Journal of Chemical Health Risks

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JCHR (2024) 14(4), 1888-1895 | ISSN:2251-6727

Immediate Loading and Full Mouth Rehabilitation with a 4 Year Follow Up: A Case Report

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(Received: 14 April 2024 Revised: 1 May 2024 Accepted: 18 June 2024)

KEYWORDS

Immediate Loading, Guided Surgery , Full Mouth Rehabilitation, Exocad Designing, CAD -CAM Milled Zirconia Prosthesis

ABSTRACT:

Introduction: Replacement of missing teeth using dental implants have revolutionized the field of dentistry. Digital approach for implant placement has made it easier to place implants in optimal three dimensional position thus reducing prosthetic errors. It is very important to discuss the longetivity of the implants which mainly depends on the prosthetic design , type of abutments and material used for loading implants and the prosthetic work flow.

Objectives: The objective of the present case was to achieve a completely passive fitting prosthesis using digital approach and to evaluate the marginal bone loss and longetivity after 4 years of prosthetic delivery .

Methods: Immediate implants were placed after extraction in both the upper and lower arches (6 each arch) using a digitally planned tooth tissue supported guide. The multiunit abutments were placed over the implants on the surgical day itself followed by immediate loading of the implants with a milled PMMA (Poly methy metha acrylate).The final prosthesis were delivered after 3 months of temporization .This prosthesis was made in multi layered zirconia material. The case was evaluated for marginal bone loss after 4 years.

Results: The surgical guide helped precise placement of the implants with little to no deviation from the planned position. The radiographic evaluation showed minimal or no bone loss around the implants.

Conclusions: Digital approach for implant placement and prosthetic planning can achieve good passivity for the entire superstructure over the implants and help in long term survival of the same.

1. Introduction

One well-researched treatment for partial or complete adontia is dental implants[1, 2]. Preoperative planning of the prosthesis has a direct impact on the high success rates of dental implants [3, 4]. Contemporary CAD/CAM technology allow for the most precise selection of dental implant size and location, as well as precise implantation in accordance with preoperative planning. Nonetheless, there is ongoing debate on whether to screw or cement prosthetic construction [5-8]. Achieving passive fitting is one of the main issues with a full-arch implant-supported prosthesis. Assuming that the implant and framework surfaces are made exactly plain, passivity is attained when both the antagonist surfaces i.e the intaglio surface of the framework and the multi units of the implants are in maximal congruency, with no stresses in the components after the final tightening of the screws [9]. The passive fitting of the construction may not be secured by the screw retaining from the bone level platform. Furthermore, problems at this kind of fixation

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JCHR (2024) 14(4), 1888-1895 | ISSN:2251-6727

might range from implant fracture or failure of its osseointegration to fracture of many components in the implant suprastructure system [10]. On the other hand, because there is cement space between the prosthesis and abutment, cement retaining can offer passive fitting. However, this kind of fixation may result in additional complications, such as the inability to receive maintenance services and an increased risk of developing periimplantitis due to extra cement left in the peri-implant soft tissue area [11–13]. In this sense, creating screw-retained implant-supported prosthetic constructs with the use of multiunit abutment systems is the best possibility. The multiunit abutments allow for complete passive prosthesis fitting, even in cases when implant axes are positioned significantly apart. Furthermore, because all manipulations will take place above the implant platform and bone level, intraoperative multiunit abutment insertion shields the soft tissues around the implant surface from damage caused because of repeated screwing and unscrewing of implant suprastructures. This clinical case shows a case keeping in mind these drawbacks using guided surgery with a treatment protocol that is more predictable in full mouth rehabilitation by immediate loading.

2. Objectives

To place 6 implants each in the upper and lower jaw using surgical guide .

To achieve completely passive fit of the prosthesis using digital approach.

To analyse marginal bone loss after 4 years of prosthesis delivery by placing the final multi unit abutment on the same day of the implant surgery .

Methods *:*

Patient Information

65years old male complained of mobile teeth and inability to chew food. He also experienced pain due to mobility. The pain was dull gnawing and aggravated on chewing and relieved on its own after sometime. He wanted to opt for fixed solution for both the upper and lower jaws.

