

Case Reports

THE USE OF OSSEOINTEGRATED IMPLANTS IN FIXED PARTIAL DENTURE

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تم استخدام زراعة الأسنان للاستعاضة عن الأسنان المفقودة جزئياً في الفم خلال السنوات الأخيرة عن طريق الجسور السنية التي تثبت على غروس الأسنان والأسنان الطبيعية في الوقت نفسه، ورغم أنه لا توجد نتائج دراسية على المدى البعيد لهذا النوع من الاستعاضة - بواسطة الوصلات الصلبة - فإن في هذه المقالة قد تم استخدام غروس الأسنان والأسنان الطبيعية معاً لتركيب الجسور الثابتة.

In recent years, osseointegrated implants have been used to replace missing teeth in partially edentulous patients. A combination of implants and teeth were used as abutment for fixed partial denture. However, long-term results of combining rigidly held osseointegrated implant with natural teeth have not been reported. This paper discusses the combined use of implants and natural teeth to support fixed partial dentures.

Introduction

The Branemark System¹ was originally developed for the treatment of edentulous patients. This type of treatment was made on these patients where a combination of implants and teeth were utilized as abutments for fixed restorations.^{1,3}

In 1986, Ericsson *et al*² reported the first study on 10 patients using osseointegrated implants in combination with natural teeth. No significant failures occurred during the observation period of 6 to 30 months. There was no significant biochemical problems or changes revealed in regards to the health of the tissue supporting the implant or the abutment with either rigid or semi-rigid connectors. Koth *et al*⁴ used single crystal sapphire implants as posterior abutments for fixed prostheses.

Kirsch and Ackermann⁵ reported the results of their study from a subject of more than 500 patients. After 8 years, they discovered a failure rate of 1.7 % to 5.2 %. The number of restorations supported by implants and natural teeth was not given.

Difficulties may occur in this type of treatment due to anatomical obstacles in partially edentulous

areas. In addition, theoretical problems might arise in treating partial edentulism due to the difference in mobility between natural teeth and osseointegrated implants when they are combined to support a rigid prosthesis.^{6,7} However, long-term result of combining rigidly held osseointegrated implants with healthy natural teeth has not been reported. This paper discusses the use of combining implants and natural teeth to support fixed partial denture.

Case 1

A 40-year-old female patient presented in our clinic complaining of discomfort in her mandibular removable partial denture. She was unable to masticate with the existing partial denture. Medical and dental histories were assessed and complete intra-oral examination and diagnostic radiographs were taken. Patient was generally healthy and dental history indicated that she had previously undergone periodontal full mouth surgery two years ago. Her general dentist fabricated a temporary mandibular partial denture for her.

Upon clinical examination, it was found that the teeth distal to the right first mandibular premolar were missing with ill-fitted unilateral temporary partial denture. Periodontal probing and examination showed that the remaining mandibular teeth were healthy.

Radiographic examination of the remaining mandibular teeth and alveolar bone in the missing

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area, showed no sign of pathosis. Utilization of a rigidly connected fixed partial denture supported by a natural tooth (mandibular right first premolar) on one side and distal implant abutment on the other was discussed with the patient, then decided.

Surgical Procedures

The operation was carried out under local anesthesia. Mucoperiosteal flap was raised in the mandibular right segment exposing the underlying bone. The implant site preparation was carried out using a low speed bur with internal and external irrigations. Implant* site alignment was facilitated by using an occlusal acrylic stent which was previously fabricated. Then a 4.25 mm diameter and 13 mm long Microvent fixture[§] was placed in the site

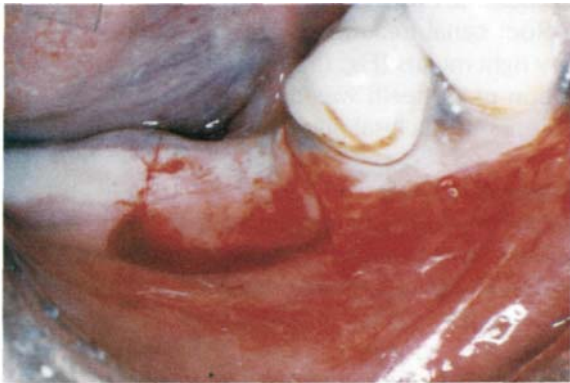


Figure 1. Right lateral view: Incision made for the mucoperiosteal flap in the mandibular right segment.

