RESEARCH PAPER | Medical Science | Volume : 4 | Issue : 8 | August 2014 | ISSN - 2249-555X

Replacement of Maxillary Central Incisor with Mini Dental Implant in Narrow Edentulous Space: A Case Report.

KEYWORDS: Mini dental implant, Narrow edentulous space, Tooth replacement.

Dr. Jitendra J. Mete

Assistant Professor, Department of Prosthodontics, Pandit Deendayal Upadhyay Dental College, Solapur, Maharashtra, India. 413255.

ABSTRACT *The success rate of dental implants in the edentulous mouth has encouraged dentists to extend this application to the replacement of single missing teeth. The use of standard-sized or of wide-diameter implants is suggested to allow favorable contact surface between the bone and the implant itself. Occasionally, lack of space does not allow the dentist to place implants of such dimensions. An adequate solution in these cases, when single-tooth restorations are needed and the space is not sufficient to insert a standard or a wide diameter implant, is the mini dental implant. Review of literature suggest that single-tooth mini dental implant restoration can be a successful treatment alternative to solve both functional and esthetic problems in cases where space problems limit the use of wide diameter implants. In this article a case of successful use of mini dental implant in patient with narrow edentulous space for the replacement of maxillary central incisor is presented.*

Introduction

Loss of tooth not only causes difficulty in mastication, but is also psychologically disturbing on the part of the patient, as it compromises both, esthetics as well as speech. For these reasons, most patients want even a single lost tooth replaced[1]. Conventional rehabilitation of missing teeth with removable prostheses causes many problems like difficulty in mastication, psychological problems, poor esthetics, poor retention, and stability of prosthesis; all these leading to lack of confidence. In addition to these problems, fixed prostheses also require unnecessary grinding of adjacent healthy teeth, caries, short life span of prosthesis, etc.

In 1952, professor Per-Ingvar Brånemark discovered that metal implants could be structurally integrated into living bone with a very high degree of predictability and without long-term soft tissue inflammation or ultimate fixture rejection[2]. Brånemark named the phenomenon osseo integration initially defined at a light microscopic level as "a direct structural and functional connection between ordered living bone and the surface of a load-carrying implant[3]." Conventional theory held that the use of a standard size or a wide diameter implant was essential to ensure adequate bone-to-implant contact. It has been reported that space between implant and adjacent natural tooth should be at least 1.25 mm, of which 0.25 mm space is required for periodontal ligament and 1 mm is required for bone to ensure proper blood supply necessary for osseo-integration of implant. Small diameter implants mini dental implant are the preferred treatment modality in cases of limited anatomical geography where mesio-distal space between two adjacent teeth is inadequate (<6 mm) to place conventional smallest diameter implants (3.75 mm). Specifically, mini dental implants are indicated for the replacement of teeth with small cervical diameters and in cases of reduced inter-radicular bone[4]. They have also been shown to be a viable alternative to bone augmentation when poor alveolar ridge width is encountered[5] and in cases of restricted mesio-distal anatomy[6]. Unlike standard implants, mini dental implants allow immediate loading. These implants require drilling of bone only, one third to half of the total implant length, and are self-tapped firmly into the bone, so integration is immediate. Balkin et al.[7] reported that histologically, the bone appeared to be integrated to the surface of the mini dental implants at the light microscopic level, and the bone appeared to be relatively mature and healthy. Proposed advantages of the use of mini dental implants include reduced bleeding, decreased post-operative discomfort, shortened healing time, placement into narrow ridges, and reduced cost.

Here a case is presented in which mini dental implant was used to replace maxillary central incisor as an alternative to bone augmentation in edentulous space with poor alveolar ridge width.