Clinical Findings **[fig 1,2]**

Missing-16,26,31,32,36,41,42,43,44,46

Root piece-25,48

Grade II Mobility –33,45,15

Grade III Mobility-12,21,22

Grade III furcation involvement with 17,27

Traumatic occlusion, collapsed bite

Provisional Diagnosis

Generalized chronic periodontitis

Overall Prognosis

Questionable

X-Ray Panoramic Radiograph Image without Implants.

Fig-1

Fig-2

Treatment Plan

Since the patient wanted to go for fixed solution, we planned to carry out full mouth implant treatment. After evaluating the prosthetic space we decide to rehabilitate with FP1 kind of prosthesis and place implants using guided surgery .6 implants each in the upper and lower arch followed by immediate loading if adequate primary stability is achieved. He was explained the steps of procedures, the risk and benefits of the same. A written consent was obtained from him before the surgical procedure was initiated.

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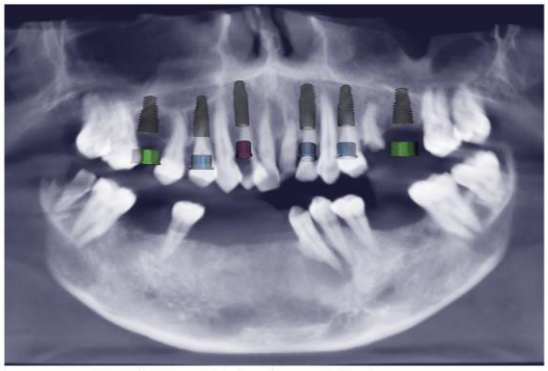
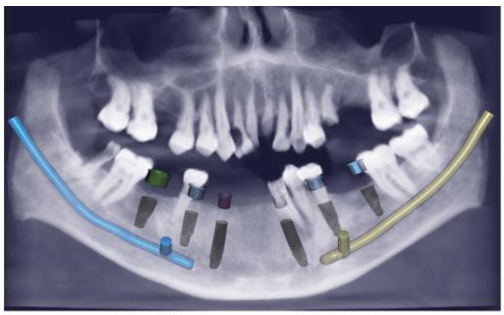
Preoperative Cbct And Opg

Anatomic landmarks and vital structures were marked and assessments in different regions of the jaw were carried out. Exocad planning software was used to digitally plan out the implant positions in the upper and lower jaws by first carrying out virtual extraction**[fig 3,4]**.



X-Ray Panoramic Radiograph Image with all Implants set.
(Due to technical reasons, the graphical representation of implants and mandibular canals inside this image might be distorted.)

Fig-3



X-Ray Panoramic Radiograph Image with all Implants set.
(Due to technical reasons, the graphical representation of implants and mandibular canals inside this image might be distorted.)

Fig-4

Surgical Guide

A surgical guide was made which was tooth and tissue supported guide. Here we planned to retain a few teeth which were extracted after the implant placement in the same sitting .This is done so that it is easier to stabilize the guide on teeth that are firm compared to fixation of a guide in completely edentoulos jaws.**[fig 5]**

Fig-5

Surgical Phase

The planning report, surgical guide were ready before the surgical phase had to be carried out. Surgical phase consisted of administration of local anesthesia with epinephrine 1:200000, followed by extraction of the remaining natural teeth except the teeth indented to be kept to support the guide. The guide was stabilized with fixation pins and consecutive placement of implants in the lower arch first followed by the upper arch was done .Guide stabilization forms an integral part of guided surgeries. If for any reason there is slight misfit of the guide, reassure that the guide is stabilized in the desired fixed position then only proceed with the osteotomies. Implants used were Neodent -Aqua Helix **[fig 6]**. After achieving the desired primary stability and evaluating the ISQ values which were above 70 for most of the implants ,we decided to immediately load the implants.

Fig-6

Resonance Frequency Analysis

RFA value helps to measures the stability of the implants. The measuring device used was the PENGUINE

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(Bredent) . Values of RFA above 70 were considered for immediate loading.

