Acta Scientific Dental Sciences

Volume 2 Issue 2 February 2018

Case Report

Clinical Outcomes of Implant-Supported Mandibular Molar Crown: Case Report

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Received: December 26, 2017; **Published:** January 10, 2018

Abstract

This article describes a case report of rehabilitation of two missing mandibular molars using implant supported crowns. A 47 year old female patient, with defective mandibular bridge was referred to the department of fixed prosthodontics at Dental Clinic of Monastir. The edentulous ridge was measured and it was suitable for adequate dimensions two molars. The adjacent tooth was vital and prepared, the third molars was extracted.

Radiographic evaluation confirmed 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. The second premolar was restored by a metal ceramic crown.

Keywords: Missing Mandibular Molars; Implant Supported Crown; Flapless Surgery; Cemented Crown; Screw Retained Crown; Implant Diameter

Introduction

Both the size and the position of the first mandibular make them essential for maintaining proper arch form and occlusal schemes [1,2].

The use and success of osse-ointegrated dental implants for the rehabilitation of posterior partially edentulous jaw had been revealed in the literature by several studies [3-6]. These rehabilitations offers substantial advantages when compared with removable partial dentures: improved occlusion and support, simplification of the prosthesis, less invasive restorative procedures, improvement in oral health and bone maintenance [7,8].

According to Zarb., *et al.* [9], the success rate of 41 implants placed in the upper jaw was 97.6% jaw, versus 92.2% for the 64 implants placed in the lower jaw, after a loading period of 2.6 to 7.4 years.

However, Block., *et al.* [10] reported lower success rates for implants inserted in posterior inferior areas (78.5% for first molars and 71.8% for second molars).

Furthermore, the replacement of a single molar with an implant presents a biomechanical challenge for the practitioner and the patient [11]. Occlusal forces are greatest in the molar region, leading increased stress on the implant components as well as the surrounding bone and tissues.

One way to control the excessive load was to place two narrow or standard diameters.

Implants in order to restore single molar restorations (3,7 or less). Unfortunately, the ability to do this was limited by some factors such us, skills of surgeon, arch morphology, proximity of adjacent teeth and vertical access [12]. A second alternative evocated to replace one or two standard diameters was the use of wide-diameter implants (more than 3,7 mm) to support a single molar prostheses, the 3DFEA of Ormianer., *et al.* were able to show that 6 mm implants were not more susceptible to failure than standard-diameter implants and helped to preserve peri-implant bone levels [13]. Despite, Some clinicians reported that wide-diameter implants placed to replace molars may be susceptible to failure more than standard and narrow diameter implants [14].

Guidelines for implant selection and treatment planning should be strongly respected for the success of the treatment.

Case Presentation

A healthy 47-year-old patient was referred to the fixed prosthodontic department to replace her missed mandibular molars # 46, 47 with implant-supported prostheses. The patient reported that her molars were decayed I showing a high mobility that led her dentist to extract them. Following the extraction, the dentist

placed a 3-unit fixed partial denture using teeth 45 and 48 as abutments; but it showed a repetitive loss and mobility of the third molar #48. She desired an estimate for an implant (Figure 1).

Figure 1: The initial situation.

Comprehensive examination revealed that the patient has good oral hygiene with effective and regular brushing three times a day the adjacent teeth were vital and prepared, free from caries and fillings with a suitable crown volume and height. The space included between the edentulous ridge and the antagonist tooth was not suitable for a sufficient height of mandibular molars so an orthodontic treatment was performed for the patient using slip cover or essix retainer to push in upper molars during 6 months (Figure 2), the result was excellent.

Figure 2: Orthodontic treatment.

Radiographic evaluation Cone Beam Computed Tomography (CBCT) showed the feasibility of implant placement in the edentulous ridge (Figure 3). It revealed thick cortical bone and adequate bone of type 3 quality in the premolar and molar site 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 two mandibular molars (16 mm with a thickness of 8 mm). The mandibular canal was almost in the center of the mandible bucco-lingually and in the inferior 1/3 of the mandible vertically, at a distance approximately 14 mm from the alveolar crest.

Figure 3: Radiographic evaluation of bone (CBCT).

The decision of two implants supported crowns was retained. After administration of local anesthesia with a 2% Lidocaine hydrochloride solution containing epinephrine at 12.5 ug/ml, a flapless surgical technique was used for implant placement. When drilling the implant site, a direction indicator was used to check the orientation of the fixture. Two implant fixtures (intra-Lock system; diameter 3.75 mm; Length 10 mm) were then placed. As aesthetic was not advocated in this situation, provisional restoration was not necessary. Initial stability was very good. Two weeks post flapless implant placement, peri-implant tissues health was ideal.