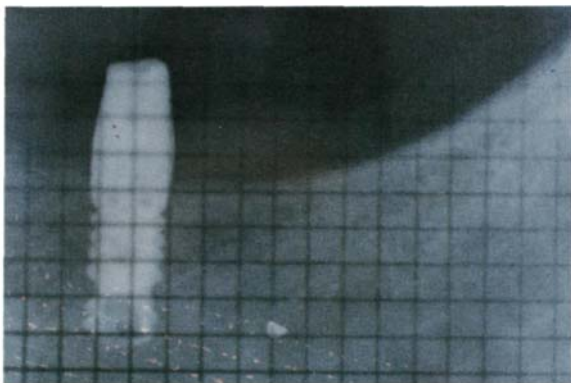


Figure 2. Periapical radiograph for implant in bone, three months post insertion.

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§ Corevent Corporation, Encino, California, USA.

and the flap was sutured with a black silk suture. Patient was given post-operative instructions and medication. An appointment was given after one week for suture removal [Fig. 1].

After three months, the implant was exposed to verify osseointegration placement of the healing abutment, and radiographs were taken [Fig. 2]. Endodontic treatment was done on the first right mandibular premolar with subsequent temporization.

Restorative Phase

Prosthetic insert was placed after removal of the healing abutment. Final impression was taken for the right first mandibular premolar and transfer coping of the implant picked-up at the same time. Casting was obtained from a wax pattern and the metal framework was tried in the mouth for clinical fit. Porcelain bake was completed and the bridge was provisionally luted in the mouth.



Figure 3. Right lateral view: Bridge provisionally luted on implant and natural tooth.



Figure 4. Periapical radiograph showing bridge in place.

Post-operative radiographs were taken [Figs. 3,4] and patient went under observation. Oral hygiene instructions were given and patient was placed under a recall program.

Case 2

A 33-year-old male presented to the clinic complaining of inability to masticate on the missing mandibular right molar area. Medical history revealed that he was completely healthy. Clinical examination of the right side of the mandible showed that he had an over eruption of maxillary right molars with mesial tilting of the maxillary right first molar, and a reduction in the maxillo-mandibular space between maxillary right molars and right mandibular residual alveolar bone. Good bone quality was found in the residual bone area in terms of width and density.

Upon discussion with the patient, decision was made to restore the right side as follows:

1. Restoring and leveling the occlusal plane of maxillary right molars by root canal treatment of maxillary right first and second molars; crown lengthening surgery and subsequent restoration with individual crowns.
2. Over eruption of the maxillary right molars diminished the intermaxillary space between the maxillary and mandibular left molar area dictated leveling the occlusal plane used for short implant abutment. The third maxillary right molar was considered for extraction to avoid super-eruption.
3. Restoring mandibular right side by using a fixed bridge supported by natural tooth (sec-

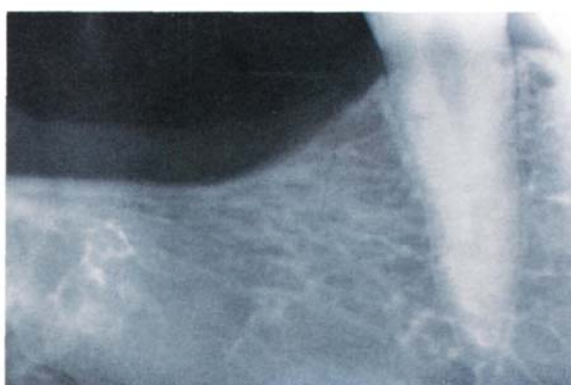


Figure 5. Periapical radiograph of missing mandibular right molar area and second mandibular right premolar with no sign of pathosis.

ond right mandibular premolar) on one side and a distal implant abutment on the other.

Surgical Procedures

Mucoperiosteal flap was raised on mandibular right side exposing remaining alveolar bone. Implant site was prepared with a low speed cannon drill,* with internal and external irrigation, gradually widening the implant site till it reached the optimum size. Microvent implant fixture* was placed into the site in the level with the bone crest. The flap was sutured with a black silk suture. Post-operative instructions and medications has been given, and appointment after one week was made for suture removal.