Temporization Phase

Multi unit abutments were placed over the implants and torqued[**Fig 7,8**].The multiunits guaranteed absolutely passive fitting of full-arch prosthesis and were not again unscrewed until final prosthesis delivery .

Fig -7

Fig -8

Open tray impression copings were screwed over the multi unit abutments. All the impression copings were splinted using a dental floss over which pattern resin was flown to help maintain rigidity of the assembly **[Fig 9,10]** .This is done so that there is no movement of the open tray impression copings during the final impression after which rubber base material was used for final impression.

Note that if for any reason there is any type of movement noticed in the copings redo everything before even considering that the lab could fix it or it wouldn't matter

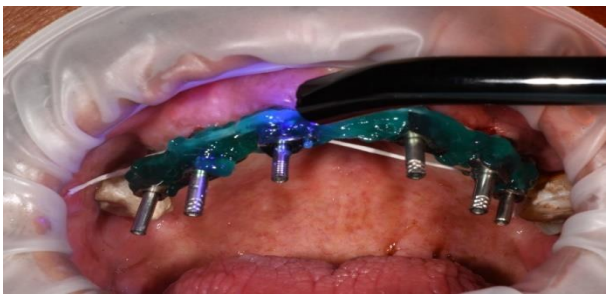

Fig -9

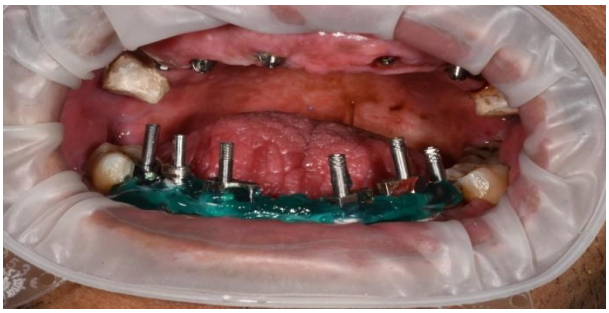

Fig -10

Once the impression is taken models are poured with the respective analogues and multiunits are screwed over the same .After this the lab scans the models on the desktop scanner so that they can design the prosthesis in a software known as EXOCAD .Since the interach distance in this case is around13mm per arch we have decided to go for a FP1 kind of a prosthesis**[Fig11]** .

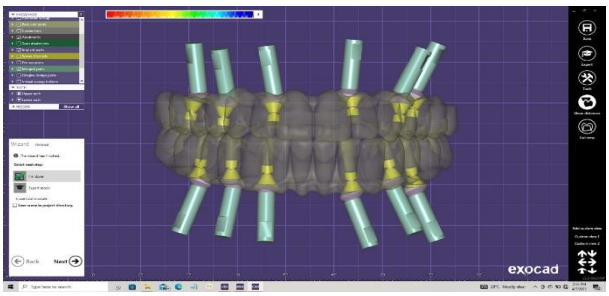

Fig 11

All the designing of the upper and lower arch prosthesis and occlusion was done is the same software**[Fig 12,13,14].** The jaw relation that was taken before starting the procedure was used as a guidance .

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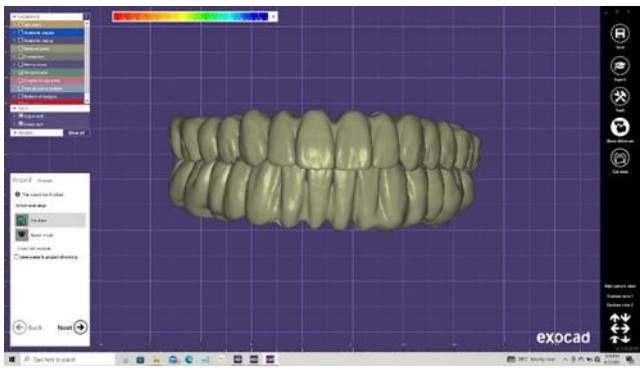