Case Report

Thirty years old female patient presented to the department of Prosthodontic with chief complaint of missing upper front tooth. Detailed case history, clinical, & radiographic examination was done. Medical history did not reveal any significant finding. Patient gave a history of extraction of maxillary left central incisor 2 years back. On clinical examination maxillary left central incisor edentulous space was found to have inadequate width buccolingually & on intraoral periapical radiographic examination there was inadequate width mesiodistally between nasopalatine cannal & left lateral incisor (Figure.1, & 3). Various options for the replacement of tooth were discussed with patient. Considering patient's desire, economic, & anatomic constraints it was decided to replace maxillary left central incisor with mini dental implant. Mounted diagnostic casts of patient were used to analyze occlusion, & for diagnostic wax up. Diagnostic & surgical stent was fabricated from diagnostic wax up putty index (Aquasil soft putty, Dentsply) in clear self-cure acrylic resin (DPI, Mumbai). After analysis of computed tomographic scan images of maxilla it was decided to place mini dental implant 2.4 mm wide and 13 mm long, endosseous self-tapping screw form, large grit sand-blasted and acid-etched titanium with integrated abutment (HI-TEC, TRI-N, life care, Mumbai, India).

The implant placement was performed under local anesthesia (2% lidocaine with 1:80,000) and pre-medication. With no. 15 blades incision was made, & flap was reflected (Figure.2). The surgical guide template was positioned, and round bur was used to mark the potential implant site.

Volume : 4 | Issue : 8 | August 2014 | ISSN - 2249-555X

Round bur (D 1.5 mm) was used to make a depression in the compact bone, which acted as a purchase point for surgical drills. Pilot drill (D 2.0 mm) was inserted along the correct axis to the depth of one third to half of the length of the implant with minimum pressure. Then, the plastic mount was removed and insertion tool TIT is connected. Using the Combo wrench, the implant was inserted until the desired depth was reached. Torque value of 30-35 nN/cm was recorded on rachet. The flap was sutured with 3-0 mersilk with interrupted suture around the neck of the implant. Five days post-operative course of antibiotic and analgesic was given. Post-operative instruction was given and asked to do thorough mouth rinse (0.12% Hexidine mouthwash).IOPA And OPG radiographs were taken post-operatively to evaluate implant position and proximity to vital structure (Figure.3).

After seven days of implant placement, suture removal was done. Minimal abutment preparation for transitional prosthesis was done. Transitional acyclic prosthesis (DPI, Mumbai) was cemented in infra-occlusion (Figure.4). After 3 months period of soft tissue healing, transitional restoration was removed, abutment preparation was done, and final impression was made with polysiloxane impression material (Aquasil soft putty and light body, Dentsply). Porcelain (Ivoclar vivadent) fused to metal crown was cemented in place (Figure.5, 6, & 7). Instructions regarding oral hygiene maintenance were given to the patient. Follow up was done at 3 months interval for 1year after final prosthesis cementation. At 1 year follow up visit radiographic & clinical examination revealed absence of clinical mobility, & bone loss, with healthy Periimplant gingival tissue. Patient expressed satisfaction with esthetic & function of prosthesis.

Discussion

The mini dental implant is a one-piece implant that does not require a separate abutment. This simplifies the restorative phase resulting in a reduced cost for the patient. The mini dental implant was initially designed for temporary prosthetic stabilization during the healing phase of standard implants[8]. The mini dental implant is also used for orthodontic anchorage[9] and temporary fixation of transplanted teeth[10]. Its success in these procedures has led to its use in long term fixed and removable dental prostheses [11, 12, 13]. Conventional implant treatment requires adequate bone width and interdental space. Augmentation procedures can be used to overcome these problems[14] but these techniques are complex and can cause post-operative pain and discomfort for the patient as well as incurring additional costs. The mini dental implant can be used in many such cases to overcome these kinds of limitations[15]. The percentage bone to implant contact for mini dental implant is comparable to conventional implants[16].

After placement of the mini dental implant a patient can have an immediate temporary prosthesis fitted. An extended healing period with mini dental implant is usually not necessary[14]. The pull-out strength of an implant has been shown to be based on its length rather than its diameter[17]. The surface area of five mini dental implant implants is considered to be equivalent to two traditional 3.75mm implants of equal length[11].

Due to economic & anatomic constraints of the patient in the present case, mini dental implant was used to replace missing maxillary left central incisor, which is an acceptable alternative in cases where space problems limit the use of standard or wide diameter implants. In the present case complex surgical procedure for bone grafting was avoided which reduced the cost of treatment, & associated morbidity[18].

