

Case Report

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Volume 2 : Issue 4

Article Ref. #: 1000DOJ2122

Article History

Received: September 28th, 2015

Accepted: November 6th, 2015

Published: November 9th, 2015

Citation

Daouahi N, Hadyaoui D, Khlifa MB, Cherif M. Management of missing second premolar with single-tooth implant using flapless surgery. *Dent Open J.* 2015; 2(4): 121-124. doi: [10.17140/DOJ-2-122](https://doi.org/10.17140/DOJ-2-122)

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Management of Missing Second Premolar with Single-Tooth Implant using Flapless Surgery

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ABSTRACT

This article describes a case report of rehabilitation of missing mandibular premolar using implant supported crown and a flapless surgery. A 23 year old female patient, with agenesis of second premolar, was referred to the department of fixed prosthodontics at Dental Clinic of Monastir. Comprehensive examination revealed that, an orthodontic treatment was set up leading to space opening. The edentulous ridge was measured and it was suitable for adequate dimensions of second premolar. The adjacent teeth were vital, free from caries and fillings. Radiographic evaluation showed the feasibility of implant placement in the edentulous site. A flapless surgery technique was performed for implant placement. The implant supported crown was cemented using Zinc phosphate cement.

KEYWORDS: Missing mandibular premolar; Implant supported single crown; Flapless surgery; Cemented crown; Screw retained crown.

INTRODUCTION

For many years, conventional fixed bridges were considered to be the best treatment option for the replacement of missing single tooth. Their survival rate was estimated to be about 75% after 15 years. But, extensive teeth preparations can result in devitalization of the pulp which requires canal therapy. As the ideal treatment approach should be the less invasive one, two treatment modalities have become popular for single tooth replacement including implant retained restorations and resin bonded bridges. This later may, according to recent studies, function for many years. But, its credibility has been reduced especially in the posterior teeth.¹⁻⁴

Implant supported restorations is widely proclaimed in the literature. In addition to its high success rate, it leaves the adjacent teeth untouched. Successful use of dental implants depends on optimal conditions of peri-implant tissue around it. The determination of implant size imposes a three dimensional evaluation of bone thickness. A minimum of 1.5 mm between the implant fixture and adjacent roots is, in that order, required to avoid bone resorption and be in favor of papilla regeneration. Ideal tri-dimensional positioning of dental implants, requires adequate edentulous ridge with sufficient bone thickness.^{1,4-7} According to studies, the majority of failures are associated with the supra-structure rather than with the implant itself.

Recently, the use of “flapless” implant surgery has gained popularity among surgeons. In fact, it has numerous advantages, including preservation of circulation, soft tissue architecture, and hard tissue volume at the site; decreased surgical time; improved patient comfort; and accelerated recuperation. It allows also the patient to resume normal oral hygiene procedures immediately after the surgery. The successful use of this approach often requires advanced

clinical experience and surgical judgment.⁷

Implant supported fixed prostheses may be cemented or screw retained on the implant abutments. According to some authors, cementation may be preferred particularly in single unit restorations. It offers the potential for higher passivity placement of the crown.^{8,9}

CLINICAL REPORT AND PROCEDURE

A 23 year old female patient, with agenesis of second premolar, was referred to the department of fixed prosthodontics after orthodontic treatment. She expressed her wishes for a minimally invasive treatment approach.

Comprehensive examination revealed that, an orthodontic treatment using edgewise brackets was performed leading to space opening for eventual prosthetic replacement of the missing tooth (Figure 1). The adjacent teeth were vital, free from caries and fillings with a suitable crown volume and height. Oral hygiene was evaluated as good. Radiographic evaluation Cone Beam Computed Tomography (CBCT) showed the feasibility of implant placement in the edentulous site. It revealed thick cortical bone and adequate cancellous bone of type 3 quality in the premolar and molar area based on the classification of Lekholm and Zarb and no remarkable alveolar ridge resorption. The edentulous ridge was measured and it was suitable for adequate dimensions of second premolar (7 mm with a thickness of 8 mm).

The mandibular canal was almost in the center of the mandible buccolingually and in the inferior 1/3 of the mandible vertically, at a distance approximately 12 mm from the alveolar crest. The decision of implant supported crown was so retained. After administration of local anesthesia with a 2% Lidocaine hydrochloride solution containing epinephrine at 12.5 µg/ml, a flapless surgical technique was used for implant placement (Figure 2). When drilling the implant site, a direction indicator was used to check the orientation of the fixture. An implant fixture

(Drive System; diameter 3.75 mm; Length 10 mm) was then placed. As aesthetic was not advocated in this situation, provisional restoration was not necessary. Initial stability was excellent. One week post flapless implant placement, peri-implant tissues health was ideal. During the healing period, the patient does not expressed discomfort or neurological symptoms. Peri implant bone was also subsequently monitored by radiological control. Osseo-integration was excellent and no bone resorption has been observed around the implant (Figure 3).

