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Case Note

Dental implant for the replacement of anterior missing tooth in resorbed anterior ridge

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Abstract

The replacement of teeth in the anterior region of maxilla is most critical because esthetics, phonetics, function, occlusal pattern, and patient awareness blend to provide a very specific incisal edge and contour position. Various treatment options are available for the restoration of a single, maxillary anterior missing tooth. When possible, the independent implant and crown is the treatment of choice. The single tooth implant is indicated to improve the daily hygiene and decrease caries and endodontic risks to the adjacent teeth. FRIALIT-2 dental implant system with the internal hex design provides excellent stability for single tooth restorations. This case report describes the management of an anterior missing tooth using FRIALIT-2 implant.

Keywords: Anterior missing tooth, Dental implants, Single tooth replacement, Single tooth implant

Introduction

Dental implants have evolved into a predictable procedure for the treatment of fully and partially edentulous patients. The breakthrough in oral rehabilitation was initiated by the discovery that dental implants, made of commercially pure titanium, which can achieve anchorage in the jaw bone with direct bone-to-implant contact. This functional ankylosis referred as osseointegration was first described by the two research groups of Branemark and Schroeder[1]. The mechanism of osseointegration was well described by Davies[2]. Osseointegration, as first defined by Branemark, denotes at least some direct contact of living bone with the surface of an implant at the light microscopic level of magnification. Branemark advocates complete immobilization of the implant for 3 – 6 months before placing it in function[3].

The replacement of a single missing tooth is a challenging and demanding clinical endeavour. Not only must the crown conform to contour, shade, and texture, but the gingiva must also be in symmetry and harmony with the adjacent tissue. From 1993 to the present, single tooth implants have been shown to be the most predictable method of tooth replacement. Multiple studies of at least five years' duration demonstrate a higher survival rate than other methods of tooth replacement[4,5]. When a patient desires to avoid preparing adjacent teeth that have no caries, restorations or both and to enhance esthetics, a single tooth implant is the best solution. The treatment of single missing tooth with implant-supported crown is a standard therapy, provided strict, clearly defined indications are observed. These days, single tooth replacement is one of the most common procedures performed in implant dentistry and one of the most common site is maxillary anterior arch[3]. This paper depicts the use of a FRIALIT-2 implant for esthetic replacement of missing maxillary left central incisor of a 19 year male patient.

Case Report

A 19 year old male patient presented at the Department of Prosthodontics, Manipal College of Dental Sciences, Mangalore with a chief complaint of a missing tooth in the upper left anterior region. Past history revealed that the tooth got fractured due to contact sports 5 years back and subsequently the root portion of the tooth was extracted by a local dentist then. The patient reported no difficulties at the time of extraction of the root portion of the fractured tooth. His medical history was clear. On extra oral examination, there were no abnormalities observed. Intra oral examination showed that his oral cavity was in good condition. Soft tissues were normal and other hard tissues were sound.

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As per his chief complaint, 21 was missing (Fig. 1 & Fig. 2). The neighbouring teeth were caries-free without any signs of periodontal problems. Due to the long interval of partial edentulism, substantial hard and soft tissue loss had occurred and facial "hour glass" concavity could be noted apical to the edentulous region. Mesiodistal dimension of the edentulous region was slightly more than that of the adjacent central incisor. Width of the edentulous ridge was adequate and tissue overlying the ridge was firm and keratinized. Patient never used removable partial denture before.

Treatment alternatives were discussed with the patient and implant-supported restoration was agreed upon. The pre-implant diagnosis and bone mapping indicated the possibility for an implant with a diameter of 3.8 mm and length of 13 mm. A FRIALIT–2 implant with a grit-blasted and acid-etched surface was chosen.