Conclusion

The successful treatment with mini dental implant in present case & evidence from literature suggest that single-tooth mini dental implant restoration can be a successful treatment alternative to solve both functional and esthetic problems. They may represent the preferred choice in cases where space problems & economic constraints limit the use of standard or wide diameter implants requiring complex surgical procedures.

Figure Legends

Figure. 1 - Maxillary left central incisor edentulous space occlussal view.
Figure. 2 – Flap reflection.
Figure. 3 - IOPA radiograph after implant placement.
Figure. 4 – Provisionalisation.
Figure. 5 – Metallic coping trial.
Figure. 6 - Porcelain fused to metal prosthesis cemented in place.
Figure. 7 – Extraoral view after cementation of final pros thesis.

REFERENCE

1. Carl E. Misch. Text book of Contemporary implant dentistry.3rd Ed. New Delhi; Elsevier; 2012. p: 11. | 2. Brånemark PI. Osseointegration and its experimental background. J Prosthet Dent 1983; 50:399-410. | 3. Hansson HA, Albrektsson T, Brånemark PI. Structural aspects of the interface between tissue and titanium Implants. J Prosthet Dent 1983; 50:108-13. | 4. Davarpanah M, Martinez H, Tecucianu JF, Celletti R, Lazzara R. Small-diameter implants: Indications and contraindications. J Esthet Dent 2000; 12:186-94. | 5. Froum SJ, Cho SC, Cho YS, Elian N, Tarnow D. Narrow-diameter implants: a restorative option for limited interdental space. Int J Periodont Rest Dent. 2007; 27:449-55. | 6. Mangano C, Bartolucci EG. Single tooth Replacement by Morse taper connection Implants: A, Retrospective study of 80 Implants. Int J Oral Maxillofac Implant 2001; 16:675-80. | 7. Balkin BE, Steflik DE, Naval F. Mini dental implant insertion with the auto-advance Technique for ongoing Applications. J Oral Implantol 2001; 27:32-7. | 8. Sendax VI. Mini-implants as adjuncts for transitional prostheses. Dental Implant Update 1996; 7: 12-15. | 9. Kanomie R. Mini-implant for orthodontic anchorage. J Clin Orthod 1997; 31: 763- 767. | 10. Nagata M, Nagata S. Mini-implant is effective as a transitional fixation anchorage for transplantation of teeth. Japan J Cons Dent 2002; 45: 69-73. | 11. Englsh CE, Bohle GC. Diagnostic, procedural, and clinical issues with the Sendax mini dental implants. Compendium 2003; 24 (Suppl.1):1-23. | 12. Shatkin TE, Shatkin S, Oppenhemer AJ. Mini dental implants for the general dentist: A novel technical approach for small-diameter implant placement. Compendium 2003; 24 (Suppl 1): 26-34. | 13. Mazor Z, Steigmann M, Leshern R, Peleg M. Mini-implants to reconstruct missing teeth in severe ridge deficiency and small interdental space: A five year case series. Implant Dent 2004; 12; 336-341. | 14. Choi R. Incorporating mini-implants within the general dental practice. Pract Proc Aesth Dent 2007; 19 (Suppl): 1-5. | 15. Siddiqui AA, Sosvicka M, Goetz M. Use of mini implants for replacement and immediate loading of two single-tooth restorations: A clinical case report. J Oral Implantol 2006; 32: 82-86. | 16. Simon H, Caputo AA. Removal torque of immediately loaded transitional endosseous implants in human subjects. Int J Oral Maxillofac Implants 2002; 17: 839-845. | 17. Block MS, Delgado A, Fontenot MG. The effect of diameter and length of hydroxyapatite-coated dental implants on ultimate pullout force in dog alveolar bone. J Oral Maxillofac Surg 1990; 48: 174-178. | 18. Paolo Vigolo, Dr Odont, Andrea Givani. Clinical evaluation of single-tooth mini-implant restorations: A five-year retrospective study. J Prosthet Dent 2000; 84:50-4. |