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Implant Supported Overdenture: A Case Report

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Abstract: ***The prosthetic management of the edentulous patient has been a major challenge. Complete maxillary and mandibular dentures have been the traditional standard of care. However, most of the patients report problems adapting to their mandibular denture due to a lack of comfort, retention, stability and inability to masticate.Implant supported overdentures have proved to be one of the best alternative options in prosthetic rehabilitation of various cases of edentulism. They satisfy patient's expectations, improve quality of life with their long term serviceability and predictable outcomes.Implant supported overdentures offers many practical advantages over conventional complete dentures and removable partial dentures. These include decreased bone resorption, reduced prosthesis movement, better esthetics, improved tooth position, better occlusion, increased occlusal function and maintenance of the occlusal vertical dimension.This paper describesa case report in which a partially edentulous patient with compromised periodontal health was rehabilitated withan implant supported mandibular overdenture and a conventional maxillary complete denture.***

Keywords: Overdenture, Implant supported mandibular overdenture, Conventional denture

1. Introduction

The transition from dentulous to edentulous state poses differentchallenges to the patient as well as the clinician. Bone resorption especially in mandible is an important factor to be considerededuringrehabilitation. Traditional removable prostheses need continuous adjustments. Implant borne prostheses have provento be an effective alternative as they have many beneficial effectslike preservation of bone volume, improved retention, stability, function, proprioception and comfort. By placing implants in the edentulous mandible and subsequently loading them, bone resorption can be limited as light irritative stimuli leading to changes in bone architecture, shape and volume resulting in subperiosteal growth [1]. This is supported by Wolff'slaw, which states that a change in function leads to a changein structure[2].The reduced degree of rotational freedom of over denture diminishes the forces applied on the distal part of themandible while still having mucosal support. Feine and Carlsson advocated that 2-implant retained overdenture as the standard ofcare for the edentulous mandible in a consensus conference heldin 2002 [3-5].Implant supported overdenture (IOD) is also a cost effectivetreatment option as compared to implant supported fixedprostheses. Theyprovide facial support, are relatively simple toconstruct, can restore bothdental and alveolar tissues and are esthetically more satisfactory. Implant supported overdentures vary in design according to themethod of attachment and amount of support to be desiredfrom implant and ridge mucosa. The selection of an attachmentsystem whether it is stud, magnet or bar depends on a number offactors such as type of prosthesis, number of implants,patient'sexpectations, amount of retention required and cost.Bar attachment provides superior retention and stability ascompared to stud attachments. It also allows splinting ofimplants and better distribution of forces. Laboratory techniciancan position attachments parallel to each other even if theimplants are not parallel. Incorporating clips on the bar allowsvertical movement of denture, thus reducing forces on implants,less screw loosening and less crestal bone loss. Bars can beprefabricated or casted. Due to improved retention and stability ofthe bars as compared to stud attachments, denture extensionscan be kept to the minimum especially in patients with anexaggerated gag reflex.This case report depicts a step by step procedure for fabricationof implantsupported over denture with cast bar and clip attachments for an edentulous mandible opposing a maxillarycomplete denture.

2. Case-Report

A 73 year old male patient presented to the department ofProsthodontics with multiple missing teeth in maxilla andmandible. Remaining teeth had severe periodontal disease (fig1-preoperative orthopantomogram,figure2-intra-oral maxillary arch,figure3- intraoral mandibular arch).

Figure 1: Preoperative Orthopantomograpm

Figure 2: Intraoral Maxillary arch (Preoperative)

Figure 3: Intraoral Mandibular arch (Preoperative)

Patient had no previous experience of any removable denture. Patient was screened and explained all treatment possibilities.The maxillary ridgewas favourable for complete dentureconstruction.Preoperativeradiographs shows severe bone loss and deficiency in heightand width in mandible.He was informed about the implantbasedtreatment strategies that could be followed. Afterobtaining consent from the patient, it was decided to get all theteeth extracted and replace them with a conventional completedenture in the maxillary arch and an implant supported overdenture in the mandibular arch.Impressions were made andjaw relations were recorded. Diagnostic teeth setup was done atappropriate vertical dimension to assess the available restorative space for a cast bar and superstructure attached to denture withindirect technique.

