Immediate Loading of Edentulous Mandibular Arch with Screw Retained Final Prosthesis on Strategic Implants® With Single Piece Multi Unit Abutment Heads: A Case Report

Article · July 2018

CITATIONS
2

READS
585

4 authors, including:

Stefan Ihde
University of Belgrade
58 PUBLICATIONS **486** CITATIONS
SEE PROFILE

Gabriela Fernandes
University at Buffalo, The State University of New York
197 PUBLICATIONS **472** CITATIONS
SEE PROFILE

BAOJ Dentistry

Vivek Gaur, BAOJ Dentistry 2018, 4: 2
4: 040

Case Report

Immediate Loading of Edentulous Mandibular Arch with Screw Retained Final Prosthesis on Strategic Implants® With Single Piece Multi Unit Abutment Heads: A Case Report

Vivek Gaur[1], Anita Doshi*[2], Stefan Ihde[3], Gabriela Fernandes[4]

[1] *Private Dental Practice, Etah, Uttar Pradesh, India*

[2] *Prosthodontist, Private Dental Practice, Mumbai, Maharashtra, India*

[3] *Head of Dental Implants Faculty, International Implant Foundation, Munich, Germany*

[4] *Department of Oral Biology, UB School of Dental Medicine, SUNY Buffalo, Buffalo, New York, USA*

Abstract

The technology that was developed for the Strategic Implant® differs significantly from the conventional root-form implants. The Strategic Implant® works with the bone, and it follows the principles of orthopaedic surgery and traumatology. They are placed in such a way in to the bone, that the apical load transmitting threads of the implants are positioned (and there by fixated) directly into the 2nd (distant) cortical bone. The aim of this case report was to present the clinical application and advantages of this new and unique smooth surfaced single-piece bi-cortical screw implants (with multi unit abutment) that demands no integration into the 1st (crestal) cortical bone. This eliminates the micro motion with immediate loading protocol, there by allowing the restoration of completely edentulous mandibular arch with final screw retained prosthesis with in 72 hours.

Key Words: Strategic Implant®; Immediate functional loading; Single-Piece Dental Implants; Cortical Implantology; Multi Unit Abutment

Introduction

There is a general tendency to reduce treatment times and to simplify dental treatment procedures in order to increase patient acceptance and to reduce the risk of complications. In implant dentistry, treatment time can be shortened through early or immediate loading [1]. It is widely accepted that immediate loading is desirable if the outcome in terms of implant survival and treatment success is comparable with that of conventional loading [2, 3]. Immediate loading of oral implants is defined as a situation where the superstructure is attached to the implants at the time of the surgery or until no more than 72 hours post-surgery [4].

Two different approaches to immediate loading of dental implants are currently known. These approaches possess two factors in common that involve the accomplishment of the splinting/stabilization of several implants via the prosthetic superstructure [5]. The first approach relies on the compression screw principle. Screw implants of this type require an undersized osteotomy and the implant itself creates the compression of the bone while it is inserted. Lateral condensation of spongy areas is the guiding principle of these implants; surface characteristics of the implants play no role as long as the implant is I little bit rough. Implant stability is greatly increased by a mechanism that could be regarded as

***Corresponding Author:** Anita Doshi, Prosthodontist, Private dental practice, Mumbai, Maharashtra, India. Tel:+91 9320030735; Email: dranitagala@gmail.com

Sub Date: March 27th, 2018, **Acc Date:** June 1st, 2018, **Pub Date:** June 12th, 2018.

Citation: Vivek Gaur, Anita Doshi, Stefan Ihde, Gabriela Fernandes (2018) Immediate Loading of Edentulous Mandibular Arch with Screw Retained Final Prosthesis on Strategic Implants® With Single Piece Multi Unit Abutment Heads: A Case Report. BAOJ Dentistry 4: 042.

"corticalization" of the spongy bone. The second approach is to establish cortical anchorage of thin but strong body screw implants (Strategic Implant®, BECES, BCS) or basal implants. Screwable basal implants (Strategic Implant®) are not root-form implants. In fact, they are positioned in such a way into the bones, that the apical load transmitting threads of the implants are positioned (fixated) directly into the cortical distant (opposite) of the oral cavity [1].

Basal bone is defined as the resorption-stable part of the osseous tissues of the mandible and maxilla which are underlying the alveolar processes [6]. It is a resorption stable bone in the mandible and maxilla formed by macro trajectories [7, 8]. The basal bone is present throughout life; it is very strong and forms the stress bearing part of our skeleton. If dental implants are anchored in this bone, they can be loaded (splinted) with fixed tooth restorations immediately. Strategic implant® functions according to the principles of traumatology and orthopedic (bone) surgery. Like in traumatology, immediate loading protocols are used [9-11].