After 4 months of healing and management of peri implant soft tissues, an accurate impression using the Pick-up technique was then performed. It uses square copings and an open tray allowing the coronal coping screw to be exposed. The copings are then unscrewed to be removed along with the impression. The analogs are connected to the copings to fabricate de definitive cast (Figures 4, 5 and 6).

The abutment was selected and prepared according to the adjacent and opposite teeth. Final restoration, which consists on metal ceramic crown, was performed and cemented using Zinc phosphate cement (Figure 7). After prosthetic treatment was completed, a follow up program was carried for the patient. It offers the opportunity to examine the patient every 6 months in the first year and every 12 months in subsequent years.

DISCUSSION

The use of dental implants in the rehabilitation of dental agenesis after orthodontic treatment has become a well established and accepted contemporary clinical method. Recent studies reported implant success greater than 95% after restoration with single crowns.^{1,2,5,6,10-12}

Brånemark established the use of extensive surgical flaps to visualize the surgical field during implant surgery. In fact, the elevation of a muco periosteal flap can facilitate implant placement by allowing the surgeon to visually assess bone

1. Implant placement and radiological evaluation of Osseo-integration



Figure 1: Management of adequate space for implant placement.



Figure 2: implant placement using flapless surgery.



Figure 3: Radiological evaluation after 2 months of Osseo-integration.

2. Management of periodontal tissues during the healing period



Figure 4: Placement of abutment healing.



Figure 5: Management of peri implant soft tissues.

3. The impression technique :Pick up

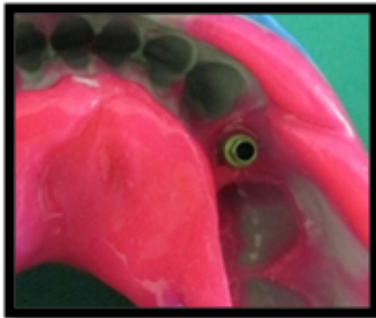


Figure 6: coping removed along with the impression.

4. The final restoration



Figure 7: Final restoration; cemented metal ceramic crown with reduced buccolingually diameter.

quantity and morphology at the site. Over the past three decades there have been several alterations to this flap design in favor of flapless implant surgery which has gained popularity among surgeons. It is indicated when the bone has abundant width and when the soft tissue has sufficient amounts of keratinized mucosa.

According to studies that compared the average marginal bone loss occurring with conventional *versus* flapless implant surgery, the authors reported slightly less bone loss for the flapless approach (-2.1 mm, SD 1.4 mm; n=70 implants) *versus* the conventional approach (-2.8 mm, SD 1.5 mm; n=39 implants).¹³

This technique has numerous advantages, including preservation of circulation, soft tissue architecture, and hard tissue volume at the site; decreased surgical time; improved patient comfort; and accelerated recuperation. It also allows the patient to resume normal oral hygiene procedures immediately after the surgery. The successful use of this approach often requires advanced clinical experience and surgical judgment

The approach has some drawbacks including a lack of proper drilling depth assessment and an inability to correct peri-implant defects because they are not exposed during surgery.^{4,6,7}

There are two different methods of retaining a fixed supported restoration: screw retention and cementation. The screw retained prosthesis was originally more popular because it simplified retrieval of the supra structure. However, occlusal screw holes can compromise occlusion and porcelain strength. Recent studies, showed occlusion improvement and simplicity of fabrication for cemented restorations. From a biomechanically point of view the potential for passivity is higher when a cemented restoration is placed on the implant. The fact that there is only one screw attaching each abutment to each implant in a cemented design, *versus* two screws in screw retained prosthesis reduces the possibility of preload stresses and screw loosening. In addition, the cement space that exists between the crown and abutment can help compensate for minor discrepancies in the fit of the prosthesis.^{6,8,9}

CONCLUSION

Implants placement using a flapless surgery seems to be a suitable option in the rehabilitation of missing single teeth. It is indicated in cases with sufficient bone with sufficient amounts of keratinized mucosa. It has become a well established and accepted contemporary clinical method. has numerous advantages. The successful use of this approach often requires advanced clinical experience and surgical judgment.

CONFLICTS OF INTEREST

The authors declare that they have no conflicts of interest.

CONSENT

The patient has no problem with publishing the details of the clinical report.

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