The crestal incision was made to the palatal aspect of the edentulous region and a sulcular incision was carried on the proximal aspect of the adjacent teeth; the papillae were reflected as part of the mucoperiosteal facial flap. As facioplalatal width was 4 mm at the crest with a facial 'hour glass' concavity, bone spreading was carried out to expand the width of bone before implant placement. Osteotomy was begun 0.5 mm more palatal than the usual mid-crest position in order to place a slightly thicker bone on the facial aspect. Purchase hole to the depth of approximately 0.5 mm was made with no. 6 round bur at the centre of crest and 0.5 mm palatal to mid facial palatal dimension. Using an expansion instrument, bone expansion was done prior to the pilot drilling (Fig. 3). The expansion instrument, during the course of manipulation, penetrated to the depth of 5 mm – 6 mm. Following this, 2 mm pilot drill was used to penetrate till the depth of 13 mm.

Bone condensers were used in a sequential manner before following each drilling protocol. After the final drill of 3.8 mm diameter to the depth of 13 mm (Fig. 4), implant was ratcheted into the osteotomy site slowly until the top of the implant merged with the crestal bone level (Fig. 5). The implant was placed at the bone level to achieve minimum sulcus depth. The site was primarily closed by placing interrupted sutures. Post operative intraoral radiograph verified the proper positioning of the implant (Fig. 6).

Phase II surgery was performed after 4½ months considering the D3 bone density of the site. Healing was found to be satisfactory with normal soft tissue contour. The implant was uncovered and healing abutment was placed. After two weeks of the stage II surgery, patient was recalled for the prosthetic procedure. On removal of the healing abutment, gingival thickness was found to be of 3 mm. With a special tray, implant level impression was made using additional silicone (polyvinyl siloxane) impression material. For this procedure, a transfer coping was inserted into the implant body and closed tray impression technique was followed. After making the impression, the permucosal healing abutment was reinserted into the implant body until the next restorative appointment. Later, the transfer coping was removed, connected to implant body analog, and reinserted into the impression. A master cast was poured. An occlusal bite registration was made in centric occlusion.

The master cast was mounted to the opposing arch with the bite registration. We selected a 3.8 D, MH-6, straight abutment with gingival height of 2 mm to have a crown margin 1 mm below the free gingival margin. The implant abutment was modified for height and parallelism (Fig. 7). A full-contour wax-up and cut-down of 2 mm in the regions of porcelain was made on metal coping. After satisfactory metal try in, prosthesis was completed. In the following appointment, the soft tissues were healthy, the patient's home care was found satisfactory, and thus the restoration was cemented (Fig. 8). The patient was recalled after a month for maintenance appointment. The soft tissue and hard tissue surrounding the implant revealed stable periimplant condition. Further he was recalled every 3 to 4 months for oral hygiene examination.

