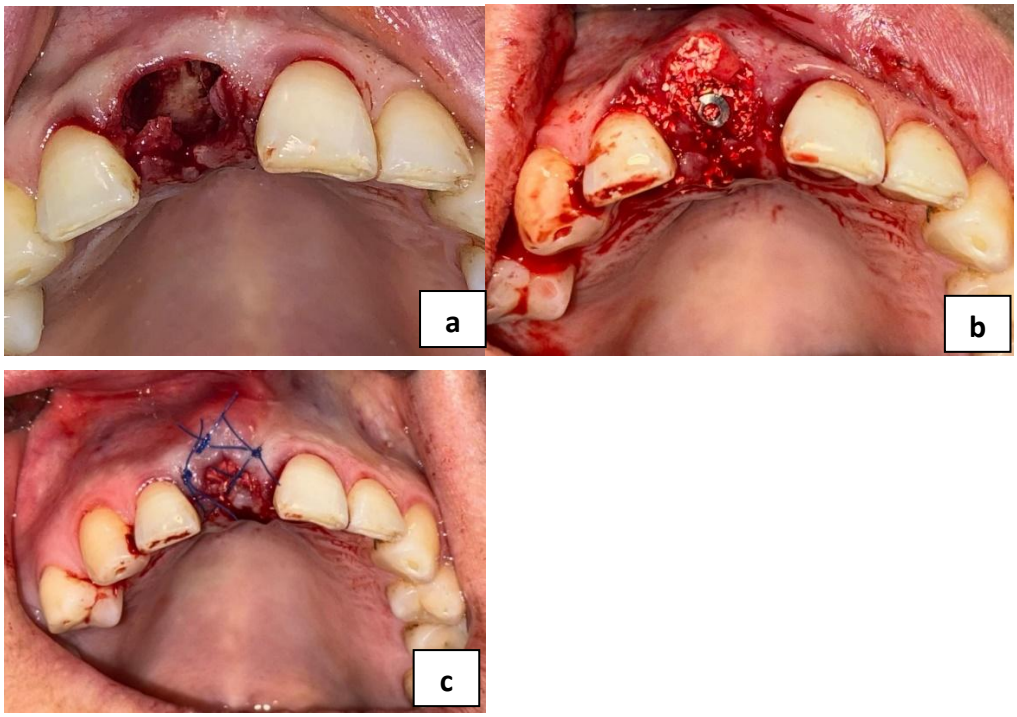

Figure 1: a: Post extraction socket, b: Xenograft and collagen membrane, c: Immediate implant placement.

Due to insufficient primary stability, immediate implant loading could not be performed. Given the patient's esthetic concerns, the crown of the extracted tooth was carefully separated from its root, all pulp tissue was removed, and the pulp chamber was filled with flowable composite resin (Diafil Flow, DiaDent Group International, Seoul, South Korea) (Figure 2).

Figure 2: Seperated crown and supported composite material at the cervical region.

To maintain the EP and shape the interdental papillae until osseointegration was fully achieved, the crown

was splinted to the adjacent anterior using a periodontal splint and composite resin to ensure patient's esthetic comfort and support gingival contouring. Before splinting, care was taken to ensure adequate pressure on the gingiva and proper proximal contacts with the neighboring teeth to support papilla formation (Figure 3). A 0.7 mm periodontal splint wire was adapted and bent to conform precisely to the palatal surfaces of the adjacent anterior teeth (12 and #21). To optimize peri-implant soft tissue conditioning, a light-curing resin composite (G-aenial A'CHORD, GC Corporation, Tokyo, Japan.) was added to the cervical portion of the crown, particularly in the areas corresponding to the interdental papillae and the EP. This contouring allowed controlled pressure on the gingiva (soft tissue stasis), which facilitated the preservation and gradual sculpting of the gingival architecture. Proper proximal contacts were established to maintain interdental papillae. Occlusal evaluation was performed to ensure that the wire did not interfere with mandibular anterior teeth during function. Once this verification was completed, the periodontal splint wire was secured using flowable composite (Diafil Flow, DiaDent Group International, Seoul, South Korea) in the region free of occlusal contacts, thereby minimizing the risk of unwanted functional loading during the healing phase. The patient was instructed to avoid biting with the anterior teeth or applying force to the area and was advised to maintain good oral hygiene.

