AIMING LONG TERM SUCCESS WITH SHORT IMPLANT: A CASE REPORT

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ABSTRACT

Placing an implant in the posterior part of the maxilla and mandible has always been critical due to poor quality and quantity of bone. Long implants could be placed in association with complex surgical procedures such as sinus lift and bone augmentation in the maxilla and advanced surgical procedures for the mandible but these are higher in cost and are time consuming. Hence, there is a need for a less invasive treatment option in atrophic areas of bone. Here, data related to short implants survival rate is structured with emphasis on the indications, advantages, and biomechanical factors to be taken into consideration while choosing short implants represented in a clinical case aiming for long term success with short implant. These can be considered as an effective treatment alternative in resorbed ridges. Thereby, suggesting length does not decide the success of the implant but pre-operative planning and case selection increase the success rate. Short implants can be considered as a viable treatment option in cases with atrophic ridges in order to avoid the complex surgical procedures required to place conventional implants.

INTRODUCTION

Choice of implant length for available bone quality and quantity and biting force is a critical factor in the success of implants and the longevity of the prosthesis. Long implants have always been considered to be desirable, but in patients with alveolar bone resorption their placement is problematic due to the anatomic boundaries. Anatomical limitation in resorbed maxillary ridge includes the maxillary sinus posteriorly, nasal floor and nasopalatine canal anteriorly whereas in case of resorbed mandible it is inferior alveolar canal. Advanced surgical procedures such as guided bone regeneration, block grafting, maxillary sinus floor grafting, distraction osteogenesis and nerve repositioning can be carried out in order to gain alveolar height in these areas for the placement of long length implants but these are technique sensitive, challenging, costly, and are time consuming. Short implants are less invasive treatment alternatives in cases with resorbed ridges [1–3]. There is no general definition of a short implant; most of the authors have considered implants which are less than 10mm are short implants [4–6]

Short implants were found to have similar survival rates, reduced treatment cost and time as compared to long implants assisted by advanced surgical procedures.[7]

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One of the studies concluded that there is sufficient evidence showing high success rates with short implants when compared to surgical augmentation procedures in the treatment of atrophic ridges[8]

GUIDELINES FOR PLACING SHORT IMPLANTS

TABLE 1: Guidelines for placement of short implants and other therapeutic options based on bone height, bone quality, and certain risk factors such as smoking, history of periodontal disease and advanced age are as follows:

Ridge height (Resorbed maxilla)	Bone type	History of periodontitis, smokers, advanced age	Treatment
<5mm	Type I, II, III	No	Sinus lift/short implant
	Type IV	Yes	Sinus lift/short implant
5-6mm	Type I, II, III	No	Short implant
	Type IV	Yes	Sinus lift/short implant
≥6mm	Type I, II, III	No	Short implant
	Type IV	Yes	Short implant
Ridge height (Resorbed mandible)	**Bone type**	**Treatment**	
<8mm	Type I, II, III, IV	Advanced surgical procedure/short implant	
≥8mm	Type I, II, III, IV	Short implants	

This manuscript describes success is very much dependent on preoperative planning and proper case selection. Present case report presents with placement of short implant with a flapless surgical technique that caused minimal discomfort to the patient, thereby aiming for long term success with short implant in resorbed ridge.

CASE REPORT

A 65-year-old diabetic female reported to the clinic with the complaint of missing tooth 16 (right maxillary first molar). The tooth had been extracted 2 months earlier due to gross decaying; since then she did not wear any prosthesis and was having difficulty in chewing, so she wanted to have a fixed solution. After intraoral

