

Minimally Invasive Transmucosal Insertion and Immediate Provisionalization of One-Piece Implant in Partially Edentulous Posterior Mandible

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ABSTRACT

Although dental implantology had evolved over number of years, many dental surgeons are unaware of the concept of immediate loading with use of titanium one-piece implants that began in the early 1960s. Although long term success have been revealed with the use of two piece implants over the period of years, many obstacles like pain, inflammation and the bacterial migration into the micro-gap of two-piece implants when they are loaded; loosening and even fractures of the internal screws when they are loaded which limits patient acceptance towards dental implants. Immediate loading of one piece implants by using provisional acrylic resin crown with minimally invasive or atraumatic, flapless surgical procedures provides a better soft tissue adhesion and seal to form a healthy collar, avoids a second stage surgical procedure and with higher patient acceptance. One-piece implant also allows a minimally invasive trans-mucosal flapless placement and limits the requirement of hard tissue grafting procedures. With all these conception, the present case report evaluated the clinical performance of a one-piece implant in a partially edentulous posterior mandible.

INTRODUCTION

Dental implantology has evolved over the years, but patient acceptance is still not wide, because of the expenses and durations which are required to attain a functional status. Over three decades of literature have documented the high long-term success of dental implants which utilized conventional Brånemark two-stage protocol, which allows a load-free healing period of three to six months [1-3]. The actual need of healing periods of such durations has been greatly questioned, because they were determined on an empirical basis [4].

Many dental surgeons, however, are unaware of the concept of immediate loading with use of titanium one-piece implants and the fact that it is actually not new and that it began in the early 1960s [5]. However, there is increasing popularity among patients and dental surgeons with respect to immediate loading of dental implants and swift deliveries of implant supported restorations can be considered as the standard of care in case of missing teeth. There are many advantages of the immediate loading protocol, which include reductions in the number of surgical interventions and in the overall treatment time. Furthermore, there is substantial evidence on the fact that immediate loading of implants can be carried out without jeopardizing the survival rates, thus providing high initial stability of the implant and controlled loads [6-11].

A better understanding of oral biology had led to minimally invasive or atraumatic, flapless surgical procedures [12-16]. With appropriate case selections, single-stage surgeries, immediate loadings, and flapless implants, placements are dependable treatment approaches which offer favourable and long-term prognoses [14].

Many clinical case presentations have described immediate loading of single implants by using provisional acrylic resin crowns [4, 7-9, 17, 18, 19]. The immediate provisionalization of a one-piece implant allows a better soft tissue adhesion and seal to form a healthy collar and it avoids a second stage surgical procedure [20]. The restorative

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process with the one-piece implant resembles that of a natural tooth. The easily prepared abutment part enables an individualized borderline of the preparation, to exactly follow the contour of the gingival margin, without violating the soft tissue seal, potentially leading to better preserved interproximal bone and papillae [21].

A one-piece implant allows a minimally invasive trans-mucosal flapless placement and it limits the requirement of hard tissue grafting procedures [11]. The present case study evaluated the clinical performance of a one-piece implant in a partially edentulous posterior mandible.

CASE REPORT

A 43-years-old male patient presented to the Department of Periodontics and Implant Dentistry, seeking replacement of a missing tooth in relation to tooth #36 [Table/Fig-1, 2]. The patient was thoroughly informed of the immediate loading as well as two-stage protocol and he decided to go for the former method. A pre-surgical radiographic evaluation was carried out with panoramic radiographs and digital intra-oral radiographs. The ridge width was evaluated by ridge mapping and the implant size (3.75 x 10 mm) was selected by using the expanders in the kit as dummy implants on the diagnostic casts.

A surgery was performed under local anaesthesia. No flaps were reflected. An initial drill was used for site preparation, to give a needlepoint accuracy for position, angle and depth and the use of copious saline irrigation. The drill passed through the mucosa (transmucosal) [Table/Fig-3], the cortical bone and then, the cancellous bone. A periodontal probe was used to assess the integrity of the bone in all five dimensions.

The implant was placed with a plastic carrier through the transmucosal osteotomy and it was rotated clockwise, until the plastic carrier could no longer rotate the implant [Table/Fig-4]. A hex driver with a ratchet wrench was used to complete the seating of the



[Table/Fig-1]: Pre-Operative Photos Before Extraction Of 36



[Table/Fig-2]: Pre-op photos after extraction of 36



[Table/Fig-3]: Intra-op photos of making a punch minimally invasive for implant placement

implant. It was then placed and seated until the first thread was flush with the crestal bone. The level counter was checked by using RVGs. Primary stability was found to be 40Ncm.

The provisional acrylic resin restoration was fabricated at chair-side [Table/Fig-5]. Care was taken to achieve a smooth contour of



