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Case Report

Prosthetic Rehabilitation of Traumatic Bone Defect Utilizing Partial Malo Bridge in Esthetic Zone

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Abstract

Prosthetic dentistry involves the replacement of missing and contiguous tissues with artificial substitutes to restore and maintain the oral functions, appearance, and health of the patient. It is a challenging task for the dentist to restore the edentulous areas with ridge defects. Treatment options for of such cases can be either surgical or non-surgical technique such as use of fixed, removable, or fixed- removable partial dentures. But each treatment plan undertaken should be customized according to patient needs. Besides these other factors like quality and quantity of existing contiguous hard and soft tissues, systemic condition and economic status of the patient play an important role in treatment planning, clinical outcome and prognosis. This case report presents the restoration of a Seibert's Class III ridge defect by cobalt chrome CAD/CAM milled framework with overlay PFM metal laser sintered crown in a 21-year-old female patient.

Keywords: Sibert's Class III; CAD/CAM Metal Framework; Metal Laser Sintered Crown

Introduction

Implant-supported fixed prostheses have increasingly been the first-choice of treatment for the rehabilitation of edentulous areas [1]. Fixed implant retained prostheses as an alternative to removable prosthesis has achieved predictably high survival rates. The conventional method of fabrication of implant supported prosthesis was using metal framework by lost wax technique and then firing of porcelain over metal framework. Alternative of the conventional technique was the CAD/CAM milled prosthesis where the prosthesis is milled from solid blanks of titanium, titanium alloy, or ceramic materials such as zirconia [2].

In the present case 21-year-old female patient came to Department of Prosthodontics, FODS KGMU, after traumatic loss of anterior maxillary teeth and few posterior teeth (Figure 1a, 1b). The traumatic bone loss resulted in class III of Sibert's anterior ridge defect classification[3] Here the major concern from patients' point of view was aesthetic which was also affecting her psychologically. On the other hand, Challenge for Implantologist and Prosthodontist were to give a prosthesis which can fulfil aesthetic requirements by compensating the deficient hard as well as soft tissue and also which is cost effective.

Management of such cases involves a wide range of treatment options comprising mainly of soft tissue augmentation (employed mainly for Siebert's Class I defects) [3] bone augmentation techniques by Inlay and Onlay grafting (mainly for Siebert's Class II and III defects) [4] and combination technique incorporating soft tissue

and bone augmentation. For treating this patient our requirements were improved quality of materials, aesthetics, biomechanics, facilitation of hygienic maintenance, retrievability, and long-term prognoses for patients and prostheses. Implant retained fixed prosthesis followed by Malo bridge concept of Dr. Paulo Malo was used with the cobalt-chrome framework by CAD/CAM technique and individual porcelain fused to metal crowns were luted on this framework, pink porcelain was used to provide better aesthetics and compensating soft tissue defect.

Clinical Report

It was a clinical scenario of a 21-year-old female with Sibert Class III defect of anterior ridge in maxilla. Clinically there were missing 11 12 13 14, 21 in the maxillary arch in first and second quadrant respectively with associated soft tissue defect (Figure 1a), radiographic examination revealed (Figure 1b) the post-traumatic horizontal as well as vertical loss of maxillary bone in the same region. Treatment plan was discussed with the patient and then we start with the surgical phase.

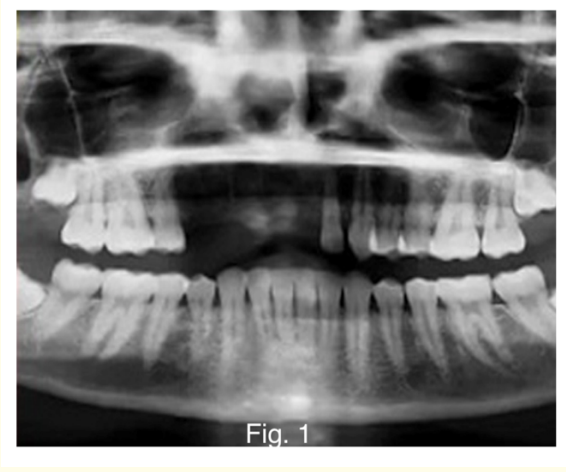

Figure 1

Surgical phase

On radiographic evaluation we planned to place 3 dental implants (Noble Biocare Active) in the region of 21, 13, 14 with the dimensions of 4.3 X 13.0mm, 4.5 X 13mm, 4.5 X 11.5mm respectively. procedure was performed under local anaesthesia (2% Xylocaine hydrochloride with 1:20,0000 adrenaline), platelet rich fibrin (PRF) mixed xenograft (Bio-Oss) was placed as onlay grafting, followed by watertight tension free PTFE suture was given which minimize the micro- damage reaction around the tissue defect and prevent the bacterial colonization. For the confirmation of final implant position postoperative radiographs was taken immediately after surgery and kept as a baseline record (Figure 2). Postoperative regimen of oral amoxicillin 500mg every 8 hrs, and 0.2% chlorhexidine oral rinse was advised. Patient was recalled after 4 months for definitive prosthodontic rehabilitation.