This paper presents a clinical technique for immediate implant loading with a new, smooth surfaced single-piece bi-cortical screw implants (with multiunit abutment) to restore fully edentulous mandibular arch with a final screw retained prosthesis within 72 hours. The protocol recommends the placement of four single-piece bi-cortical screw implants in the anterior mandible engaging base of mandible between the mental foramina and two single-piece bi-cortical screw implants in distal part of mandible on both sides, thus engaging the lingual/vestibular cortical plate.

Case Report

A 65-year-old, healthy female patient witha fully edentulous lower arch presented to the clinicwith a desire to have fixed restored teeth for the same. Clinical examination (Figure 1, 2) revealedfully edentulous mandibular arch and maxillary arch that was restored with crowns and bridge. Radiographic examination (Figure3) revealed an atrophicmandibular arch. After discussing the various treatment plan options and upon obtaining the informed consent of the patient, a decision was made to use a single-piece immediate loading smooth surface bi-cortical screw implants with multi unit abutment with screw retained prosthesis (Figure 4). Local anesthesia was achieved with lidocaine 2% with adrenaline 1:100000. Infiltration to the mental nerve was made. No mandibular nerve block was administered, in order to make sure that the mandibular nerve remained functioning. Following soft tissue cleaning with antiseptic 5% Betadine solution (water based), flapless surgery preparation of osteotomy sites was carried out using the sequential order of calibrated drills recommended by the manufacturer, cooled with saline solution in external mode at a speed of 27000 rpm, implant beds were prepared with the use of a 2.0 mm drill (30 mm long) . For the distal mandible, we used a straight hand piece, and for the anterior implants, we used an angled handpieces 1:1 (blue). Two one-piece implants with a diameter of 3.6 mm and a length of 14 mm were placed with help of an insertion tool (Figure 5) and were anchored into the lingual cortical plate on both sides, where superior primary stability was achievable. Four Implants with the length of 23 mm were placed and anchored in the base of the mandible in the inter-foraminal region. The implants were bent to a favorable position of the internal thread with an angulation adapter (Figure 6) so that the screwaccessholes faced occlusally (Figure7,8 ,8a). Immediately post-surgery, the final impression was taken for creating the final prosthesis. Open tray multi-unit impression copings were placed onto the BECES® MU implants(Fig. 9), which were then splinted with a low shrinkage self polymerising resin (Figure 10). This ensured an accurate transfer without accidental displacement of the impression copings. An open tray impression was made with a rigid polyvinyl siloxane material in order to capture the positions of the implants and the soft tissues. A metal frame from Co-Cr-Alloy was fabricated and a try in was made on the day after the implant placement (Figure 11). The bite, the vertical and the sagittal relationship as well as the aesthetic appearance were checked at this stage of treatment. Later on within 72 hours final metalfused to ceramic prosthesis screwed in onto the implants and final tightening of screwd on eat 35N torque (Figure 12,13). Access holes were blocked with Teflon and covered with composite material (Figure 14, 15). Very good result of this treatment was achieved with high patient satisfaction (Figure 16, 17). Patient was seen every month for the first 6 months, with special care paid to the occlusion and hygiene (the pontics were relieved from gingival contact and there were open embrasures for purposes of cleaning). Thereafter, the patient was followed up on every 6 months clinical and radiographic check-ups.

Figure 1.Clinical intra-oral examination

Figure 2. Clinical intra-oral examination (occlusal view)

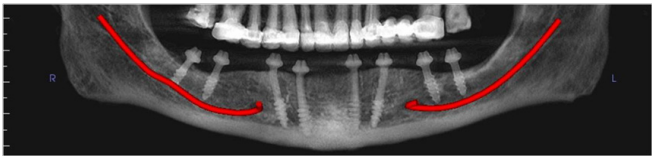

Figure 3. Radiographic pre-operative view.