Fig 12

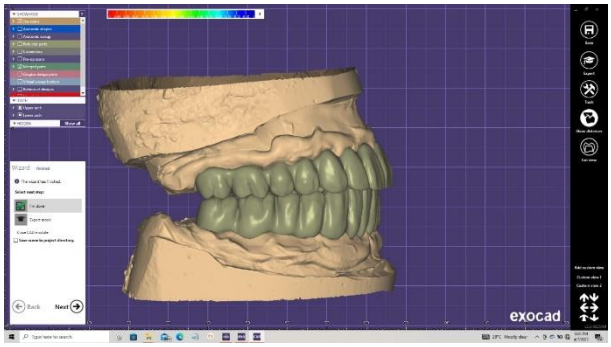

Fig 13

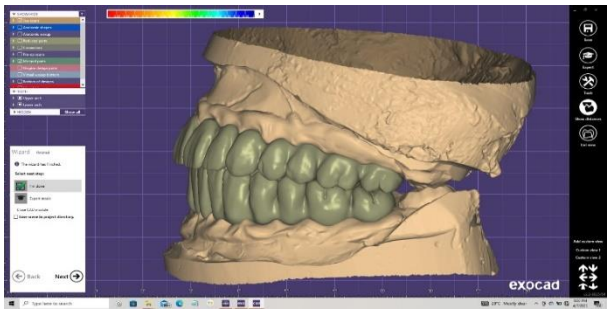

Fig 14

The lab then milled a PMMA temporary which was glued to the temporary cylinders in the lab itself .The temporary cyclinders with the milled PMMA fits over the multiunit abutments .The entire prosthesis was finally screwed in the patients mouth**[Fig 15].**

Minor occlusal corrections were made intraorally and the occlusal slopes were kept as shallow as possible. Instructions to the patients were given to maintain a semi solid diet specially for 4 to5 weeks. After allowing for osseointegration for a period of about 3 months and verifying all the implants radiographically final impressions were made.

Fig 15

Prosthetic Procedure

Once the bite gets stable over the milled PMMA and the implants get osseointegrated and the patient is accustomed to this new bite ,we record this bite with the bite registration paste .The PMMA which the patient is wearing is used to fast track the procedure for final impression wherein the lab places the analogues in the intaglual surface of the PMMA and pours the model .Also the PMMA is scanned which gives all the information of the occlusion, vertical dimension ,jaw realtion etc . We didn't have to take a jaw relation or teeth setting trial this time ,we skipped the step because patient is already wearing PMMA which can be used as a reference . The lab designs the prosthesis according to the PMMA designing the patient is wearing by scanning it with the analogues in the intaglual surface. It gives all the information the lab wants from our side including occlusion, smile line, lip line , aesthetics. Once the scanning is done the PMMA is returned back to the patient to be worn until the final prosthesis is milled in monolithic zirconia **[Fig 16,17]**.

Fig 16

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Fig 17

Again the designing of the prosthesis is done with the EXOCAD software . Once final prosthesis is ready in the multilayer monolithic zirconia, the tie bases are glued extraorally in the laboratory to the zirconia prosthesis. Shiefields one screw test was used to check for the passivity of the prosthesis following which the screws were torqued at 15Ncm.

Filling the access holes with a temporary material. Minor occlusal corrections were done to make sure that we achieved a group function type of occlusion and verified that no contacts occurred during lateral excursive and protrusive movements . The final prosthesis was then screwed intraorally and ready to use for the patient**[Fig 18]**.

Fig 18

The occlusion was checked again for bilateral simultaneous contacts and the patient was instructed to maintain good oral hygiene and follow up. The post operative opg was evaluated for the final seating of the prosthesis over the tie bases and implants.

The patient was followed at 1, 3, 6, and 12 months post delivery of the final prosthesis. A CBCT and OPG was ordered after 12 months to check for any bony changes in the peri implant bone and it was observed that there was no bone resorption seen **[Fig 19]**.

