

CASE REPORT

Single-tooth Replacement by Dental Implant: Factors affecting Treatment Modalities

Khyati Madia

ABSTRACT

Tooth loss can cause functional, social, psychological, and esthetic consequences among patients. The treatment modality chosen can impact their well-being. Despite the high success rate among patients, single-tooth implant placement comes with challenges. This case report evaluates the factors affecting the treatment modalities and considerations required to place single-tooth dental implants in patients.

Keywords: Dental implants, Single-tooth implant, Treatment modalities.

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INTRODUCTION

Tooth extraction is always accompanied by a loss of soft and hard tissues. The subsequent ridge deformity may cause severe esthetic and functional problems. Implant dentistry has become an integral part of routine dental practice. It should be considered as the first treatment modality to replace missing teeth. The replacement of a single molar with single implant has been shown to be an effective treatment modality.^{1,2} However, this presents various challenges. To achieve a predictable and durable restoration, visualization of the final restorative reconstruction is necessary prior to onset of treatment. The purpose of this article is to report on a single implant and the successful replacement, functionally, esthetically, socially, and psychologically, of a mandibular molar.

CASE REPORT

A 19-year-old female in excellent health, with no known allergies or sensitivities to medications, presented to a dental clinic in Mumbai with the chief complaint of "difficulty in chewing and so want to replace my missing

tooth" (Fig. 1). Initial clinical evaluation revealed that the patient's general periodontal condition was healthy, despite the fact that she did not seek regular professional oral hygiene assistance. Tooth 36 had a history of gross decay due to dental caries. The tooth was determined to be nonrestorable and was extracted. The orthopantomogram (OPG; Fig. 2) confirmed the clinical findings and further notes the presence of an overerupted 26, impacted 18 in horizontal position, and various artifacts. The patient was presented with the following treatment options for the replacement of the mandibular left first molar. One option was a three-unit fixed partial denture using teeth 37 and 35 as abutments. However, an implant restoration for the replacement of the edentulous space at tooth 36 was determined to be a more conservative option. An alternative option was to use Osstem implants (Osstem Implant Co., Ltd.) to support a ceramic crown. Alveolar bone analysis was done using cone beam computed tomography. The



Fig. 1: Missing tooth 36



Fig. 2: Orthopantomogram confirming the clinical findings

Private Practitioner

Dr. CH Mehta's Clinic, Mumbai, Maharashtra, India

Corresponding Author: Khyati Madia, Private Practitioner, Dr. CH Mehta's Clinic, Mumbai, Maharashtra, India, e-mail: khyati.madia@gmail.com

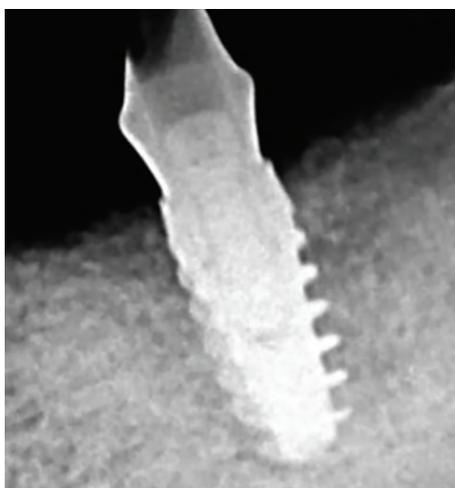


Fig. 3: Radiograph of single implant

measured height was 17.16 mm, the width was 4.96 mm, and length was 6.76 mm. Thorough ultrasonic scaling and maintenance were performed prior to implant placement. The patient was injected 1:200,000 adrenaline in local anesthetic (Lignox[®]). The osteotomy sites were prepared using a pilot drill followed by verification using direction indicators. Sequential drilling was done up to the final dimension of the implant and one implant was placed in relation to teeth #36 (Fig. 3). Postoperative homecare instructions were given, which included toothbrushing, 0.12% chlorhexidine rinse, and postoperative medication: Amoxicillin 500 mg and metronidazole 400 mg thrice daily for 5 days along with paracetamol for 3 days. Sutures were removed after 7 days, at which time adequate wound healing was seen. Impressions were made after 4 months and subsequently zirconia crown was loaded in relation to teeth #36. One year postoperative review revealed no evidence of mobility, paresthesia, bone loss, or a peri-implant lesion. The peri-implant soft tissue around the site showed no signs of inflammation.