FIG 1A-B: Missing maxillary right first molar

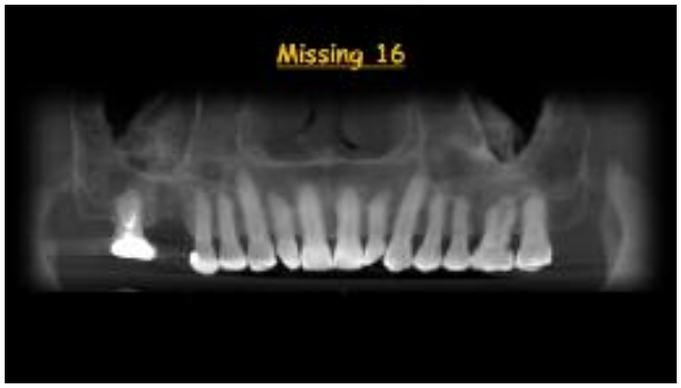

FIG 1B

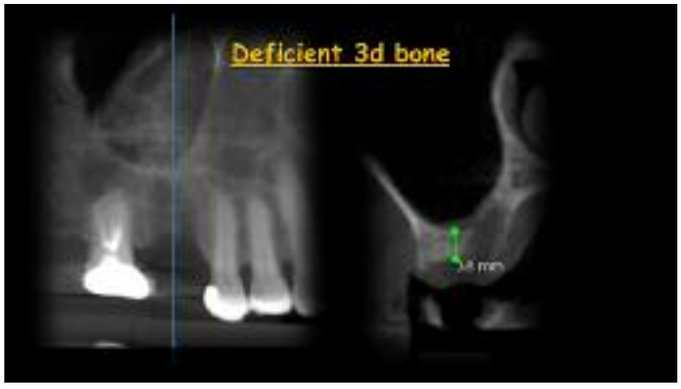

FIG 1C: Deficient 3D bone

FIG 2: Short implant of 4.8 ⌖ 5 mm placed with flapless osteotom

examination, treatment options available were: fixed partial denture and an implant-retained restoration/crown; patient agreed with the implant-retained restoration/crown as this was more predictable and conservative to teeth and long term solution.

To check for the bone level for implant selection CBCT (cone beam computed tomography) was done, which showed deficient 3D bone i.r.t 16. **(Figures 1A,B,C)**

Looking at the compromised bone level, she was offered treatment options with dental implants and bone augmentation. The patient refused bone augmentation and chose the option of short implant placement in the posterior maxilla. After measuring the bone level clinically and radiographically, it was decided to place a bone level short implant (4.8 × 5 mm, implantswiss Implant System) by flapless surgical procedure. **(Figure 2)**

Implant placement was performed under local anaesthesia; a tissue punch was used to perforate the gingival tissue so as to gain access to bone without elevating the flap. The osteotomy procedure was initiated with a pilot drill at the punch site under copious irrigation; the final osteotomy was prepared by sequential drilling. The proper angulations and depth of osteotomy were evaluated with a depth gauge and radiographs. After the final osteotomy preparation, implantswiss implant was placed with an insertion torque of 30Ncm

FIG 3: Post-operative OPG

by a torque measuring wrench posing good primary stability, parallel to the roots of the adjacent teeth. ISQ measurements were in the range of 75-78, a healing abutment was then placed on the implant to facilitate the development of a gingival emergence profile for the anticipated restoration. Post-operative OPG was taken to check for the placement of the implant. **(Figure 3)**

Postsurgical instructions were explained to control postoperative

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FIG 4: Post-operative 4months radiograph and scan

FIG 5A: Digital model

FIG 5B: A.I (Artificial intelligence) CAD/CAM designing

pain. Antibiotics and analgesics were prescribed to the patient for 5 days. The patient was recalled after 1 week for a routine check-up; there was no extraoral swelling or discomfort. The patient was recalled after 4 months for carrying out the prosthetic procedures. ISQ test was done again, which showed excellent biological stability with reading measuring 84, showing excellent secondary stability. **(Figure 4)**

For taking impressions to avoid discomfort and save time and improve accuracy, we took direct impressions using the CAD/CAM technique using CEREC, Dentsply-Sirona workflow.

Procedure for chairside screw retained prosthesis began with the use of a scanbody over ti-base. Digital model were prepared and prosthesis designing was done chairside only by CEREC workflow with the help of Artificial Intelligence (A.I) **(Figures 5A,B)**

Manufacturing was done with Sirona CEREC Zirconia A3 meso L block which included milling, sintering and glazing done chairside only on Primemill & Speedfire **(Figures 6A,B)**

Crown was cemented extraorally over ti-base with dual-cure resin cement.

Finally, within 1 hour chair side screw retained prosthesis was prepared which was ready to be delivered. After final placement of prosthesison its desired site, intraorally post-operative radiograph was taken. **(Figures 7A,B)**

Patient was asked to come for timely follow-ups for 3 years, and radiographs were taken respectively, which showed long term success with short implants. **(Figure 8)**

After the 3-years of follow-up, CBCT evaluation was done to assess actual 3-3-dimensional bone around short implant & it was found that uniform bone was formed without performing complex sinus lift procedure.

