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Designing the Occlusion for a Single Tooth Implant in a Compromised Occlusion

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ABSTRACT

Single implant restorations are fast becoming the treatment of choice for many partial edentulous situations because of inherent advantages they possess. Indicated for many clinical conditions that range from ideal to imperfect, single tooth implant restorations provide competent functional option to natural teeth. Although there are various determinants for single implant prosthetic option, one factor that decides its ultimate success is the patient's occlusion. As there is no occlusion that is ideal therefore this article in the form of a clinical case report discusses designing of single implant restorations in compromised occlusion.

Keywords- *occlusion, abutment, fixture, Osseointegration, crown*

INTRODUCTION

Since the advent of the work done by Branemark and his associates,^[1] the field of implant Prosthodontics has been the subject of extensive research in dentistry for the last two decades.

During this period, focus of research has largely been on biological aspects that includes Osseointegration and bone physiology. Publications in the field of implant dentistry have shown a less

number of failures than what should be anticipated after Branemark and his associates laid down the criteria for the success of an implant.^[1] However, single tooth implants in the management of patients with compromised occlusion has remained uncertain, controversial and the subject of considerable debate.^[2-8] An area of concern, where single tooth implants have shown more failures is in patients whose existing occlusion is different or compromised.^[9-11]

Dental occlusion is complex because it is dynamic in nature and changes not only with time but also with events. Perhaps an inability to recognize and anticipate these changes in occlusion is a major cause of failures for which studies are non-existent. This article is an attempt to present one such case where future changes in occlusion were anticipated and incorporated in the existing treatment plan which ultimately led to success of a single implant posterior crown.

CASE REPORT

An elderly male patient aged 38 years, reported to the department of Prosthodontics with chief complaint of dissatisfaction with his existing dentition in terms of masticatory performance. Medical, social and drug history was non-contributory. Dental history included loss of mandibular first molars on both sides since last 2 years due to decay. There was no history of wearing prosthesis because the patient did not want to either wear a removable prosthesis nor a fixed partial denture. The patient's preference for implant supported prosthesis was exemplary. Extra oral examination revealed a decrease in the lower third

of the face with protrusion of the mandible. Intra oral findings included absence of mandibular first molars on right and left side with lost anterior guidance and canine being worn out but still managing to protect anteriors and posteriors when lateral movement of the mandible was done (**Fig 1**). Radiographic evaluation of the patient showed enough width and length to place a minimum size of CeraOne system (Nobel Bio care, Goteborg, Sweden) implant. After clinical, radiographic and biochemical evaluation of the patient a treatment plan was presented to him that included oral hygiene maintenance program followed by implant supported single crown in relation to the missing molars.



Figure 1: Intra oral view of Kennedy class 3 modification 1 situation

Preliminary impressions were made and the diagnostic casts, thus obtained were mounted on a semi adjustable articulator. A diagnostic cum radiographic splint (**Fig. 2**) was fabricated that would enhance the correct placement of the implant fixture. At the first stage surgery a narrow, internal platform, parallel walled endosseous implant was inserted (3.5 by 11.5 mm) using a surgical template

(Fig. 3 and 4). At the same visit, the healing abutment was inserted (3.4 by 4 mm) (Fig. 5) following which post-operative medication, including amoxicillin 500 mg every 8 hours for 10 days and an acetaminophen/hydrocodone- based analgesic was given. The implant was allowed to heal for 4 months. After ensuring that the implant was Osseo integrated using a reverse torque test, an abutment was placed on the implant fixture at the second stage surgery. Once implant integration was assured, an implant- level impression was made with a custom tray and polyether (ImpregumTM, 3M ESPE) impression material using a closed tray impression technique. The definitive cast was fabricated from a soft tissue moulage and type IV dental stone. The maxillomandibular relationship was obtained using a face bow record and respective casts were mounted on semi adjustable articular. On the articulator, the wax pattern was made and an implant protected occlusion was incorporated for the single crown that would restore the area of the missing right molar. Framework for metal, ceramic crown was cast following which porcelain was fired on the metal crown after metal trial in the patient's mouth. Evaluation of occlusion was done in centric and eccentric positions and the crown was adjusted accordingly to provide a group functional occlusion during lateral movements.

The final crown was cemented with zinc phosphate cement for trial cementation (Fig. 6). The patient was given instructions regarding the maintenance of implant prosthesis and was put on a follow up for a period of one year. The patient continued to be on trial cement for more than five years and continues to be satisfied with the prosthesis.

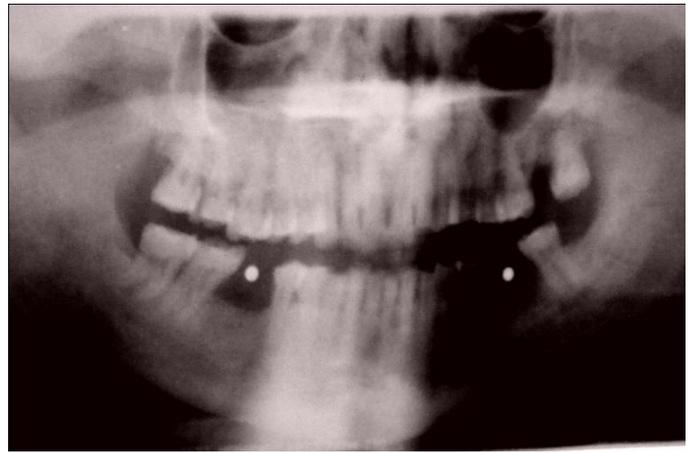


Figure 2: A radiographic splint using two metal bearings to identify location of implant



Figure 3: Stage 1 surgery for implant fixture placement



Figure 4: Implant fixture placed within the bone



Figure 5: Placement of healing abutment



Figure 6: Crown placement

DISCUSSION

When restoring edentulous spaces involving molar with dental implants, larger occlusal loads are anticipated and therefore retentive capability of such restorations is challenged. ^{[12], [13]} The purpose of this article is to impart the significance of anticipating changes in occlusion. On a cautionary note, the reader should be aware of dynamic changes in occlusion with particular emphasis on the mandibular movements. The first important finding in this case was to find the cause of attrition that had resulted in loss of anterior guidance. As the first molars were lost on both sides which are

primarily responsible for the mastication of food, especially hard food, every subject's tendency in such cases is to masticate by taking the mandible anteriorly so that the mandibular second molars can break the food. With time, anterior forces by mandible start attrition of the teeth and when severe changes the anterior guidance. When the process continues the occlusion shifts from canine protected to group function occlusion. This anticipation that the occlusal changes will stop after restoration of the mandibular molar played a significant role in the final success of the implant supported single crowns. Wider distribution of forces implied that cement failure will not occur. ^[14]

CONCLUSION

Treatment planning for a single crown that is supported by an implant requires understanding of the dynamic nature of occlusion. Loss or protection to the posterior teeth by anterior teeth in mutually protected occlusion usually takes place with a cause. Once the cause is removed, the situation becomes favorable.

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