Figure 4. BECES® MU (single piece multi-unit) implant on the delivery holder

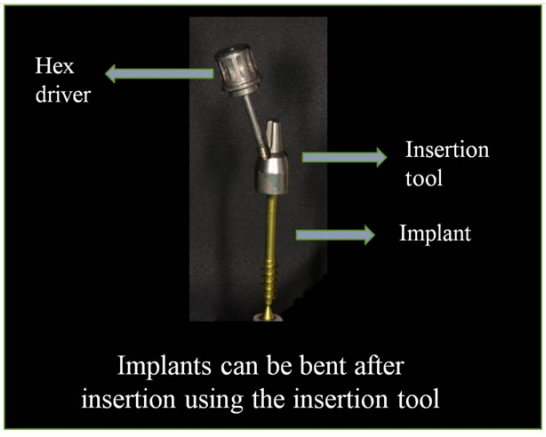

Figure 5. BECES® MU with insertion tool tighten with hex driver

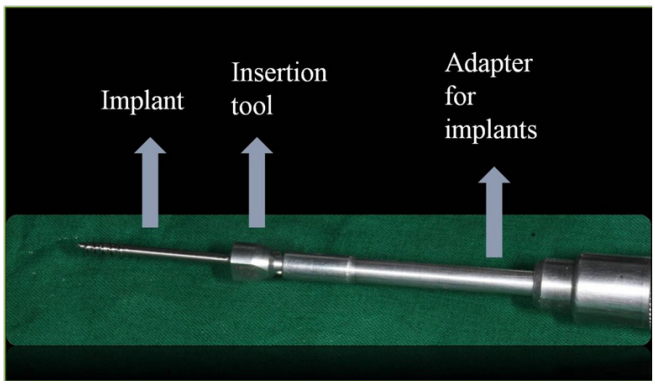

Figure 6. BECES® MU with insertion tool in hand grip adapter

Figure 7 Implant placement

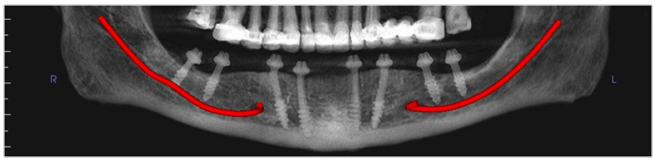

Figure 8.Radiographic view post implant placement

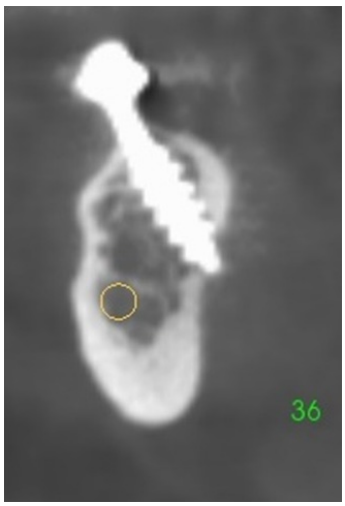

Figure 8A. Cross section showing lingual cortical engagement with BECES® MU implant

Figure 9. open tray impression post on BECES® MU implant

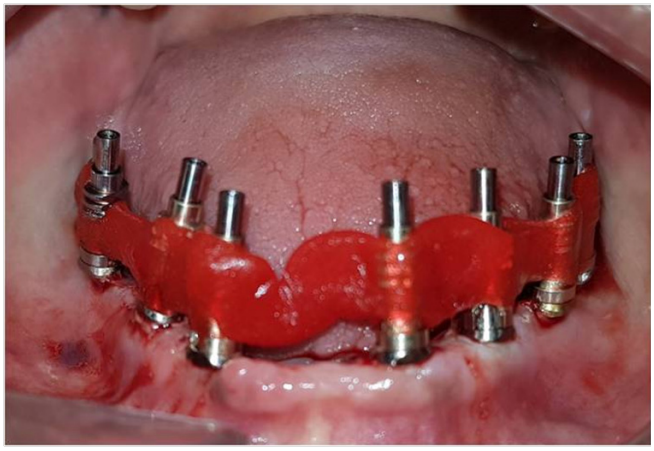

Figure 10. Impression post splinted with pattern resin and before pick-up impression

Figure 11. Metal trial

Figure 12. Screwable porcelain-fused-to-metal circular bridge

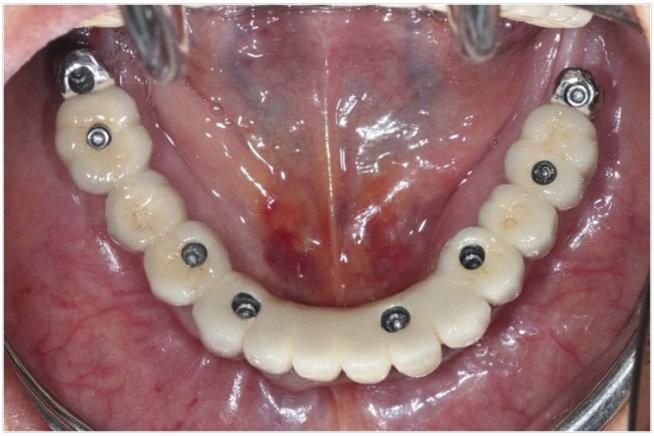

Figure 13. Final Prosthesis

Figure 14. Screw access holes blocked with Teflon

Figure 15. After sealing the holes in the prosthesis with Teflon and covering with composite material

