

CASE REPORT

Esthetic Outcome of Emergence Profile in a Single Tooth Implant Restoration

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ABSTRACT

In the past two decades, replacement of missing teeth with implant-supported prostheses has become a widely accepted treatment for oral rehabilitation of partially or fully edentulous patients. With the growing use of implant-supported oral rehabilitation in the partially edentulous patient and single tooth restoration, the emphasis has now changed toward achieving predictable esthetic success, particularly in the maxillary anterior region and patients who may show the peri-implant soft tissue when smiling and speaking. Establishing a soft tissue contour with intact interproximal papillae around implant-retained restoration is challenging, and failure to achieve these harmonious relationships of soft tissue around the implant may lead to unesthetic appearance. In the following case report, the patient presented with an unfavorable tissue contour around an implant restoration. Reshaping of soft tissue was planned. A combination of two surgical techniques was used, which includes a papilla reconstruction and interpositional graft for achieving desired esthetic for a single-stage implant. Following this, sequential molding of marginal gingival tissue was carried out using provisional restoration to obtain an emergence profile.

Keywords: Cast scraping procedure, Emergence profile, Implant positioning.

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INTRODUCTION

The treatment of a single missing maxillary anterior tooth in the esthetically prominent area has become more challenging for the dentist with the rise in esthetic expectations and demands of patients. The missing tooth can today be replaced by various treatment modalities like conventional

fixed partial denture, resin-bonded prosthesis, removable prosthesis, and single tooth implant.¹ Pretreatment evaluation of space available for the restoration, volume of available bone, and soft tissue are important diagnostic parameters for achieving a restoration with proper biologic contours.² The pretreatment shape of the available bone and soft tissue is the decisive indicator of the final esthetic result. Augmentation of the deficient bone volume is a well-established modality in implant dentistry.³ In the anterior maxilla, the placement of an implant in a prosthetically ideal position is often not possible because of the lack of soft tissue and sufficient bone, vertically or horizontally, making the achievement of ideal emergence profile difficult. An excellent esthetic outcome is dependent on the materials and techniques used, as well as on the combined efforts of a multidisciplinary team.⁴ This clinical report describes a treatment modality where the combined efforts of the periodontist and prosthodontist were significant to achieve an excellent esthetic result.

CASE REPORT

Outline of the Case

Diagnosis

A 24-year-old male patient visited the Department of Prosthodontics for replacement of his missing maxillary right central incisor and esthetic correction of the right lateral incisor. The patient reported dissatisfaction with the provisional removable partial denture that he had been wearing since 1 year, owing to discomfort and poor esthetics. Clinical evaluation revealed that maxillary right central incisor was missing and incisal edge of the lateral incisor was fractured (Fig. 1). Past dental history revealed that the



Fig. 1: Clinical evaluation of the patient

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right central incisor was extracted following endodontic complications 4 years earlier. The intraoral periapical X-ray revealed sound bone and sufficient amount of space suitable for placement of the implant. Two treatment modalities were possible: An anterior fixed conventional bridge or a semibonded (Maryland-type) bridge and placement of implants. Various treatment alternatives were discussed with the patient and replacement of the missing tooth was planned with an implant-retained prosthesis.

Treatment Plan

After thorough history, clinical examination, radiological evaluation, other necessary investigations, cost factor, and the patient's need for an immediate fixed restoration, it was decided to place 2.8 mm diameter and 13 mm insertion length single-stage implant in the edentulous space. Esthetic contouring and the ceramic crown for the right central and lateral incisors were planned.

