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Single Implant Restoration for Replacement of Extensively Damaged Maxillary Lateral Incisor using Two - Stage Surgical Protocol: A Clinical Report

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Abstract: ***The replacement of a single anterior tooth in esthetic zone is a challenging treatment. This report describes the replacing of extensively damaged maxillary right lateral incisor using an implant - supported restoration. After clinical and radiographic examination, the decision was made to extract the tooth and replace it with an implant. Therefore, tooth was atraumatically extracted then the alveolar ridge was attempted to preserve by using platelet - rich fibrin (PRF). Implant placement was delayed for 6 months due to the existence of the periradicular infection. Therefore, acrylic resin - bonded prosthesis as a transitional restoration was made to restore the esthetic and function during this period. A 3.25 mm diameter implant (Biomet3i) was placed after the healing of the area with allograft bone augmentation and resorbable membrane simultaneously. The tissues were approximated and sutured over the implant using the two - stage surgical protocol. After3 months, the implant uncovered, and the soft tissue was contoured with provisional restoration before the definitive impression making. Cement - retained all ceramic crown with a customized titanium abutment were used as a definitive restoration.1 - year after completing the treatment, no evidence of marginal bone loss or any other signs or symptoms of failure were found.***

Keywords: single implant, anterior implant, implant - supported restoration

1. Introduction

The single implant restoration for replacing of missing tooth become the ideal treatment modality these days due to the high success rate in several long - term studies.[1, 2]Implant dentistry revolution begun when Brånemark established the concept of osseo integration of dental implant and bone.[3]

Achieving a natural looking emergence profile with completely formed interdental papilla that fills the embrasures between the implant restoration and the adjacent teeth is considered often the most difficult aspect of implant restoration in anterior esthetic zone. Literatures found that when the measurement from the contact point to the crest of the bone was 5 mm or less, the papilla was present almost 100% of the time. When the distance is 6 mm, the papilla was present in 56% of the time. When the distance is 7 mm or more, the papilla was present in 27% of the time.[4]

Some evidence suggests implants can be placed immediately into sites with periapical and periodontal infections. The sites must be thoroughly debrided before placement. Guided bone regeneration is usually performed to fill the bone - implant gap and/or socket deficiencies.[5] While another literature suggests that immediate implants placement may be at higher risk of implant failure than delayed implants after 1 year of follow up.[6]

The original Brånemark protocol claimed the use of a two - stage surgical approach in which the implants were submerged for 3 - 6 months under the mucosa. This non stressed submerged implant was considered prerequisite to attain osseo integration. It was supposed also that soft tissue interposition would jeopardize the outcome if happened. After this period, a second surgery was required to initiate the prosthetic procedure, which considered one of the drawbacks of this approach.[7]

Linkow et al[8] was one of the first to try to load dental implants immediately; however, success was rather limited as a result of fibrous encapsulation.[9] Atieh et al[10] was published a systematic review with meta - analysis on this topic and concluded that more failures are to be expected following immediate loading of single implants when compared with delayed loading.

2. Clinical Report

A 24 - year - old, healthy woman presented with esthetic problem caused by extensively damaged of the maxillary right lateral incisor. All other maxillary anterior teeth have proximal and cervical caries lesion. Clinical and radiographic examination revealed that maxillary right lateral incisor had destructive structure with unfavorable prognosis, and it was indicated for extraction (Fig.1 and 2). The alternative treatment options for this patient consisted of traditional FDPs, cantilever FDPs, an acid etched resin - bonded prosthesis, or a single implant - supported restoration. After discussing the advantages and disadvantages of these options with the patient, single implant - supported restoration was selected because of its high esthetic and preservation of the adjacent teeth structure. The treatment plan was completed and the informed consent was signed by the patient. After local anesthesia, the tooth was atraumatically extracted, the socket was debrided then the alveolar ridge was attempted to preserve by using platelet - rich fibrin. Implant placement was delayed for 6 months due to the periradicular infection existence.

Therefore, Acrylic transitional resin - bonded prosthesis had constructed to restore the appearance and function during this period (Fig.3).

A 3.25 mm diameter implant (3i Biomet) was placed after the healing of the area with an allograft bone augmentation and resorbable membrane simultaneously. Then tissues were approximated and sutured over the implant using the two - stage surgical protocol. This protocol was selected because of the torque value during tightening of the implant was less than 30 Ncm. Most studies agree that achieving good primary stability is key condition to immediate loading protocol success.[11] Therefore, after 3 months, the implant uncovered, and emergence profile was contoured through provisional restoration for 6 weeks (Fig.4 and 5). Thereafter, Resin composite was added on the implant coping to transfer the created emergence profile to the laboratory technician before the definitive impression making (Fig.6).