Figure 16. Post-operative view

Figure 17. Post-operative radiographic view

Discussion

Strategic implantology is the most patient-friendly, minimal invasive technique that canbe employed to restore the normal masticatory function in the edentulous maxilla and mandible. The philosophy of this treatment differs from conventional / alveolar / axial approach in implantology. The rapeutic options to stop peri-implantitis around crestal implants are missing; usually the disease stops as soon as it reaches basal (i.e. resorption resistant) bone areas, however otherwise it is not possible to influence the progredient character of the disease. Peri-implantitis is not found in the Strategic Implant® at all. In this technology implants are engaged into the dense basal (2nd cortical) bone and at the buttress achieving high mechanical stability. Immediately, latest within 3 days, a cross arch rigid splinting is done with the help of a prosthetic framework. These implants can then achieve biological stability / osseo integration after remodelling of bone.

The Strategic Implant® is anchored cortically by the surgeon, and the process of creating this an chorage has been denominated as"osseo-fixation" [12,13]. Secondary osseo-integration into spongious bone are as through which end osseous parts of the implants are projecting is expected to happen in any case later. However for primary stability, i.e. for the success of the treatment, the macro-mechanic an chorage (osseo-fixation) in the 2nd or 3rd cortical is decisive[14, 15].

Wang et al. reported that bicortical anchorage, that engaged cortical bones on both the cervical and lateral sides, demonstrated better results when measured by resonance frequency analysis [16]. In the distal mandible suitable 2nd cortical scan be found on the lingual and on the vestibular aspect. In the inter-foraminal region the base of the mandible (being a 2nd cortical) is accessible with long implants. Using the lingual 2nd cortical is easier compared to using the vestibular cortical, because the drilling can be done with the straight hand piece and insertion can be done with hand grip (instead of the ratchet). Lingual cortical engagement is more predictable as the bone gets formed being in the compressive stress zone and the tenting effect is achieved . So after maturation of call us bone is formed. All in all 16 methods have been defined by the International Implant Foundation (Munich/Germany, see www.implant foundation. org) and these methods describe the correct approach for anchorage of implants in every part of the maxilla-facial skeleton.

Keeping a defined and bilateral balanced prosthetical situation (loading) is necessary [17].The main reasons canbe summarized

As follows:

- Onlywhen a bilaterally identical anterior AFMP-angle (Planas' Masticatory Functional Angles) is present, the chewing activity of the patient will be equal on bothsides [18].
- Only if balance is present on both the sides of the distal mandible, will the development of a preferred chewing side be avoided. Otherwise the side, which is balanced during regular chewing, will be preferred sooner or later. If the patients develop permanent unilateral pattern of chewing, around some of the implants bone will be overloaded, while around other others the bone will be under-loaded, i.e. the bone areals are under tension (which leads to a decrease in mineralisation and local osteoporosis).
- In the first healing phase after implant placement extensive remodelling takes place over the whole mandible [19]. Therefore the strength of this bone is reduced for a considerable time period and unilateral functions will quickly result in morphological changes that are difficult to reverse. Fatigue micro damage accompanying

the remodelling will occur in areas far away from the actual implant osteotomy [20, 21], because all of the mandible tends to remodel after surgery on the bone.

Principles and merits of the Strategic Implant® involve the following:

- Engages basal bone – nasal floor, maxillary sinus floor, walls of sinus, septa of sinus, wall of nasal cavity, palatal bone, crest of alveolar bone, pterygoid bone, zygomatic bone.
- Aggressive threads - achieve high primary stability thus immediate functional loading
- Smooth surface and single piece with small peri-mucosal penetration – resist infection
- No peri-implantitis
- To be rigidly splinted within 3 days – activation, resorption and formation (A-R-F) takes place when bone remodelling starts taking place on 3rd day onwards. Takes almost 4 – 6 months to complete , thus mechanical stability transform to biological stability
- Increased macro retention is achieved by tilting the implants.

Conclusion

Within the limitations of this study, it can be concluded that the Strategic Implant® can be successfully used in the atrophic mandible with good results and in an immediate functional loading protocol. The technique of Strategic Implant® solves all problems connected with conventional (crestal) implantology. Moreover, it is a customer oriented therapy, which meets the demands of the patients ideally.