DISCUSSION

Single-tooth implant restorations are individual free-standing units similar to conventional single crowns, and are normally cemented to prefabricated or customized abutments. They can be screw retained also. Single-tooth implant placement can sometimes be challenging for new clinicians. There are many factors affecting treatment modalities while placing a single-tooth implant. First criteria are bone density determinants in treatment planning; implant design, surgical approach, healing time, and type of loading during prosthetic reconstruction.³ The second important factor is edentulous space consideration. The following guidelines⁴ should be used when selecting implant size and evaluating mesiodistal space for implant placement:

- The implant should be at least 1.5 mm away from the adjacent teeth.

- The implant should be at least 3 mm away from an adjacent implant.
- A wider diameter implant should be selected for molar teeth because of the high occlusal loads.

Thirdly, the height, buccolingual width, and contour of the ridge can be visually assessed. The careful palpation of the ridge will detect any presence of concavities. If the overlying tissue is fibrous or thicker, accurate assessment may be difficult with visual assessment and palpation.⁵ The fourth important factor is crown height. The ideal vertical dimensions of each region are 3 mm for the soft tissue,⁶ 5 mm for the abutment height,⁷ and 2 mm for the occlusal metal or porcelain. The screw-retained restorations generally require lesser crown height space as compared with the cement-retained prosthesis since it can screw directly onto the implant body. Periodontal examination is the fifth important aspect. It includes assessment of both soft and hard supporting tissues of the dentition. An adequate collar of keratinized tissue provides a healthy emergence suitable to resist trauma from mastication, and allows for more convenient prosthetic procedures⁸ and oral hygiene measures. The sixth important aspect is to assess the restorative and endodontic status of the patient, so that the future implant sites are not at risk. Pathological changes, restorations, and the need for root canal treatment should be evaluated. The seventh important aspect is the inclination of the adjacent teeth. It is a very important parameter to assure adequate implant teeth distance to avoid interference from a convergent root during implant placement.⁹ A panoramic or periapical radiograph can offer a basic clue to inter-root space. The eighth important aspect is the height of the available bone. It is measured from the crest of the edentulous ridge to the anatomical landmarks that limit the placement of the implant. The assessment of implant length should allow an adequate safety margin of approximately 2 mm. The ninth important aspect is the occlusal analysis. Masticatory forces developed by a patient restored with implant-supported restorations are equivalent to those of a natural dentition,¹⁰ and implants can tolerate the axial load better as opposed to lateral loads.⁸ Also, implant-supported restorations are more susceptible to occlusal overloading than natural teeth. Intraoral examination along with mounted diagnostic casts is used to evaluate the type of occlusal scheme and guidance in lateral and protrusive movements.¹¹ Key determinants mentioned earlier are very important, other than that pretreatment diagnoses which are useful are preimplant imaging, which involves all radiographic examinations that assist in determining the patient's implant treatment plan, use of steel radiopaque marker, using surgical guide template, using dentures as guide, and making a diagnostic wax-up.³ Along with this, having soft skills is also very important

like effective communication. Effective communication between the clinician and the patient is very crucial. After the evaluation of the data, a separate consultation appointment is arranged to present the ideal treatment plan to the patient along with the predictable treatment alternatives. This will help the patients to understand the extent of the problem.¹² Finally, the last and the most important criterion is to obtain informed consent from the patient before the commencement of the treatment.

CONCLUSION

Although patients have various options for replacing a missing tooth, treatment with a dental implant has become the new standard of care. Treatment of a single tooth is a routine challenge in dentistry. Clinicians should consider single-implant replacement in future by using effective treatment modalities for best possible treatment outcome.

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