Figure 3: Crown stabilized with wire and composite resin.

Frequent follow-up appointments were scheduled to monitor the healing process and tissue response (Figure 4).

Figure 4: 1 month follow-up.

After three months of osseointegration, an irreversible hydrocolloid impression *(*Hydrocolor 5, Zhermack,

Zhermack SpA., Badia Polesine, Italy) was made from maxilla. Based on this impression, a symmetrical crown corresponding to tooth #21 was fabricated from polymethyl methacrylate (PMMA) using CAD/CAM technology and was screwed on an angled polyether-ether ketone (PEEK) abutment (Temporary abutment, 18°, type 2, GH 3.5, Medentika, GmbH, Hügelsheim, Germany) (Figure 5a, b).

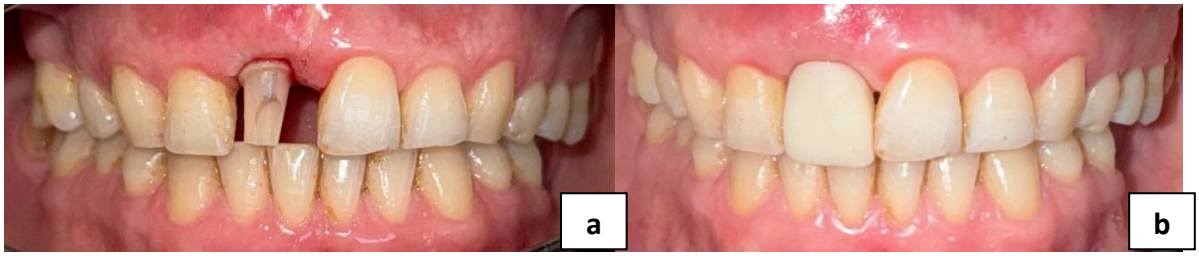

Figure 5: a: PEEK abutment, b: screw retained PMMA on PEEK abutment.

At the one-month follow-up appointment, clinical examination revealed the initial formation of interdental papillae with no signs of inflammation or soft tissue recession. The provisional crown demonstrated satisfactory esthetics and stability, with the peri-implant tissues responding favorably to the prosthetic contours (Figure 6a, b).

Figure 6: a, b: One month follow up with recessing interdental papillae.

At the two-month follow-up, the EP had matured into an ideal form, and the interdental papillae displayed a healthy and harmonious appearance consistent with the contralateral dentition. No functional or esthetic complications were reported by the patient during this period (Figure 7a,b).

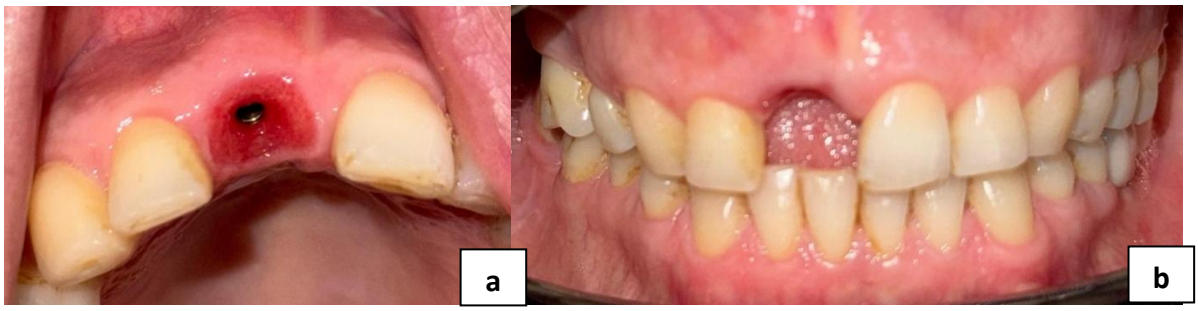

Figure 7: a: Final EP before impression. B: Gingiva profile is preserved in vertical and horizontal dimensions.

Once optimal soft tissue maturation was confirmed, the EP was transferred to the definitive impression. This step ensured that the peri-implant gingival contours would be accurately replicated in the final restoration, thereby providing both functional stability and natural esthetics.