1 Manufacturer: Simpladent GmbH, Dorfplatz 11, 8737 Gommiswald, Switzerland

References

1. Misch CE, Hahn J, Judy KW, Lemons JE, Linkow LI, et al.(2004) Workshop guidelines on immediate loading in implant dentistry. J Oral Implantol 30(5): 283-288.
2. Misch CE,Wang HL (2003) Immediate occlusal loading for fixed prostheses in implant dentistry. Dent Today 22(8): 50-56.
3. Romanos GE (2014) Advanced immediate functional loading: requirements for long-term success in modern implant dentistry. Compend Contin Educ Dent 35(7): 474-483.
4. Aparicio C, Rangert B, Sennerby L (2003)Immediate/early loading of dental implants: a report from the Sociedad Espanola de Implantes World Congress consensus meeting in Barcelona, Spain, 2002. Clin Implant Dent Relat Res 5(1): 57-60.
5. Werner Mander TF, Long-term study on immediate Loading of one-piece KOS® implants with fixed complete dentures.
6. Odin G, Misch CE, Binderman I, Scortecci G (2012) Fixed rehabilitation of severely atrophic jaws using immediately loaded basal disk implants after in situ bone activation. J Oral Implantol 38(5): 611-666.
7. Weiss CM (1988) Dental implants: physiologic and clinical comparisons of fibro-osteal and osteal integration. Gen Dent 36(3): 243-248.
8. Weiss CM, Reynolds T (2000) A collective conference on the utilization of subperiosteal implants in implant dentistry. J Oral Implantol 26(2): 127-1278.
9. Bel JC, Court C, Cogan A, Chantelot C, Pietu G, et al. (2014) Unicondylar fractures of the distal femur. Orthop Traumatol Surg Res 100(8): 873-877.
10. RickmanM, Young J, Trompeter A, Pearce R, Hamilton M (2014) Managing acetabular fractures in the elderly with fixation and primary arthroplasty: aiming for early weightbearing. Clin Orthop Relat Res 472(11): 3375-3382.
11. Lepley CR, Throckmorton GS, Ceen RF, Buschang PH (2011) Relative contributions of occlusion, maximum bite force, and chewing cycle kinematics to masticatory performance. Am J Orthod Dentofacial Orthop 139(5): 606-613.
12. Kopp S, Kuzelka J, Goldmann T, Himmlova L, Ihde S (2011) Modeling of load transmission and distribution of deformation energy before and after healing of basal dental implants in the human mandible. Biomed Tech (Berl) 56(1): 53-58.
13. Ihde S, Ihde A, Lysenko V, Konstantinovic V, Palka L (2016) New Systematic Terminology of cortical Bone areals for osseo-fixated Implants in Strategic Oral Implantology J.J.Anatomy 1(2): 007
14. Donsimoni JM, Dohan D (2004) Les implants maxillo-faciaux à plateaux d'assise: Concepts et technologies orthopédiques, réhabilitations maxillo-mandibulaires, reconstructions maxillo-faciales, réhabilitations dentaires partielles, techniques de réintervention, méta-analyse. 1re partie : concepts et technologies orthopédiques. Implantodontie 13(1): 13-30.
15. Ihde, Stefan (2005) Principles of BOI, Scientific and Practical Guidelines to 4-D Dental Implantology. Springer, Heidelberg.
16. Wang K, Li DH, Guo JF, Liu BL, Shi SQ (2009) Effects of buccal bi-cortical anchorages on primary stability of dental implants: a numerical approach of natural frequency analysis. J Oral Rehabil,. 36(4): 284-291.
17. Ihde S, Eber M (2004) Case report: restoration of edentulous mandible with 4 BOI implants in an immediate load procedure. Biomed Pap Med Fac Univ Palacky Olomouc Czech Repub 148(2): 195-198.

18. P (1982) La rehabilitation neuro-occlusale. Masson, Paris.

19. Atkinson PJ, Powell K, Woodhead C (1977) Cortical structure of the pig mandible after the insertion of metallic implants into alveolar bone. Arch Oral Biol 22(6): 383-391.

20. Martin RB, Burr DB(1982) A hypothetical mechanism for the stimulation of osteonal remodelling by fatigue damage. J Biomech 15(3): 137-139.

21. Gaur V, Doshi A, Ihde S, Fernandes G, Lysenko V (2018) "Immediate Loading of Implants in the Partially Edentulous Maxilla: A Case Report of a Novel Technique with Strategic Implants ."IOSR Journal of Dental and Medical Sciences (IOSR-JDMS) 17(5): 34-40.