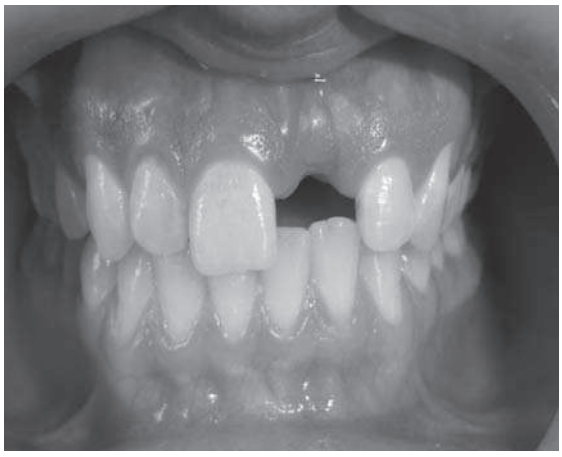

Fig. 1: Intraoral photograph showing missing left central incisor

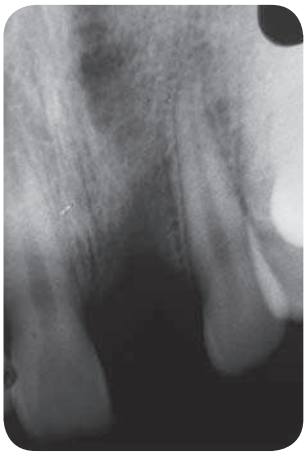

Fig. 2: Pretreatment inraoral radiograph

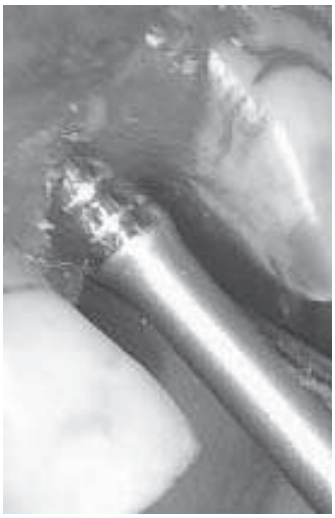

Fig. 3: Bone expansion

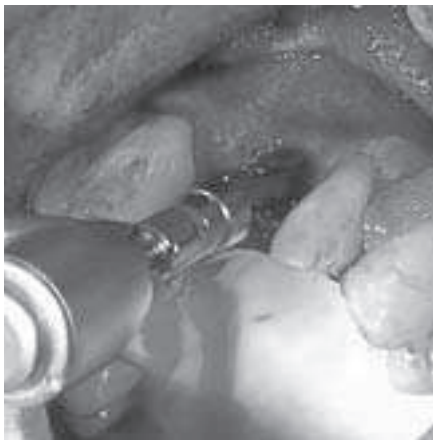

Fig. 4: Implant site preparation

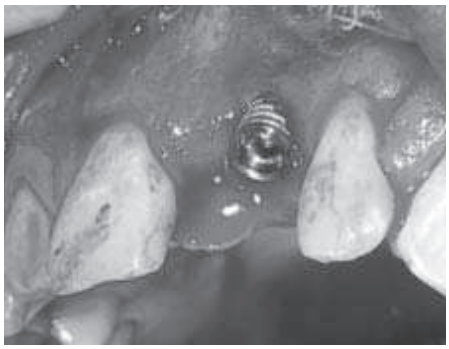

Fig. 5: Insertion of FRIALIT-2 (3.8D, 13mm) implant

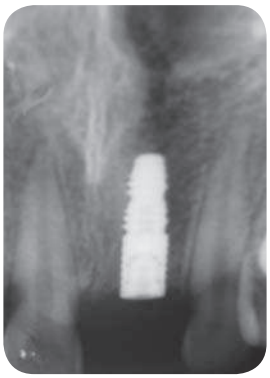

Fig. 6: Intraoral radiograph immediately after implant insertion

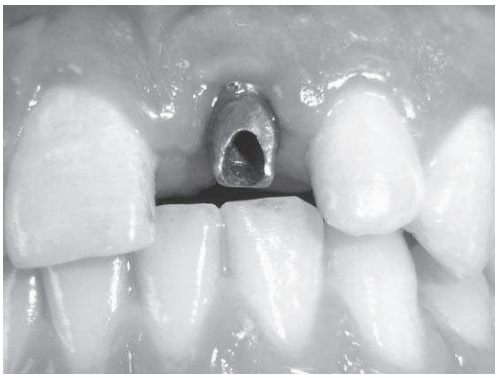

Fig. 7: Intraoral picture showing modified abutment

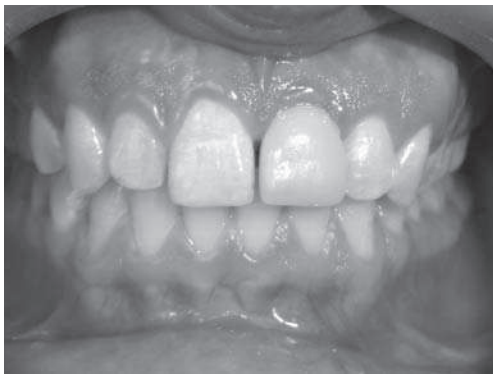

Fig. 8: Intraoral picture after PFM crown cementation

Discussion

Implant dentistry has become successful because of the biological properties of titanium. Studies have advocated a 2-stage surgical protocol for load-free and submerged healing to ensure predictable osseointegration. It has been advocated that after implant placement, surgical site should be undisturbed for a period of 3-6 months, depending on the bone quality, to allow uneventful wound healing, thereby enhancing osseointegration between the implant and bone. The rationale behind this approach is that implant micromovement caused by functional force around the bone-implant interface during wound healing may induce fibrous tissue formation rather than bone contact, leading to clinical failure[6]. In addition, primary closure of the implant after stage I surgery has also been thought to prevent infection and epithelial downgrowth[7,8]. Branemark theorizes that the implant must be protected and completely out of function, as he envisions a healing phase up to 12 months in which new bone is formed close to immobile, resting implant; remodeling phase of 3 to 18 months when the implant is exposed to masticatory forces; and a steady state after 18 months, in which there is a balance between the forces acting on the implant and remodeling capacities of the anchoring bone[3]. These days, loading implant right after placement has gained popularity among clinicians. Data from the current available literature suggest that several factors may influence the results of immediate implant loading. These could be divided into the following four categories: surgery-, host-, implant-, and occlusion-related factors. Primary implant stability is a key factor to consider before attempting immediate implant loading. It is important to note that a meticulous case selection is still needed to integrate this treatment into daily practice[9].

Management of an anterior missing tooth can pose a challenge to practitioners. The alternative treatment options for the restoration of a single, maxillary anterior missing tooth include a fixed partial denture, a removable partial prosthesis, and acid-etched resin-retained prosthesis or an implant supported prosthesis. For many years, conventional fixed bridgework was considered be the best treatment option for the replacement of a missing single tooth. The survival of this type of restorations was