Results and Discussion

In this case, we aimed to achieve optimal soft and hard tissue healing around single-unit implant in the anterior maxilla, where esthetic outcomes are significantly important and the patient's esthetic expectations were particularly high. Managing and knowing key factors influence peri-implant tissue stability to ensure long-term functional and esthetic success. Immediate implant placement (IIP) has shown significant advantages from patients' perceptions by reducing overall treatment time and the number of surgical interventions, and by providing higher cost-effectiveness compared to delayed implant placements [11]. Moreover, IIP has been reported to minimize peri-implant bone resorption and contribute to the preservation of hard and soft tissue volumes when combined with bone grafts such as autogenous bone and connective tissue graft (CTG) or collagen matrices (CM) as an alternative to CTG [12]. Grafting the gap between the extraction socket and the implant has been shown to support soft tissue integrity, particularly in immediate implant placement cases such as the present one [13]. A flapless approach that aims to minimize tooth extraction trauma, combined with IIP and immediate provisionalization, seems to achieve optimal results regarding interproximal bone levels, survival rates, and aesthetics [14]. However, immediate provisionalization with immediate loading with provisional crowns requires sufficient primary stability after implant placement [15], which was not achievable in this case, necessitating the use of alternative strategies for soft tissue management such as using fixed, fixed-removable or removable provisional restorations [9]. In this case, the availability of the patient's own extracted tooth's crown allowed us to use as a provisional restoration thereby providing support for the interproximal papilla and soft tissue contours and preventing the collapse of the papilla until osseointegration was fully achieved. A PEEK abutment was selected to support the CAD/CAM-fabricated PMMA provisional crown as a temporary abutment, which reduces stress shielding between dental implants and the surrounding alveolar bone, allows for appropriate labial and buccal shaping, supports the papillary tissues, and is reasonably priced. Its adaptability for temporary prostheses and favorable color facilitate the creation of an optimal provisional aesthetic outcome, making it a practical choice for temporary implant restorations [16].

Delayed implant loading protocol enables osseointegration and soft tissue maturation. This loading protocol is based on the concept that increased vertical or lateral force upon the implant during the healing process results in implant motion, abnormal healing, and fibrous tissue encapsulation. Due to insufficient primary stability delayed implant loading was preferred in this case as immediate loading requires higher primary stability values than delayed loading [17,18].

The EP refers to the part of the implant-abutment-restoration complex that extends from the bone crest to the free gingival margin is critical for the long-term health and aesthetics of rehabilitation in the esthetic zone [19]. The EP often requires customized modification to achieve a natural appearance. If designed properly, the abutment emergence supports the free gingival margin and papilla while maintaining adequate space for the biological width [20]. The EP needs to be created or maintained whereas in delayed implants, is achieved through customized provisional, healing abutments, a combination of prefabricated healing abutments and partial coverage provisional restoration, or by adapting the patient's own tooth[21]. The subgingival contour of the EP is divided into three main zones: the esthetic (E), bounded (B), and crestal (C) zones, each designed to perform specific functions. To achieve an optimal EP, these zones made with using PEEK abutment, a PMMA crown, additional and adjustments with flowable composite [10]. The provisional restoration should be worn for at least one month to allow proper conditioning of the peri-implant soft tissue complex. During this period, frequent follow-up visits are necessary [22].

This case report is limited by the fact that it presents a single case with relatively short follow-up period. Long-term outcomes with definitive restoration regarding peri-implant soft and hard tissue stability and esthetic maintenance could not be fully assessed.

Conclusion

In this case report, soft tissue management guidelines were successfully applied to achieve an optimal EP and interdental papillae, resulting in a natural-looking esthetic outcome for the definitive restoration in the anterior maxilla, when immediate implant loading was not achievable due to insufficient primary stability. To prevent the collapse of the interproximal papilla and soft tissue contours following tooth removal, the patient's own crown was used to support these structures and provided esthetic comfort until osseointegration was achieved. Subsequently, a CAD/CAM-fabricated PMMA provisional crown on a PEEK abutment allowed precise shaping of the EP and interdental papilla, resulting in harmonious peri-implant soft tissue contours and high patient satisfaction. Accurate diagnosis, appropriate treatment planning, meticulous implant site development, and multifactorial approach are essential for clinical success and optimal esthetic results.

Conflict of Interest

The authors report no conflicts of interest related to this study.