Procedure

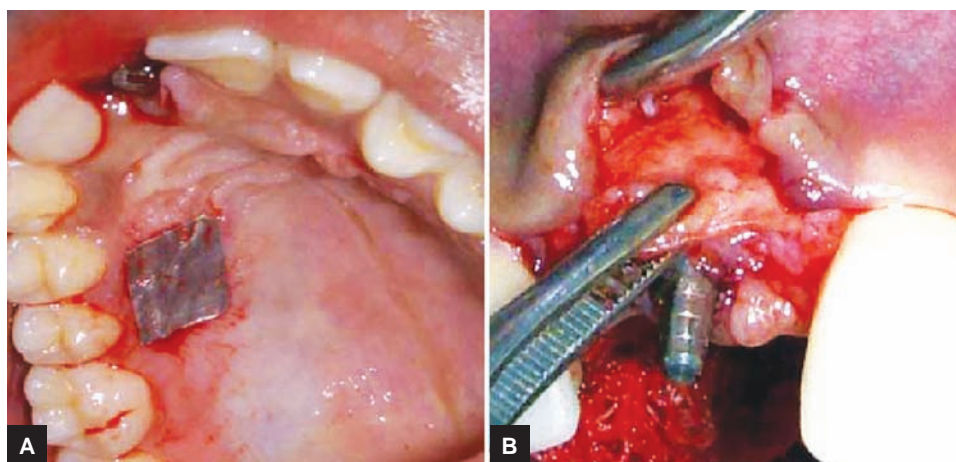
Thorough oral prophylaxis was performed before any intervening procedures were carried out. Radiographic and other required investigations were carried out to rule out any systemic conditions. Ceramic crown was given on right lateral incisor to improve esthetics before placement of the implant in the right central incisor area. Strict infection control measures were followed before and during implant placement surgery to avoid any contamination of the placement site and the implant. Diagnostic cast measurements revealed the mesiodistal width of the contralateral central incisor to be 7 mm, while that of edentulous space was 5 mm that was sufficient for implant placement. Radiographic assessment was done with a periapical radiograph of the site, taken after placement of a 4 mm ball bearing.⁵ Bone sounding with Wilson caliper⁶ and palpation of the proposed implant site revealed that the bone width at the crest level of the



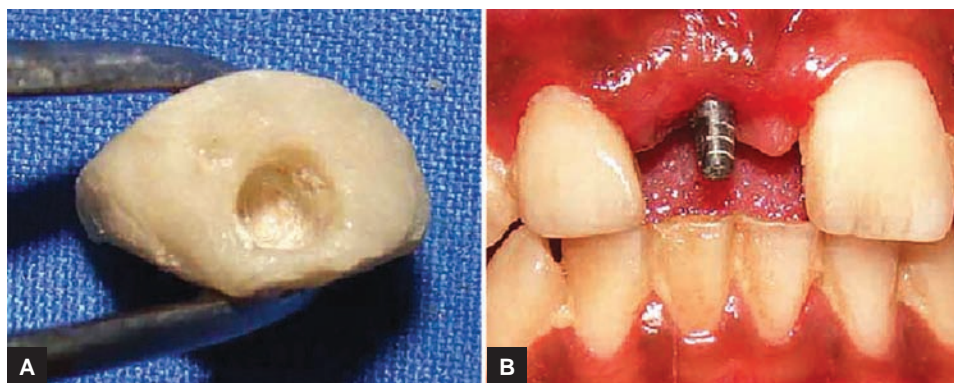
Fig. 2: Soft tissue discrepancy around implant was noted

edentulous area was adequate to place a conventional 2.8 mm diameter single-stage implant. A surgical template fabricated using a vacuum thermoformed sheet (Easy Vac Gasket, 3A Medes, Korea) was used to guide implant positioning during surgery and highlight the proposed gingival margin.⁷ After all necessary investigations, implant placement was performed. The temporary prosthesis was given to the patient. The patient was recalled after 6 months.