[Table/Fig-4]: Placement of single piece dental implant in 36



[Table/Fig-5]: Temporary crown given in 36 within 24 hours

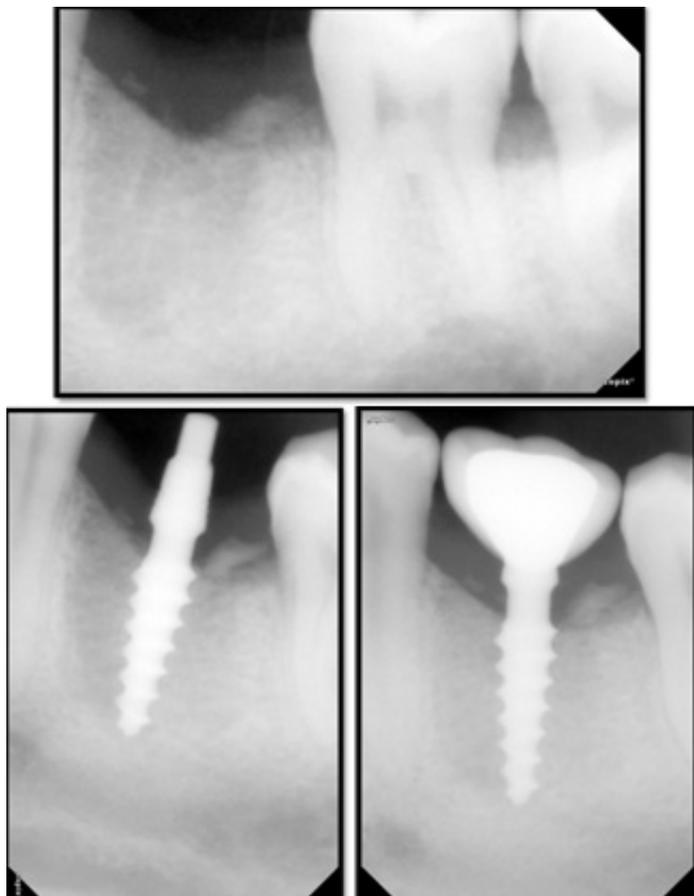


[Table/Fig-6]: Permanent crown given in 36 after 4 months

the provisional tooth, to avoid irritation of the soft tissue, as well as to condition the soft tissue profile. After making sure that the provisional crown was out of contact proximally and occlusally, it was temporarily cemented.

The patient was instructed to consume easily chewable food for two months and to avoid directly biting on the provisional restoration. Complete soft tissue healing was generally uneventful within the first two weeks after implant placement. The patient reported minimal post-operative swelling or pain experiences.

After a healing period of six months, the provisional acrylic resin restoration was replaced by a definitive restoration. Basic clinical examinations and radiographic evaluations were done pre-treatment, post-operatively and at periodic 3-month follow ups. Six months post-surgery, the final prosthesis was inserted and patient was followed up for twelve months [Table/Fig-6]. The radiographic crestal bone level, by the end of first year of functional loading, was found to be negligible [2] [Table/Fig-7].



[Table/Fig-7]: IOPA showing missing teeth ,immediate implant placement, loading of implant

DISCUSSION

Immediate loading of dental implants is becoming a widespread therapeutic procedure for the rehabilitation of patients with edentulous jaws. Several factors may influence the results of an immediate implant loading. These could be divided into the following categories: surgery, host, implant, and occlusion-related factors. Surgical factors consist of primary implant stability and surgical technique. Host factors comprise the quality and quantity of bone, and wound healing. Implant factors include the macro and micro-designs, surface textures, and dimensions of the implant. Occlusal factors involve the quality and quantity of force and prosthetic design [22]. Prithviraj et al., [23] did a review on a one piece implant and concluded that most of the surgeons preferred delayed placements with immediate loadings of one piece implants. It was reported that a conical implant design, in combination with the use of an undersized form drill, could lead to a higher initial stability than that which was seen with conventional implants [24-26]. Also, experimental and clinical studies proved that the implant surface roughness and the thread design were major factors which played roles in achieving success with immediate loading [27].

The pain that the patient suffers from after surgery and the inflammation complication rates have been found to be much higher with the conventional two-piece implants, than with the trans-mucosal one-piece approach. It takes 3-6 months for the two-piece implants to heal properly, without being loaded and to be osseointegrated, so that the prosthetic phase with the abutments can begin. Again, complications include bacterial migration into the micro-gap of two-piece implants when they are loaded; loosening and even fractures of the internal screws when they are loaded. The trans-mucosal flapless procedure resulted in minimal swelling and pain, with no occurrence of haematoma. The patients required only minimal postoperative medications. The flapless procedure resulted in a very high increase in the patient acceptance and satisfaction with this treatment modality. It was reported that flapless surgery also

helped in maintaining a better blood supply to the marginal bone, thus reducing the likelihood of bone resorption [14-16].

Although flapless implant placement is considered to be a blind surgical procedure, there is a learning curve with every surgical procedure, after which it becomes routine. Clinical studies which were done by Jill D Bashutski et al., [28] and Stuart J Froum et al., [29] found no difference in between flapless surgeries and traditional flap procedures on single tooth implants, with higher survival rates and stable marginal bone and pocket depths in both groups. There are many advantages for the patients as well as for the surgeons, since the procedure is less time consuming, as bleeding is minimal, as implant placement is expedited, and as there is no need to place and remove sutures.

The one-piece implant design eliminates the need for placing healing collars and it makes it possible to avoid manipulation of the soft tissue portion after initial healing. The implant abutment junction in a two-piece implant design constitutes a structural weakness that may complicate the procedure [15]. The primary stability of 40 Ncm to 80 Ncm is completely satisfactory to allow immediate loading or at least to provide an immediate restoration. Marco et al., [20] found no statistically significant difference between immediate and one staged restored small diameter implants, with regards to implant survival, mean marginal bone loss, and pocket depth in clinical trials which were carried over 3 years.

CONCLUSION

A single stage, one piece implant placement with immediate loading provides a good soft tissue healing and minimal post-operative discomfort to the patient. In this case report, immediate loading of a posterior single piece implant radiographically, revealed a stable marginal bone around the implant, with a maintainable peri-implant soft tissue integrity and edentulous space, both occusally and mesio-distally. Flapless surgery, in this case, reported a high success rate with minimal post-operative swelling or pain experiences and a minimal need for analgesics. Thus, within the limits of this case report, a single-stage one-piece implant placement, immediate loading, and a trans-mucosal flapless surgery provide greater advantages, with high acceptance by the surgeons as well as the patients. Further studies are needed to substantiate the findings of the above case discussion.

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