estimated to be about 75% after 15 years. Although this estimate is considered to be a fair result, the high investment in terms of both biological and economical costs requires less demanding alternative treatment[10,11]. The most commonly observed contraindication for traditional fixed prosthesis is the patient's desire. Patients are more concerned regarding the appearance of anterior teeth and wish to keep adjacent teeth intact. A second option is to restore the anterior edentulous site with a removable partial prosthesis. A common axiom in restorative dentistry is to use a fixed prosthesis whenever possible. The usual indication for removable option is the low cost. A third option to replace the single maxillary anterior tooth is resin-bonded prosthesis. Research groups in several centres have demonstrated that the resin-bonded bridge may function for years. Nevertheless, adequate case selection is difficult and failures in performing have diminished credibility amongst dentists, despite the conservative nature of the technique[12,13].

In clinical situations where adjacent teeth are healthy, with acceptable esthetics and contour or in the presence of diastema that the patient wishes to maintain, or when the patient refuses the preparation of adjacent teeth for the fabrication of three unit fixed partial restoration, a single tooth implant is the best solution. Studies have shown that single-tooth implant restorations are a valid and lasting treatment alternative to conventional prosthetic treatment. Jemt et al[14] reported one failure out of 70 single-tooth implants inserted with 98.5% survival rate at 3 year. Schimtt and Zarb[15] reported no failures for 40 implants placed in 32 patients. In 2002, Krennmair et al[16] reported 146 single-tooth implants, with the FRIALIT-2 system, placed in 112 patients with cumulative implant survival rate of 97.3% at 7 years follow up. Implant retained single-tooth replacements do save adjacent teeth from treatment, but the operative procedure is extensive. Predictable results have been reported when clinicians adhere to the recommended protocol for placement and reconstruction.

Conclusion

The primary reason to suggest or perform a treatment is often not related to the cost, time, or difficulty to perform the procedure, but lays in the best possible long-term solution for each individual patient. The single tooth implant is indicated to improve the daily hygiene and decrease caries and endodontic risks to adjacent teeth. Replacement of missing maxillay left central incisor with dental implant resulted in successful implant angulation and stable periimplant condition.

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