Case Report

Restoring esthetics by immediately loaded implant placement

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Received: 02-12-2012
Revised: 23-12-2012
Accepted: 30-12-2012

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ABSTRACT

The replacement of a single missing anterior tooth with an implant-supported crown is a demanding therapy. This report describes a treatment in which an anterior maxillary implant was immediately restored with a provisional restoration. During the provisional phase, an optimal emergence profile was created by adjusting the provisional restoration. An impression was made with an individually fabricated impression post for an accurate reproduction of the established emergence profile and, finally, a screw-retained all-ceramic crown was placed. By implementing this protocol, an optimal definitive result could be achieved, together with immediate patient satisfaction.

Keywords: *Endodontically treated central incisor, single implant, provisional restoration, esthetic zone*

Introduction

The application of an implant-supported crown for the restoration of a missing single tooth in the anterior dentition is challenging. In the esthetic zone, both the appearance of the implant crown and the soft tissue contribute to a successful treatment outcome and should consequently be in harmony with the surrounding dentition. [1, 2] To accomplish the desired result, meticulous preoperative treatment planning is crucial, together with cooperation among several disciplines during the restorative phase. In the recent literature, several single tooth replacement treatment strategies using dental implants have been reported. [3, 4, 5, 6] In this case report, attention has been focused on immediate or early loading protocols in which a provisional restoration is placed soon after implant placement. Clinical studies of immediate or early loading have reported favorable treatment outcomes in terms of implant survival, marginal bone resorption, soft tissue level, and the incidence of complications of treatment in

which implants were inserted in healed sites, [5, 6] as well as treatment in which implants were placed in fresh extraction sockets. [7 ,8] Immediate or early implant loading provides several advantages for the patient, including a shorter overall treatment time, avoidance of a second-stage surgery, and elimination of the need for a removable prosthesis during the healing phase.

The purpose of this clinical report was to demonstrate an immediate implant loading protocol for restoration of a failed endodontically treated central incisor. After the provisional restoration phase, a definitive screw-retained 1-piece metal-ceramic crown was placed.

Case Report

A 25 year-old male reported to the department with chief complaint of pain in the endodontically treated left maxillary central incisor [Figure 1].

Fig. 1 Endodontically treated left central incisor

On intraoral examination, the tooth was tender on percussion. An intra oral peri-apical x-ray of tooth was advised, which showed an over-obturation of the root canal with the gutta percha extruding in the peri-apical region [Fig. 2]

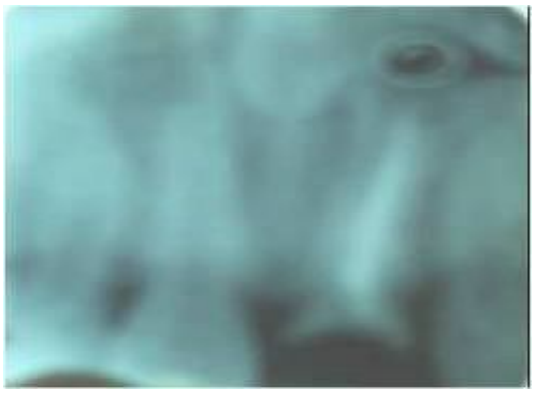

Fig. 2 Intra oral periapical x-ray showing over obturation with gutta percha extruding in peri-apical area

After discussing the various treatment modalities, restoration with implant placement followed by immediate loading protocol was planned for the patient. Clinically, adadequate bone volume was present at the future implant site. In all dimensions, sufficient space was available for an implant crown with an anatomical design. Because of the favorable starting point, it was decided to use an immediate loading protocol.

One day before surgery, the patient was advised to take antibiotic (amoxicillin 500 mg, 3 times daily for 7 days) and 0.2% chlorhexidine mouthwash for oral disinfection. Following administering of local anesthesia, the left central incisor was atraumatically extracted by means of luxators to prevent the labial and palatal cortical plates [Figure 3].

Fig. 3 Atraumatic extraction of left maxillary central incisor

After extraction of the tooth the root width and root length was measured by vernier calipers measuring 3.5 mm in width [Figure 4] and 9 mm in length [Figure 5].

Fig. 4 Vernier calliper used to measure root width of extracted left maxillary central incisor

Fig. 5 Vernier calliper used to measure root length of extracted left maxillary central incisor

After removal of the tooth atraumatically preserving buccal and palatal cortical plates followed by thorough curettage the implant measuring 3.5x 8.5 mm (Nobel Biocare) [Figure 6] was placed at the extraction site, according to the procedure prescribed by the manufacturer.