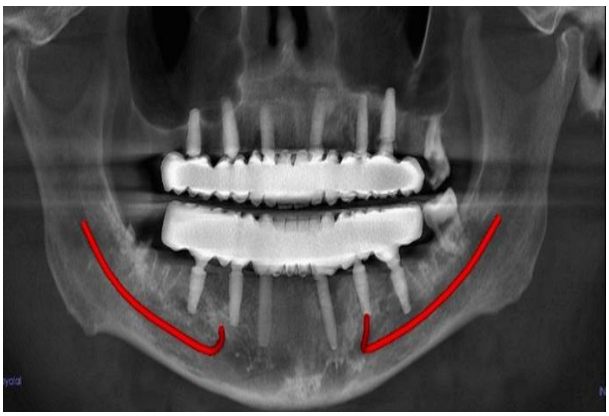

Fig 19

Also soft tissues evaluation showed healthy tissue and the patient finally went back with confidence to chew and smile **[Fig 20]**.

Fig 20

3. Results

Evaluating the marinal bone loss of the implants loaded using multi unit abutment showed little to no bone loss after a period of 4 years .This could be ascribed to the fact the the prosthesis was made passively fitting using the digital approach and so unwanted obliquely directed forces on the implants were avoided leading to long term

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stability of the implants .Also repeated screwing and unscrewing of the prosthesis using the temporary and final abutments can cause some sort of marginal changes in the bone which were avoided because we used the final abutments for temporization also.

4. Discussion

This clinical report details a monolithic zirconia full-mouth implant rehabilitation. Because the frameworks were made with a monolithic zirconia, the primary advantage of using monolithic ceramics was the decreased risk of porcelain breakage. According to studies, highly polished zirconia material is easy for patients to maintain since it does not readily attract plaque. Numerous advantageous properties of zirconia like low corrosion resistance and thermal conductivity, good biocompatibility and limited bacterial contamination, make it prime material of choice for using it for final prosthesis [14].

Completely passive fitting of the full-arch prosthesis was ensured by the use of direct multiunit abutments in conjunction with 0-degree multiunit abutments. There are more benefits to using multiunit abutments. It is commonly known that the bone level surrounding an implant can be impacted by any cause that compromises the biological width and soft tissue integrity. Conventional protocol of implant-supported full mouth rehabilitation cases was to unscrewing the healing abutment or temporary abutment and replace it with final abutment when the final prosthesis was fitted and retained. Multiple unscrewing of the supraimplant components leads to disturbance of hemidesmosomal soft tissue connection around an implant which is weak in the initial stages of healing of soft tissue and following reduction of connective tissue circle leading to newer attachment which will be less stronger and narrower than the original attachment. This can be one of the factors of bone resorption in patients with thin biotype mucosa .Multiple abutment screwing-unscrewing sequences have been linked to bone loss and have been shown to impact the oral mucosa barrier [15–17].

The meta-analysis conducted by Koutouzis T et al. [18] demonstrated that, repeated screwing and unscrewing does in fact cause marginal bone loss. In this clinical instance, CBCT imaging performed a year after prosthesis reveals stable bone levels surrounding dental implants without any remodelling of the bone around the implants. Additionally, implants were utilised in conjunction with a platform switching system and a conical hexagonal connector.

Multiunit abutments can be installed intraoperatively at the time of implant placement, sealing the implant neck and forming a wider, stronger and newer hemidesmosomal attachment at the multiunit abutment neck level. All the manipulations for replacing the prosthesis from temporary to permanent were made at the multiunit level which is sat a higher level from the peri implant bone surface. This makes it possible to preserve hemidesmosomal connection and avoid multiple screwing and unscrewing thus preventing bone loss. Accurate placement of dental implants is crucial for full-arch implant-supported rehabilitation, particularly when creating "nature-like" teeth in the final restoration without any ceramic gingiva.

Virtual-guided technologies decrease intraoperative stress and procedure time while facilitating effective implant placement in accordance with the proper prosthesis position. Compared to cement-retained constructions, screw retaining prostheses provide advantages, such as no cement in the vicinity peri-implant tissues and the potential for maintenance services (construction monitoring and unscrewing, expert hygiene treatments, etc.).

The multiunit abutments offer passivity of the fit of the prosthesis and also helps in sealing the implant neck and forming a wider hemidesmosomal connection at the multiunit abutment neck level during intraoperative installation, multiunit abutment installation preserves the integrity of peri-implant tissues and eliminates the need for repeated screwing and unscrewing.

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