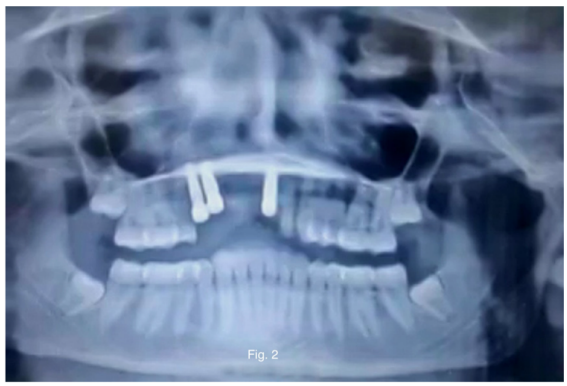

Figure 2

Prosthetic phase

In present case there was bone loss due to trauma so, in order to avoid further bone loss and also due to lack of the thickness of liner between the provisional restoration and the implant there is chances of loading of implant to avoid that we preferred not to give provisional restoration during healing phase and after four-month second stage surgery was done ,gingival formers were placed followed by suturing using PTFE suture material (Figure 3). Patient was recalled 15 days after the second stage surgery for final pickup impression. Screw retained, CAD/CAM milled poly methyl methacrylate (PMMA), frame work was used for try in (Figure 4). Evaluation of precise fit and profile was done and the framework was sent to lab for the fabrication of final metal framework. For the metal framework in present case we have used cobalt-chrome milled framework after scanning the corrected PMMA framework. This was a screw retained metal frame work over which individual

porcelain fused to metal crowns were fabricated using the metal laser sintering technique. Pink porcelain was used in cervical region of framework to compensate the soft tissue defect. Framework was screw tightened and the PFM crowns were luted over it by using temporary cement (Figure 5a,5b,6). After advising the post insertion instructions, patient was recalled after 6 months for follow up and their were improvement in esthetics (fullness of lip, using porcelain in place of acrylic) also this design provides easy retrievability of crown and cleaning of intaglio surface.

Discussion

It is a challenging task for dentist to treat the edentulous areas with ridge defects. Various factors such as quality and quantity of

Figure 3

Figure 4

Figure 5

Figure 6

existing contiguous hard and soft tissues, systemic condition and economic status of the patient play a significant role in treatment planning, clinical outcome and prognosis.

Treatment of ridge defect (Sibert class 3) in maxilla by fixed CAD/ CAM milled implant prosthesis was explained. In present case we have placed implant (Noble BioCare Active, Nobel Biocare Canada Inc. 9133 Leslie Street, Suite 100 Richmond Hill, ON L4B 4N1 Canada) and Bio-Oss xenograft (Geistlich *Bio-Oss*® Bahnhofstrasse 406110 Wolhusen Switzerland) as overlay graft, both procedure in single visit. Xenograft is slow resorbing material which maintain the contour of ridge for longer duration.

Temporisation was not performed in the present case because after implant placement-especially when combined with bone augmentation procedures-pressure may be applied inadvertently to the healing site which can lead to soft tissue thinning. This pressure, defined as "transmucosal loading," may be detrimental to bone graft healing and implant survival [5] It may also alter the surrounding soft-tissue contours unfavourably.

We used CAD/CAM milled framework for the final prosthesis in the present case. The two basic methods are currently used in the fabrication of implant frameworks are the conventional lost wax/ casting technique and CAD/CAM milling procedures where frameworks are milled from solid blanks of titanium, titanium alloy, other metal alloy and ceramic materials such as zirconia [3]. Though there were several advantage of loss wax/casting technique including aesthetics due to the proven technology associated with porcelain fused to metal and also the ability of most commercial dental laboratories to fabricate implant frameworks with this proven technology. The limitations of the lost wax/casting technique include the precision of fit, described by numerous researchers [6]. To overcome this sectional casting was also a method of choice where the sectioned fragments were welded or soldered. but the welded part due to rigidity became the weakest part of the framework leading to fracture. On the other hand, CAD/ CAM technique provides highly precise fit, without any soldered or welded joint less susceptible to human error [7]. The need of precision fit is because the minor difference in framework could invoke the risk of stress in Osseo integrated implant.

Also, the framework we used was all-in-one type screw retained framework of cobalt chrome which provide precision fit due to its machine fabrication, cost effective in comparison to titanium framework and also ease in retrievability due to screw retained nature. The final PFM crown were fabricated separately by metal laser sintering and luted over the framework by using temporary cement.

To overcome the soft tissue, defect pink porcelain was used on the cervical part of metal framework. The bond between the metal and porcelain was better in metal laser sintered crown leading to less chipping of ceramic as compared to titanium. Though this design of prosthesis is having high aesthetic value and cost-effective but is difficult to give similar aesthetic result in high lip line cases by such prosthesis due to visibility of transition from gingiva to ceramic.

Summary

Fabrication of CAD/CAM milled framework of cobalt chrome with PFM overlay crowns were used in ridge defects including hard as well as soft tissue. Cobalt chrome as an alternative to titanium was used which was precisely fitted due the computer aided milling, also it was cost effective. No additional surgery was done in the present case, both the defects were compensated by prosthesis only.

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