During the healing period, the patient did not express any neurological symptoms, mobility, pain, swelling, or suppuration. 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 4).

Figure 4: Radiological evaluation after 5 months of osseo-integration.

After 4 months of healing and management of peri-implant soft tissues with healing screw during 15 days (Figure 5), an accurate impression using the mixed Pick-up technique was then performed using the framework of tooth # 45 (Figure 6). It uses square copings and an open tray allowing the coronal coping screw to be exposed. Square copings and an open tray were used allowing them to be removed along with the impression.

Figure 5: Management of peri-implant tissues with Healing screw.

Figure 6: The impression using mixed pick up technique.

The analogs are connected by the technician to the copings the fabricate de definitive cast (Figure 7). The abutment was selected and prepared according to the adjacent and opposite teeth.

Figure 7: Analogs connected by the technician.

Final restoration was performed using 2 metal ceramic implant supported crowns for # 46, 47 teeth and a metal ceramic dental supported crown for tooth #45. Crowns were finally cemented using Zinc phosphate cement (Figure 8 and 9).

Figure 8: Final restoration, cemented metal ceramic-crowns.

Figure 9: The Final restoration after 3 years.

After prosthetic treatment was completed, a follow up program was carried for the patient. It offers the opportunity to examine the patient every 3 months in the first year and every 12 months in subsequent years (Figure 8).

Discussion

Several studies [6,8,9,12] have reported high success rates with wide-diameter implants.(6mm), (On the other hand, Some clinicians reported that wide-diameter implants placed to replace molars may be susceptible to failure more than standard and narrow diameter implants [14]. In our case, a standard implant was used and it showed a very good stability after 3 years of function. A reduced bucco-lingually molar restoration was used to ovoid nonaxial forces on standard diameter implant and allowing less intense peri-implant stress.

In fact no sufficient data have been published to adequately support evidence-based treatment planning and long-term prospective studies are needed to confirm these results [13].

According to the study of Sennerby L., *et al.* [15] that compared the average marginal bone loss occurring with flapless and conventional implant surgery, the authors reported slightly less bone loss for the flapless approach, against the conventional approach.

The Flapless technique used in our case has several advantages, such as preservation of soft tissue architecture, and hard tissue volume at the site, preservation of circulation; decreased surgical time; improved patient comfort; and accelerated recuperation. It also allows the patient to resume normal oral hygiene procedures immediately after the implant surgery. The successful use of this approach often requires severe guidelines, advanced clinical experience and surgical judgment [16].

Nevertheless, Brånemark, recommended the elevation of a muco-periosteal flap can facilitate implant placement by allowing the surgeon to visually assess bone. Currently, flapless surgery should be indicated only when the bone has abundant width and when the soft tissue has sufficient amounts of keratinized mucosa.

Concerning the impression technique, the literature does not have a consensus. Some clinicians indicate that the use of square transfer copings in the direct technique tend to exhibit a greater dimensional accuracy regarding to the cone shaped transfer copings [17,18].

However the study of Humphires., *et al.* [19] showed that the impression techniques with square transfer copings linked to acrylic resin showed greater accuracy regarding to the impression techniques with cone-shaped transfer copings. On the other hand, Carr., *et al.* [18] did not observe significant differences regarding the accuracy of the pick-up impression technique.

Consequently; the practitioner should not only chose the technique, the impression and cast material, but also have the knowledge on the advantages and drawbacks of the materials and techniques in order to minimize the undesirable errors and enable a more satisfactory final outcome.

The cemented restoration was used in our case, according to recent studies, it showed occlusion improvement and simplicity of fabrication. From a biomechanically point of view, It offers the potential for higher passivity placement of the crown. In addition, there is only one screw attaching each abutment to each implant in a cemented design, the cement space that exists between the crown and abutment can help compensate for minor discrepancies in the fit of the prosthesis. It had only one drawback of increasing the possibility of peri-implantitis if excess was not well eliminated [20].

Versus, the screw retained prosthesis was more used last decades because it simplified retrieval of the supra structure. However occlusal screw holes can compromise occlusion and porcelain strength. Two screws in screw retained prosthesis also, reduce the possibility of preload stresses and screw loosening [20,21].

Conclusion

Missing mandibular molars are challenging for rehabilitation with dental implants due to their anatomical and occlusal features. To obtain excellent results in rehabilitations of missing mandibular molars with dental implants meticulous attention must be paid.

Optimal conditions of peri-implant tissue, the determination of implant diameter imposes a three dimensional evaluation of bone thickness. Finally, the successful use of this approach often requires advanced clinical experience and surgical judgment.

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