After evaluation, soft tissue discrepancy was noted surrounding the implant (Fig. 2). The tissues overlying the implant were of the thin flat periodontal biotype with minimal height difference between the highest and lowest points on the proximal and facial aspects of the marginal gingiva. Recontouring the soft tissue was essential to achieve a natural emergence profile. According to Tarnow et al,⁸ regeneration of the papilla is clinically achievable if proximal contact of the restoration is within 5 mm of the proximal crestal bone level. So, following procedures were performed at healing period: Subepithelial connective tissue graft was performed during the healing period; subepithelial connective tissue graft was harvested from



Figs 3A and B: Subepithelial connective tissue graft harvested from palate by trap door approach and repositioning of flap around implant



Figs 4A and B: Sequential molding of gingiva using provisional restoration followed by formation of interdental papilla achieving emergence profile

palate by trap door approach⁹ (Figs 3A and B); and a template was placed at the recipient site to harvest a graft of correct dimension. At the recipient site, tunneling was performed to create a pouch-like space beneath the labial mucosa. The intrasulcular incision was made around the necks of adjacent teeth, and papilla was undermined. The graft was inserted in the pouch and anchored with interrupted suture. After stabilization, the labial flap was positioned around the implant (Fig. 3). Preservation of interdental papillae was essential for an esthetic single tooth restoration. The height of the papilla depends on the height of the underlying crestal bone on the adjacent teeth. The probability of achieving adequate papillae decreases when the distance of crestal bone level of adjacent teeth to the proposed contact of the restoration increases.

After this surgical procedure, working cast was marked 1 mm wide around the implant site and scraped to a depth of 1.5 mm with a round bur (DFS, Germany) for fabrication of a provisional restoration (Protemp 4; 3M ESPE, Germany). Sequential molding of the gingival level was planned by periodic evaluation and refabrication of the provisional restoration (Figs 4A and B).¹⁰ Follow-up at 8 weeks revealed sharp, well-formed interdental papillae, and ideal emergence profile was achieved as envisaged (Fig. 4). At 6 months follow-up, the decision to fabricate a definitive prosthesis was made. The esthetically pleasing ceramometal prosthesis was fabricated and cemented (Fig. 5). The bone and soft tissue profiles were assessed 3 months after definitive restoration and found to be satisfactory. The Jemts papillary index was employed to grade the papillae levels and index score 3 (papillae filling the entire interproximal space) was observed between the restoration and adjacent natural teeth.¹¹ The patient was satisfied with the treatment outcome and reported increased confidence levels and better speech articulation.

DISCUSSION

Soft tissue grafting procedures have been used successfully for many years in implant surgery in resolving



Fig. 5: Definitive prosthesis

recession defects around natural teeth and augmenting alveolar ridge contours. The concept of optimal biological width around the natural tooth can be applicable to soft tissues around osseointegrated implants, because soft tissues also demonstrate relatively constant dimensions around the implants. Single implant procedure, particularly in the anterior maxilla, is esthetically the most demanding one and represents an esthetic challenge to the restorative dentist to provide restorations with normal appearing soft tissue bulk and form. Soft tissue augmentation procedures, using patient's masticatory mucosa (palate), have been routinely performed to create a new zone of attached keratinized gingiva. Soft tissue augmentation procedures are used for the concave rather than a convex profile of gingiva at the implant site, which is spotted after the resolution of swelling, following implant placement.

According to Tarnow et al,⁸ optimal conditions exist when the distance between the interproximal bone crest and the apical level at the proximal surfaces is less than 5 mm. If this distance exceeds 5 mm, the interproximal bone may be raised by guided bone regeneration or by orthodontic forced eruption. Soft tissue augmentation procedures using epithelial-connective tissue graft, interpositional connective tissue graft, roll technique, double papillae repositioned flap, etc., can be used for papillary

reconstruction.¹² Position and angulations of the implant also influence the growth of interdental papillae. Application of controlled pressure around the tissue surface of provisional restoration can be possible by recontouring of the working cast. This sculpting of the tissues around the abutment helps to achieve the planned emergence profile. Advantages of this technique are that it takes less chair-side time, permits precise control over the scrapping of cast, and tissue response can be observed at periodic recall visits.

CONCLUSION

A step-by-step multidisciplinary approach is used to mold existing tissues to achieve an esthetic result in implant-supported prostheses in the esthetic zone. Adaptation of treatment plan to comply with patients' needs and expectations is essential. Posttreatment evaluation of the prosthesis must be designed to appraise not only osseointegration and crestal bone levels, but also the position of the interdental papillae and emergence profile.

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