Titanium abutment was selected due to its excellent biocompatibility and mechanical properties.[12] However, the main problem of this abutment is that its grayish color can show through the periimplant soft tissue, which is esthetically unacceptable.[13] Fortunately, the gingival tissue in the area of maxillary anterior teeth in this patient was considered as a thick biotype. The term periodontal biotype introduced by Seibert and Lindhe categorized the gingiva into “thick - flat” and “thin - scalloped” biotypes.[14] Thick gingival tissue is associated with a broad zone of the keratinized tissue and flat gingival contour suggestive of thick bony architecture.[15] It is well known in the literature that soft tissue thickness is a mainspring factor in the appearance, and if the tissue thickness is 3 mm, human eye can no longer detect the differences between titanium and zirconia abutment.[16]

Zirconia core with veneering ceramic restoration was selected to mask the color of the titanium abutment. In the delivery visit, after checking the contact, fitting over the abutment, occlusion, and shade of the cement - retained crown. The crown was cemented with zinc oxide eugenol cement to allow future retrieval (Fig.7). In fact, a study conducted by Kim et al[17] proved that decrease stress to the implant was obtained with provisional cement - retained prosthesis in comparison with permanent cement and screw - retained prosthesis.

Clinical and radiographic evaluation of the peri implant soft tissue and bone level were performed in the follow up and maintenance visits at 1 week, 6 and 12 months. No pain or tenderness during function, no mobility or significant marginal bone loss were detected (Fig.8). Meanwhile these visits, the patient oral hygiene was closely monitored and reinforced.

3. Summary

This clinical report demonstrated how to create a natural looking implant restoration when replacing an extracted anterior tooth by using two - stage surgical protocol. Contouring the soft tissue through provisional restoration before the impression making and then transferring this contoured emergence profile to the laboratory technician are substantial steps to produce an esthetic anterior implant restoration.

4. Conflicts of Interest

The author declares no conflicts of interest.

5. Figures

Figure 1: Preoperative frontal view of maxillary incisors.

Figure 2: Preoperative periapical radiograph of maxillary right lateral incisor.

Figure 3: Acrylictransitional resin - bonded prosthesis after one week of extraction.

Figure 4: Screw - retained provisionalrestorationfabricated on PreFormance® post (Biomet3i) at the day of second stage surgery

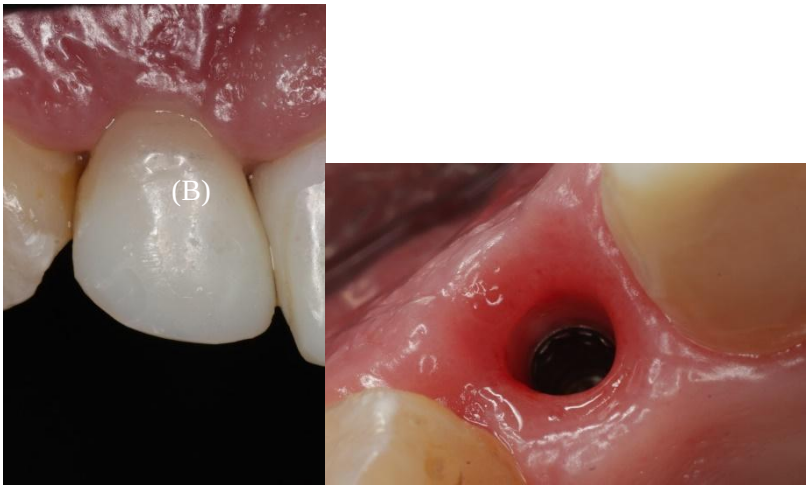

Figure 5: Periimplant soft tissue contour after 6 weeks of the second stage surgery (A) Frontal view with the provisional restoration in position, (B) occlusal view

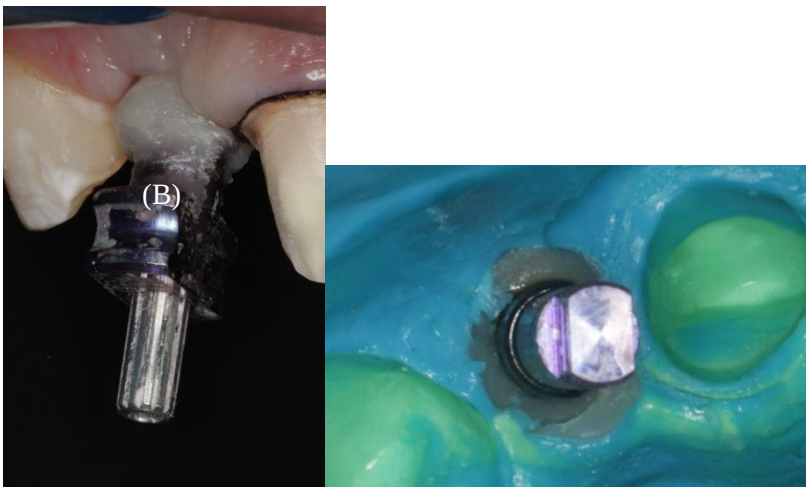

Figure 6: The customized impression coping with resin composite to transfer the emergence profile to the dental laboratory. (A) Impression coping in position, (B) and in the definitive impression.

Figure 7: Postoperative frontal view of the cement - retained implant restoration in compare with the contralateral tooth.

Figure 8.12: Months follow up of cement - retained implant restoration

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