Surgical phase:
4 implants (MIS Implants, 3{4.2 mm indiameter and 13 mm in length} and 1{ 5mm in diameter and 13 mm in length}) were placed at A,B,D and E positions(suggested by Carl E Misch) following standard protocol [6](figure 4- surgical implant intraoral).

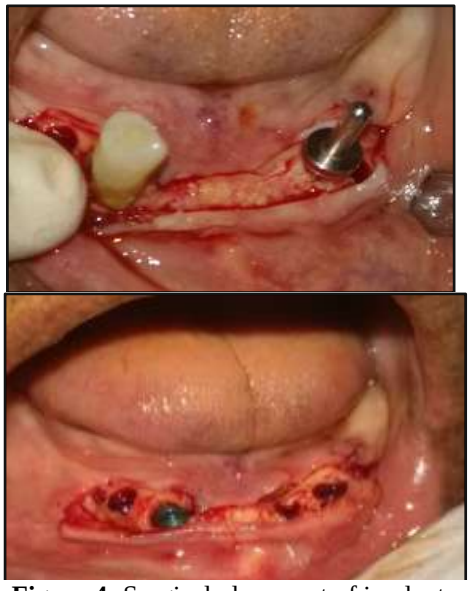

Figure 4: Surgical placement of implant

After 2 weeks, mandibularcomplete dentures was inserted. The tissue surface of mandibular denturewas relieved and relined using temporary soft denture liner.

Prosthodontic phase
After 3 months of healing, second stage surgery was carriedout and gingival formers (healing abutment) were placed. After twoweeks, mandibular definitive impressions were made. A custom tray from autopolymerising resin for the mandibular arch was fabricated. Border moulding of the mandibular arch was performed. Open trayimpression copings were attached on the implants(figure 5-transfer impression copings).

Figure 5: Splinted Impression Copings With Used Burs and Pattern Resin

Figure 6: Final Impression Copings with UsedTooth Preparation Burs

Transfercopings were splinted with the help of used tooth preparation burs and pattern resin(figure:5). Window was created on the border moulded tray and tray is checked for the passive orientation. Edentulous mandibular ridge impression and implant site impression made with polyether, and pick up this impression by stocktray with putty elastomeric material (figure6-final impression).Implant analogues were attached to the impressioncopings and the impression was poured in die stone. After that jig was fabricated to verify the position of an implant was replicated or not. Jig trial was done and radio graphically verified (figure 7-jig intraoral,figure 8-radiographically verification).

Figure 7: Jig Trial

Figure 8: Radiogaphically Verified Jig Trial

Figure 9: Wax pattern of Bar-Framework

Figure 10: Metal Bar fabrication

UCLA abutments were screwed to the implant analogues andcut to appropriate height according to the available restorativespace. A castable bar system was used(Figure 9-bar pattern). The plastic bar pattern was cut to the desired lengthand attached to the UCLA abutments.The height of the bar wasadjusted to facilitate easy oral hygienebeneath the bar. The bar-abutment pattern assembly was then cast. The bar was finished, polished and checked in patientintra-orally for passive fit (Figure10).

Jaw relation:

An autopolymerizing acrylic resin record base was fabricated. Wax occlusal rim is adapted on the recorded base and maxillo-mandibular relations recorded. Maxillary cast was mounted on the Hanau's Wide View Articulatorwith face bow transfer. The mandibular cast was then mountedon the articulator in centric relation. Teeth setting was carried outand tried for patient approval.

