Esthetic rehabilitation of single anterior edentulous space using platformswitched technique-A Case Report

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ABSTRACT : Replacement of missing tooth and lost tissues is an integral part of dentistry. Dr MM De Van through his works and observations concluded that perpetual preservation of what is remaining is more important than replacing what is lost. Replacement of a single missing tooth with an implant - supported crown is a conservative approach than preparing two adjacent teeth for a tooth supported fixed partial denture. The long-term success of an implant depends on the stability of bone support for the implant. Most crestal bone loss occurs in the first year of implant placement. Platform-switching is an approach which can be clinically applied to preserve the crestal bone. The concept of 'platform switching' refers to the use of a smaller-diameter abutment on a larger-diameter implant collar. The purpose of the present study was to evaluate crestal bone level around platform-switched implants.
Keywords : Platform Switching, Crestal bone loss, Microgap, Biologic Width, ADIN CloseFit™ , Immediate Loading.

INTRODUCTION

Missing tooth for a longer period leads to reduced chewing efficiency, difficulty in speech, poor facial aesthetics with low self-confidence at social platforms. It is a growing quench of every human and also the dentist to provide replacement for lost dentition by fabrication of suitable prosthesis which must have functionally and aesthetically more ingenuity according to the dentist and not distinguishable in terms of natural look and to be more comfortable and elevate level of confidence of patient.[1]

Replacement of a single missing tooth with an implant -supported crown is a conservative approach than preparing two adjacent teeth for a tooth supported fixed partial denture.[2] Since the introduction of dental implants for the replacement of missing teeth, various modifications in implant designs & surgical techniques have been developed to improve the prognosis of the implant supported prosthesis. Preservation of crestal bone is the primary aim while planning for implant placement. Adell et al.[3] were the first to qualify and report marginal bone loss of the implant. The average marginal bone loss around the implant was 1.2mm over a period of one year.[4] In the late 1980's platform switching concept was discovered accidentally where wider diameter implants with narrower diameter abutments were used.[5] On the other hand, in the platform switched concept, the horizontal relationship between the outer edge of the implant and a smaller diameter abutment is altered by physical repositioning of the implant abutment junction away from the outer edge of the implant and surrounding bone thereby containing the inflammatory infiltrate within the width of the platform switch resulting in the reduced crestal bone loss.[5]

CASE REPORT

A 41 years old female patient visited to the department of prosthodontics, Crown and Bridge with a chief complaint of missing in upper front

region since 6 months and wanted immediate replacement of the same (Fig 1). Clinical examination revealed healthy gingiva and periodontium(Fig.2). Patient was systemically healthy, non-smoker, non-bruxer and desired for dental implant placement. Cone beam computed tomography was advised to determine the dimension of the residual alveolar bone. Based on the dimension of the available bone, implant size was estimated to be 3.5mm X 15mm (Fig. 3). Patient was aesthetically more concerned and wanted implant placement along with the prosthesis immediately. Considering the available bone quantity and patient's expectation, placement of Adin CloseFit ™ implant of 3.5mm X 15 mm was planned.

Fig.1 Preoperative photograph showing missing 12

Fig.2 Occlusal view

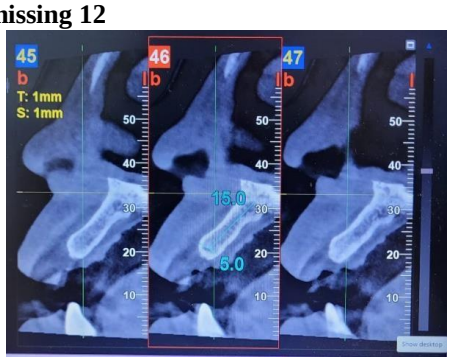

Fig.3 CBCT Planning

The surgery was performed under 2% lignocaine hydrochloride with adrenaline (1:200000) as local anaesthetic. Infraorbital and nasopalatine nerve block were given. A crestal incision extending till the proximal surfaces of teeth on either sides of the surgical site was given.(Fig.4). Vertical releasing incision was given. A full thickness mucoperiosteal flap was reflected taking care to prevent flap tearing to expose the bone at implant site (Fig.5).