Endodontic Procedure

Root canal treatment was performed on maxillary right molars [Fig. 6], and subsequent temporization of the teeth was done after establishing an acceptable occlusal plane.

Restorative Phase

The implant was uncovered four months later and the healing cap was placed. Preparation of the right mandibular premolar was made. Final impression, with transfer coping in the implant, was made.

Two weeks later, together with the impression of right mandibular first molar, the prosthetic insert was placed to the implant and casting was obtained from a wax pattern. A one piece metal framework was fabricated and was then tried in the patient's mouth. For clinical fit, an intermaxillary registration



Figure 6. Panoramic film: Implants in place in the missing right mandibular molar area. Endodontic therapy done for maxillary right first and second molar.

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Figure 7. Right lateral view: Bridge in place and maxillary right first and second molar restored in an individual crowns.

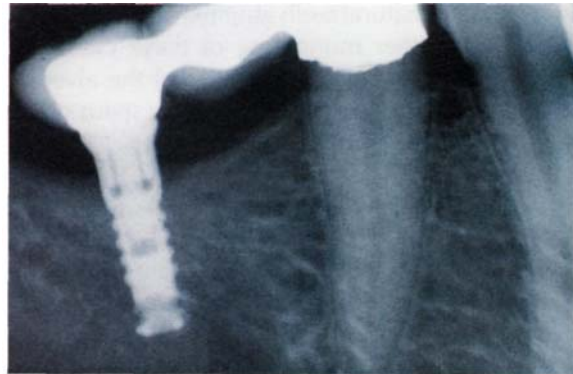


Figure 9. Case 1: Periapical radiograph after one year. Both right mandibular implant and natural tooth abutment show no signs of abnormal changes.

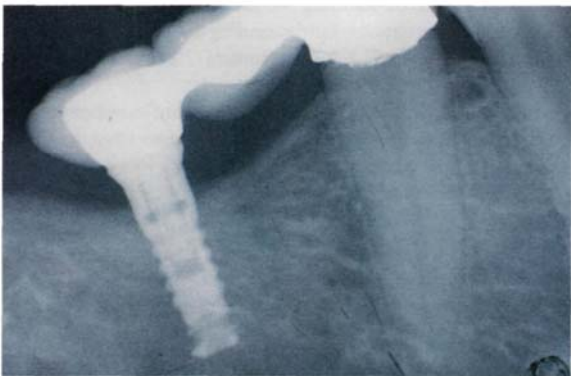


Figure 8. Periapical radiograph showing bridge in place before recall program.



Figure 10. Case 2: Periapical radiograph after one year. Both right mandibular implant and natural tooth abutment show no signs of abnormal changes.

by Duralay was taken. Porcelain work was completed, the final restoration was provisionally luted in place, and post-operative radiographs were taken. Oral hygiene instructions were given [Fig. 7] and patient went under recall and observation [Fig. 8].

Results

Patients were recalled after one year and natural teeth abutments and implants were evaluated by measuring mobility in horizontal and occlusal directions, taking radiographic examination, and periodontal probing around each abutments.

In both cases there was no mobility of the implants or natural teeth abutments. Radiographically, no abnormal changes were revealed [Figs. 9,10] and periodontal probing was less than 2mm around all abutments.

Discussion

Recently, combining implants with natural teeth was used to support fixed partial dentures. The significant effect on the health of the tissue supporting the implant or the natural abutment teeth has not yet been well-clarified. This may be due to the difference between micromovement of the osseointegrated implants and natural teeth.

The nature of the connection between natural teeth abutment and implant, which may have rigid connection or non-rigid connection problems and possible intrusion phenomena has been reported.⁸ These problems may be associated with the use of non-rigid connection, like overloading the implant,⁹ and tooth migration. Therefore, rigid connection was chosen to combine natural teeth with implants in this study.

In this investigation, only one year of observation

was made for natural teeth abutment and implants. However, further monitoring of these cases are needed to determine the changes of the alveolar bone supporting natural teeth and the status of the osseointegration process of the implants.

Conclusion

The use of osseointegrated implant in treating partially edentulous patients has become an acceptable form of dental treatment. Osseointegrated implant, in combination with natural teeth, has been used to support fixed bridges in this report and was evaluated for one year. However, further study is needed to evaluate the integrity of this type of restoration for long-term result.

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