Fig. 6 Intra oral peri-apical x-ray of the patient showing the implant placement slightly palatally for better esthetics.

The shoulder of the implant was placed at a depth of 3 mm apical to the buccal and cervical aspect of the prospective clinical crown to provide soft tissue to develop an adequate emergence profile. Next, an open tray impression was made at the implant level using a custom acrylic resin impression tray and a polyether impression material (Impregum Penta; 3M ESPE, St. Paul, Minn). Finally, a healing abutment (Nobel Replace; Nobel Biocare AB) was placed, and the wound was closed with sutures.

In the dental laboratory, a screw-retained provisional restoration was fabricated, consisting of an engaging temporary abutment (Nobel Replace Temporary Abutment Engaging; Nobel Biocare AB) against which composite resin (Solidex; Shofu, Inc, Kyoto, Japan) was modeled. Eight hours following implant placement, the abutment was removed and the provisional crown was placed [Figure 7].

Fig. 7 Post operative view of the patient showing placement of provisional implant restoration for excellent esthetics

Special care was taken to prevent any centric and eccentric occlusion contacts with the antagonist teeth. Furthermore, the provisional restoration was contoured so that the peri-implant soft tissue was optimally supported. In particular, the interproximal papillae were given enough space to regenerate. The patient was instructed to follow a soft diet, to avoid exerting force on the provisional restoration, and to continue chlorhexidine rinses (Corsodyl; GlaxoSmithKline) for 7 days. For pain control, 600-mg ibuprofen was prescribed, to be taken 3 times daily for the time period needed and 2 weeks following surgery, the sutures were removed.

The patient returned to the prosthodontist once per month for 3 months for examination of the implant. During these appointments, oral hygiene, occlusion and implant mobility were evaluated. Also, an important objective was the creation of an ideal emergence profile by removing the provisional crown.

Three months later, an implant-level impression was made using an impression post (Impression Coping Implant Level Open Tray for Nobel Replace; Nobel Biocare AB) that was customized in such a way that the obtained emergence profile could be transferred to the definitive restoration. To achieve this, the provisional crown was assembled with an implant analogue (Implant Replica, NobelReplace; Nobel Biocare AB) embedded in type IV dental stone (GC Fujirock EP; GC Europe NV, Leuven, Belgium). An addition silicone impression of the cervical portion of the crown was made. In the dental laboratory, a soft tissue cast was prepared and metal ceramic crown was fabricated. The restoration was placed. Patient was quite satisfied with the esthetic appearance.

Discussion

This report describes an immediate loading protocol finalized with the placement of a metal-ceramic restoration. A major prerequisite for immediate loading is a high degree of primary stability in terms of high insertion torque. [9] In this treatment, an initial insertion torque of at least 45 Ncm was reached. Although clinical studies on immediate single implant loading reported varying minimal insertion torques for immediate loading, the authors of this report adopted a threshold of 45 Ncm. For this patient, a substantial maturation of the papillae occurred during the provisional phase. Care was taken to ensure that the provisional crown did not disturb this process, but served as a natural guide. Regeneration of papillae with time has been reported in several studies, [3, 4] but the mechanism behind this phenomenon could not validly be explained. Some authors believe that this increase can be attributed to the remodeling potential of the soft tissues to establish a proper biological height after the surgical manipulation. [1] It is widely accepted, however, that the interproximal bone level next to the adjacent teeth is important for the future level of the interproximal papillae of the implant. [2]

Finally, a screw-retained definitive restoration was fabricated. The advantages of this type of restoration compared to a cement-retained restoration include retrievability and no risk of cement remnants, thereby eliminating the possibility of irritation of the periimplant tissues by such remnants. However, the presence of a screw access opening decreases fracture resistance of the porcelain.[10] Furthermore, screw-retained restorations necessitate precise implant positioning for a proper palatal position of the screw access hole that does not interfere with esthetics.

The immediate implant placement is an increasingly common strategy to preserve bone and reduce treatment times includes the placement of a dental implant into a recent extraction site. In addition, immediate loading is becoming more common as success rates for this procedure are now acceptable. This can cut months off the treatment time and in some cases a prosthetic tooth can be attached to the implants at the same time as the surgery to place the dental implant.

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Cite this article as: Jurel SK, Gupta DS, Agarwal H, Singh RD, Aggarwal KK. Restoring esthetics by immediately loaded implant placement. Int J Med and Dent Sci 2013; 2(1):82-87.

Source of Support: Nil

Conflict of Interest: No