Fig.4 : Crestal Incision

Fig.5 Mucoperiosteal Flap Reflection

Osteotomy site was marked with the help of lance drill into the bone and in relation with anatomic structures. (Fig.6). Osteotomy site was enlarged using successive drills with increasing diameters according to the selected implant size. Depth gauge was used, placed inside the channel to assess and finalize the length of the implant. The last drill used was 3.2mm as the diameter of the selected implant was 3.5mm. Implant was carried to the osteotomy site using the implant carrier and was driven up to15 mm using the wrench. After placing the implant in position, the torque was ascertained not less than 40Ncm for primary stability to be eligible for immediate loading (Fig.7).

Fig6. Lans drill

fig 7. Insertion torque 45Ncm

Implant placement is done. (Fig.8) and radiovisiograph was taken to ensure parallelism of theimplant to adjacent root.(Fig9)

Fig.8 Implant placement

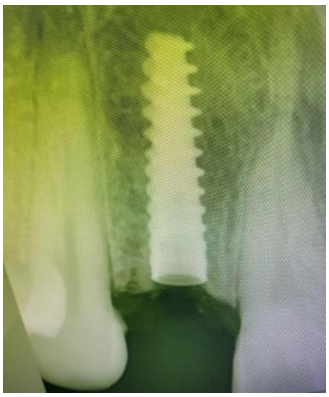

Fig.9 RVG showing parallelism withadjacent root

The suitable impression coping was placed in position (Fig.10) and interdental papillae were sutured with simple interrupted design. Open tray impression was made using Addition silicon impression material (Fig.11) Laboratory analogue was attached to open tray impression coping and model is poured with type IV dental stone. Temporary crown was fabricated and delivered to patient. (Fig.12)

Fig.10 Figure Open tray impression coping

Fig.11 Open tray implant levelimpression

Fig.12 Immediate Temporary Crown

Patient was advised not to brush vigorously, chew hard food from the surgical side for one week. Suture removal was done after 7 days. After 4 months of osseointegration period is completed, radiovisiograph was taken , final impression was made using addition silicon with open tray impression technique and the definitive prosthesis was fabricated. (Fig.13)

Figure 13 : Permanent Prosthesis

To prevent early postoperative complications, antibiotics were prescribed: 500 mg amoxicillin every 8 hours for 6 days post-surgery. Non-steroidal anti-inflammatory drugs (NSAIDS) will be administered every 8 hours as needed. The response of the patient to the implant and its loading, prior to osseointegration, was then monitored over a follow up period of 12 months. The mean marginal bone level, a parameter included in the study were recorded 4 times, i.e., at the time of implant placement, 4th, 8th and 12th month.

RESULT-

The radiographs taken immediately postoperatively, 4, 8 and 12 months, and were analyzed for changes in marginal bone loss of each fixture measured mesially and distally by using the fixture threads as an internal dimensional reference. These points were chosen because they were permanently visible and easy to locate on all radiographs. The mean marginal bone loss from baseline to 12th months at mesial and distal was 0.78 and 0.76 mm respectively. In this study, crestal bone loss was significant, result shows significant increase in crestal bone loss in first 4th months (0.45 mm mesial and 0.43 mm distal). Bone loss decreases from 4th to 8th months (0.16 mm mesial and 0.14 mm distal), and from 8th to 12th months (0.11 mm mesial and 0.13 mm distal). The implants showed a mean bone loss of 0.76 ± 0.1265 mm on mesial side and 0.78 ± 0.1481 mm on distal side after 1 year. These values show that bone loss is less in platform-switched implants.