Fabrication of overdenture:

The finished bar was placed on the articulated master cast. Thespace was provided for the bar assembly over the tissue surfaceof the trial denture base. The undercuts were blocked and thewhole assembly was duplicated to get the working cast. The trialdenture base along with positioner was taken not to disturb theposition of the anterior teeth. The under surface of the metal housing was blocked out with dental stone to avoid flow of resin between clip and bar.The dentures were processed by conventional technique. The final prosthesis had the metal housings incorporated in the tissue surface and to prevent its appearance effect opaque layer of ceramic layered (figure:11). The positioner clips were discarded and yellow retentive clips were used at their place clip and metal-housing wereplaced on the working cast.

Figure 11: Metal Housing Plate With Opaque Layer

Denture insertion appointment

Finished bar was place in patient's mouth. Abutmentswere screwed with a final torque of 35 N/cm. The screw openingswere blocked with guttapercha points. The denture was insertedin the patient's mouth and checked for proper extensions andocclusal contacts.The retentive clips clicked into place on the bar providing sufficientretention. Instructions were given to the patient regarding theinsertion and removal of the denture.(Post-operative photographs)

Figure 12

Figure 13

Figure 14

3. Discussion

The implant-supported overdenture remains in place during mandibular movements which allows the tongue and perioral musculature to resume a more normal function since they are not required to control mandibular denture movements [6-9].

The design of the implant-retained overdenture can be carried out in 2 ways [6,7,10]. In the first approach, implants are splinted with a rigidinterconnecting bar that incorporates an attachment mechanism for the overdenture retention. In the other approach, implants are not connected to each other, and the retention mechanism is provided by an abutment that incorporates some form of retentive mechanism. A major advantage of the freestanding implants is the fact that they allow for the use of the prefabricated stock retentive abutments. The use of the interconnecting implant bar requires additional laboratory and clinical procedures for its fabrication and the associated increase in treatment cost. However, in case of the misaligned or malpositioned implants, stock abutments may not provide the desired compensation, and the splinting of the implants with the interconnecting bar can overcome these problems. Another advantage of the prefabricated stock abutments is that the abutment itself can be easily replaced in case of abutment failure. Because stock abutments are identical, their replacement does not require remaking the overdenture. On the other hand, if the implant interconnecting bar has to be remade in the case of failure, it usually requires remaking the overdenture. Performancedata of the implant-retained overdenture indicate that most of thecomplications and prosthodontic maintenance are related to theattachment components of the overdenture[7,11-13].Another dilemma associated with overdenture treatment is the technique of incorporating the attachment matrices into the overdenture literature. One approach includes incorporation ofthe matrices into the overdenture in the dental laboratory. This isan extremely important step and, if not performed correctly, can negatively influence overdenture fit or contribute to the dislodgementof the matrix from the overdenture. This method ensures acceptablefit of the overdenture. However, it requires additional clinical timeand is technique sensitive. The other approach is pick-up intraorally in the clinic [14-16]. In this case four free standing implants wereplaced in A,B,D and E position. As the posterior ridge was resorbed,it was thought that it would not offer any support to the denture.In two implants retained overdenture the rotational movement is ofPM6 type which is harmful for the implant as well as to the residualridge Therefore, support was obtained from four implants. Due to financial constraints the patient was not ready forthe fixed type of restoration immediately. The same implants canbe used for the fixed restoration in future after placing the implantin C position.As with any treatment modality, aftercare and maintenance is vitalif the overdenture is to be successful. The patient must be advisedof this and reviewed regularly. Optimal surgical implant positioningis essential for the success of implant supported restorations. Animplant-retained overdenture requires meticulous treatment planningthan a conventional complete denture. Final placement of theimplants should follow the principles of ideal implant parallelism andmaximum initial stabilization and path of placement and removal.

4. Conclusion

Restoration of the edentulous mandible is a challenge. Amongdifferent treatment options, an implant-retained overdenture is a simple, cost effective solution in the rehabilitation of the edentulousmandible. This clinical report described the successful management of edentulous patient with implant supported overdentures with cast bar and clip attachment with indirect laboratory technique.It can become an excellent and profitable addition to everyprosthodontic practice.

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