Reference

1. Ikbal A., *et al*. "Black triangle and vitiated esthetic vis-à-vis management: a review". *The Traumaxilla* 4.1-3 (2022): 26-31.
2. Cardaropoli G., *et al*. "Tissue alterations at implant-supported single-tooth replacements: a 1-year prospective clinical study". *Clinical Oral Implants Research* 17.2 (2006): 165-171.
3. Araújo MG., *et al*. "Alveolar socket healing: what can we learn?" *Periodontology* 68.1 (2015): 122-134.

4. Portal-Solera A and B Pardal-Peláez. "Survival and Marginal Bone Loss in Immediate Post-Extraction Implants versus Delayed Implants: A Systematic Review and Meta-Analysis". *Oral* 4.3 (2024): 325-342.
5. Rehberger Bescos F., *et al*. "Marginal bone loss and associated factors in immediate dental implants: a retrospective clinical study". *International Journal of Implant Dentistry* 11.1 (2025): 25.
6. Chang M., *et al*. "Implant supported single-tooth replacements compared to contralateral natural teeth. Crown and soft tissue dimensions". *Clinical Oral Implants Research* 10.3 (1999): 185-194.
7. De Rouck T., *et al*. "The gingival biotype revisited: transparency of the periodontal probe through the gingival margin as a method to discriminate thin from thick gingiva". *Journal of Clinical Periodontology* 36.5 (2009): 428-433.
8. Romeo E., *et al*. "Surgical and prosthetic management of interproximal region with single-implant restorations: 1-year prospective study". *Journal of Periodontology* 79.6 (2008): 1048-1055.
9. Kois JC and JY Kan. "Predictable peri-implant gingival aesthetics: surgical and prosthodontic rationales". *Practical Procedures in Aesthetic Dentistry* 13.9 (2001): 691-698.
10. Gervyte J., *et al*. "Emergence profile management in the esthetic zone". *Stomatologija* 25.2 (2023): 47-54.
11. Huynh-Ba G., *et al*. "Immediate loading vs. early/conventional loading of immediately placed implants in partially edentulous patients from the patients' perspective: A systematic review". *Clinical Oral Implants Research* 29.16 (2018): 255-269.
12. Fernandes D., *et al*. "Effect of customized healing abutments on the peri-implant linear and volumetric tissue changes at maxillary immediate implant sites: A 1-year prospective randomized clinical trial". *Clinical Implant Dentistry and Related Research* 23.5 (2023): 745-757.
13. Kan JYK., *et al*. "Immediate implant placement and provisionalization of maxillary anterior single implants". *Periodontology 2000* 77.1 (2018): 197-212.
14. Noelken R., *et al*. "Immediate and flapless implant insertion and provisionalization using autogenous bone grafts in the esthetic zone: 5-year results". *Clinical Oral Implants Research* 29.3 (2018): 320-327.
15. Gonzalez-Martin O., *et al*. "Contour Management of Implant Restorations for Optimal Emergence Profiles: Guidelines for Immediate and Delayed Provisional Restorations". *International Journal of Periodontics and Restorative Dentistry* 40.1 (2020): 61-70.
16. Parate KP., *et al*. "Polyetheretherketone Material in Dentistry". *Cureus* 15.10 (2023): e46485.
17. Pardal-Pelaez B., *et al*. "Implant loss and crestal bone loss in immediate versus delayed load in edentulous mandibles: A systematic review and meta-analysis". *Journal of Prosthetic Dentistry* 125.3 (2021): 437-444.
18. Pandey C., *et al*. "Contemporary Concepts in Osseointegration of Dental Implants: A Review". *BioMed Research International* 2022 (2022): 6170452.
19. Schoenbaum TR and S Alawie. "Emergence profile of the implant abutment and its effects on the peri-implant tissues, in Implants in the Aesthetic Zone: A Guide for Treatment of the Partially Edentulous Patient (2018): 235-246.
20. Sun TC and TK Chang. "Soft tissue management around dental implant in esthetic zone - the current

concepts and novel techniques". *Journal of Dental Sciences* 19.3 (2024): 1348-1358.V

21. Grizas E., *et al*. "A detailed decision tree to create, preserve, transfer, and support the emergence profile in anterior maxillary implants using custom abutments". *Quintessence International* 49.5 (2018): 349-364.
22. Kan JY., *et al*. "Flapless anterior implant surgery: a surgical and prosthodontic rationale". *Practical Periodontics and Aesthetic Dentistry* 12.5 (2000): 467-474.