DISCUSSION

One of the authors conducted finite element analysis to study stresses occurring at the bone-implant interface[9]. It was found that maximum stress concentration occurred near the crest portion of the implant surface somewhere around top 5-6mm of the implant. Earlier implant supported prosthesis were given based on the rationale of optimum crown/implant ratio as implant was to be considered similar to the root of a tooth. This led to the placement of the longest possible implants. But there is a vast difference in the attachment of root and implant attachment to the alveolar bone. Root is attached via periodontal ligament, whereas; implant is in direct contact with the bone through osseo-integration.

Griffin and Cheung in 2004 recognized the maximized implant surface area as the most contributing factor to the success rate of short implants.[10] Romeo et al., in 2010 conducted literature review emphasizing the significance of treatment planning on the successful rehabilitation of short implants[11]. Implant diameter is more effective for stress distribution than implant length and implant geometry. Thoma et al., advised placement of short implants in atrophic posterior maxilla as short implants reduce patient morbidity, treatment time, and overall cost[12]. Flapless implant surgery has been suggested as best possible treatment option for enhancing implant esthetics, and is easy to perform.[13]

Short implant considerations can be categorized as follows:

a. Implant diameter: It is more efficient than length of the implant for dissipation of stress.

b. Crown/implant ratio: Act as vertical cantilever so good surface and implant system with proper force orientation and load distribution might improve the success.

c. Bone quality: Act as the primary factor for the success of short implant.

d. Implant surface: As compared to smooth surface, rough microtopography of surface increase the bone-implant contact thereby, accelerating osseo-integration.

Here in this case we opted for short implant as there was deficient bone level so long implant could not be placed without bone augmentation so in order to avoid this surgical procedure and looking at the narrow occlusal table with zero cuspal height we chose to go with placement of short implant. Placement of implant without

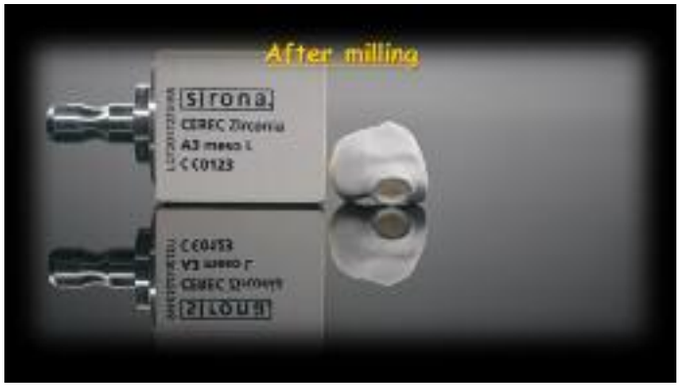

FIG 6A-B: After milling and sintering

FIG 6B

FIG 7A: Screw retained crown

FIG 7B: Final prosthesis with short implant

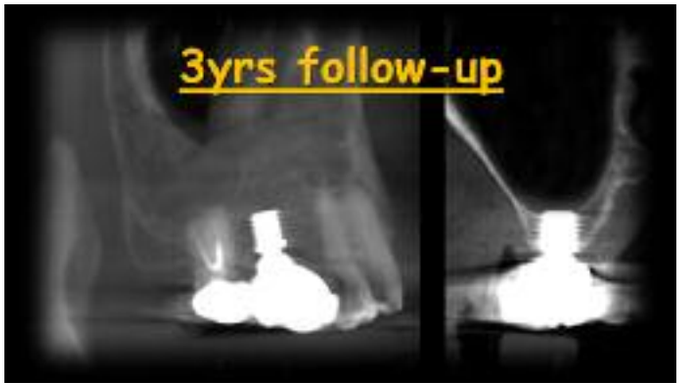

FIG 8: 3 years follow-up

raising a flap requires a certain level of experience and fine motor skills.The possibility of bone perforation and late complications might outweigh the benefit of reduced bone loss with flapless implants, so this procedure must be performed with extreme care and proper preoperative planning.

CONCLUSION

The use of short implants allows treatment of patients who are not able to undergo complex surgical techniques due to medical, anatomic or financial reasons. By reducing the need for complex surgeries short implants might reduce morbidity, cost and treatment time. When placed considering all the critical biomechanical factors and using strict clinical protocol short implants can be a long term successful treatment option in atrophic ridges. However data for long-term success and survival of these short implants, particularly with respect to occlusal loading, crown/implant ratio, and in situations of less than optimal bone quality is still needed.

For a complete list of references, email: info@dental-practice.biz

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