DISCUSSION

For many decades, Implants have been used to support dental prosthesis, but they have not always provided a favorable results. This situation has changed after the entry of endosseous osseointegrated dental implants.[6] Since then many types of implants have evolved and various modifications in its design have been made to achieve better osseointegration for its long term stability [7] The preservation of the crestal bone and soft tissue around implants is an important factor for implant success both functionally and esthetically.[8]

Ericsson et al in 1995 detected inflammatory cell infiltrate associated with IAJ of two- piece implants. The authors suggested that the formation of infiltrate in the microgap contaminated with oral bacteria acts as a defensive mechanism.[9] Platform switched implants repositions infiltrate in a 90-degree confined area of exposure instead of 180-degree surface of regular connection implants.[10] Thus smaller infiltrate around platform switched implants results in less bone loss.

Lazzarre et al in 2006 described preservation of crestal bone using platform switched implants with the radiographic observations made over a 13 year period. The inward horizontal repositioning of the IAJ shifted the microgap away from the bone and crestal bone loss is reduced.[11] Albrektsson et al in 1986 proposed a mean crestal bone loss less than 1.6mm during first post-surgical year was accepted as a criterion for implant success. They also proposed annual crestal bone loss ranging from 0.05mm to 0.13mm in the maintenance period.[12] In a study by Salamanca et al in 2017 it was concluded that platform switching seemed to be more effective for a better peri-implant alveolar bone vertical and horizontal gap reduction at 1 year.[13]

After being loaded immediately with the temporary prosthesis, the implant was closely followed up for a period of 4 months, after which it was replaced with a permanent porcelain fused to metal restoration, which would be in physiologic/functional occlusion with its opposite tooth. The crestal bone area is a significant indicator of implant health. Early loss of crestal bone is usually a result of excess stress at the per mucosal site. It is an indicator for the clinician to review the causes of possible stress for the implant, such as occlusal factors, cantilever length, and parafunction. Under ideal conditions, an implant should loose minimum bone.

Mean marginal bone levels were assessed radiographically using the standard Intra- oral Periapical Radiographs. The distance between the observed crestal bone level and implant- abutment interface was measured at the mesial and distal implant surfaces and an average to yield the mean marginal bone loss level for that implant. In some cases, a magnification error existed. In such cases, the length (mm) of the implant, and the distance between the observed crestal bone and implant-abutment interface was measured on the radiographs. The measurements were classified into groups of 0.1 mm.[14] The actual implant length is known based on manufacturing standards. The radiographs taken immediately postoperatively, 4, 8 and 12 months, and were analyzed for changes in marginal bone loss of each fixture measured mesially and distally by using the fixture threads as an internal dimensional reference. These points were chosen because they were permanently visible and easy to locate on all radiographs. The mean marginal bone loss from baseline to 12th months.

Platform switching is a major contributing factor in limiting crestal bone resorption but also provides an additional horizontal biological width, hence preserving the crestal bone. At the same time, the micro-gap is shifted away from the crestal bone, decreasing the probability of resorption. Another reason suggested for maintenance of marginal bone by platform switching is the decreased stresses around the implant neck, but the differences are very slight. So, decreased stresses may not be the only reason for the positive results shown by platform switching. Moreover, by decreasing the abutment diameter, more stresses are concentrated near the abutment, increasing the likelihood of abutment fracture.

Platform-switched implants reduce bone loss by: (A) maintenance of biological width and increased distance of Implant abutment junction from the crestal bone level and horizontal biological width is established, (B) shifting the inflammatory cell infiltrate inward and away from the adjacent crestal bone because of difference in diameter of implant and abutment, (C) decreased stress levels in the peri-implant bone, because distance between abutment and bone is increased in platform switching and (D) the possible influence of microgap on the crestal bone is diminished.[15]

CONCLUSION

Study concludes that platform switching appears to be a valid method of reducing crestal bone loss resulting from the implant-abutment union. Immediate loading of implants with platform switching technique in the esthetic zone of the maxilla is a highly predictable modality for replacing single missing teeth. The clinical implications of platform switching are numerous, and all indicate greater long-term predictability in implant prosthetic therapy by enabling preservation of the periimplant bone over time.

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