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Prosthetic rehabilitation of edentulous mandible with two-implant retained fixed hybrid prosthesis: A case report

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Abstract

Removable complete dentures have been the most cost-effective treatment option for edentulous jaws since decades. However, certain problems are encountered by the patients such as stability of the lower dentures resulting in poor masticatory efficiency. Ridge resorption and inadequate bony support are the long-term complications comprising the stability of the denture and patient finding it difficult to control denture movement during speaking and eating reducing patient compliance. Mandibular implant retained over dentures or hybrid dentures have shown to be better alternatives in terms of retention, stability and patient satisfaction. Two implants provide cost-effective, stabilized and comfortable treatment options. The present case report discusses the management of the patient with compromised dentition in which all teeth were extracted followed by conventional upper complete denture and lower two implant supported fixed hybrid dentures with splinted bar attachment.

Keywords: Hybrid dentures, implant retained overdenture, conventional acrylic dentures, edentulous, implant supported prosthesis.

Introduction

With advancement in preventive and restorative dentistry for the management of caries and periodontal disease, tooth loss remains a concern especially in older population.¹ Tooth loss affects orofacial soft and hard tissue architecture compromising aesthetics, masticatory efficiency, phonetics and oral health related quality of life.² Various treatment options are available for replacement of edentulous jaws, which includes removable complete dentures, implant retained over denture, implant supported hybrid over dentures and implant supported fixed bridges.³⁻⁵

Removable complete dentures have been the cost-effective treatment since decades. Different problems

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encountered by the patients includes the poor stability especially with lower dentures, loss of facial support, absence of proprioceptive response and poor masticatory efficiency.³ Ridge resorption and inadequate bony support are the long term complications.³ Implant supported overdenture has greater success over conventional removal denture in terms of retention and stability and patient comfort but it is costly, needs frequent replacement of attachment, and meticulous oral hygiene, but has less psychological satisfaction.⁶ Mandibular implant retained hybrid overdenture is not removable so patient is more psychologically satisfied and at the same time more cost effective as opposed to implant retained fixed bridges.⁴⁻⁶

A hybrid denture is connected to implant abutments with screws and is constructed on a metal framework.⁶ The anterior part is fixed with screws on implants while the posterior part is cantilevered from the implants.⁶ Number of implants needed to support the denture is an important factor, the choice depends on multiple factors like amount of bone resorption, cost, patient expectations and expertise of the technician. There is no difference in the changes in bone over long term in two or four implant supported fixed overdentures.⁷

Conventional treatment of implant placement took many months before delivery of final prosthesis and multiple visits and surgical intervention. Latest research supports immediate placement of implants to overcome the problems associated with conventional strategy and save patient's time and visits with a satisfactory outcome.⁸

Management of patients with missing teeth needs critical planning to provide the best possible outcome, which includes masticatory efficiency, aesthetics, phonetics, retention as well as time and being cost effective for patients. Two implant retained fixed hybrid denture fulfills this need as discussed above. The present case details the management of an old female patient who presented with multiple carious and periodontally compromised teeth and wanted a fixed prosthesis in a short time and had financial constraints. Patient was also concerned about the stability, aesthetics and comfort of the prosthesis. Keeping in mind all the factors an upper

conventional complete denture and lower two implant supported fixed hybrid denture with splinted bar attachment was given after extraction of all teeth.

Case Report

A 56-year-old female visited the dental clinics of Aga Khan University Hospital in May 2016, with the complaint "I feel pain and mobility in all my teeth, cannot eat properly and want replacement". Patient had a known history of diabetes for last 10 years and Hypertension for last 6 years which were well controlled with diet and medication. Past dental history revealed extraction of few teeth 5 months back. Patient's oral hygiene was unsatisfactory, plaque and calculus were present on all the teeth. Patient was not a regular dental attendant and visited only for symptomatic relief. Clinical and radiographic examination [Orthopantomogram (OPG)] showed multiple missing teeth # 11, # 15, # 16, # 24, # 25, # 28, # 34-38, # 44, # 45, # 47 [Federation Dentaire Internationale (FDI) tooth numbering system], broken down roots #12, # 22, # 27, # 48 (FDI) and carious and periodontally compromised

the treatment options available, she opted for upper conventional complete denture and lower two implants supported fixed hybrid overdenture.

Surgical Phase 1:

A) Extractions of all teeth were done quadrant wise along with alveoloplasty except # 33 and #43 and primary closure achieved with horizontal interrupted sutures (3.0 vicryl).

B) Immediate implant placement was done after two-weeks. Full thickness mucoperiosteal flap were applied between the mental foramens. Two bone level implants were placed after creating osteotomy of 4.3 mm at sites #33(4.7 mm × 11.5 mm) #43 (4.7 mm × 11.5 mm) (Tapered self-thread, bio-horizon implant system) and primary stability achieved. Horizontal interrupted sutures (3.0 vicryl) was used for primary closure (Figure 1 B). Two weeks later, the sutures were removed and the patient advised to come for follow-up after four weeks.

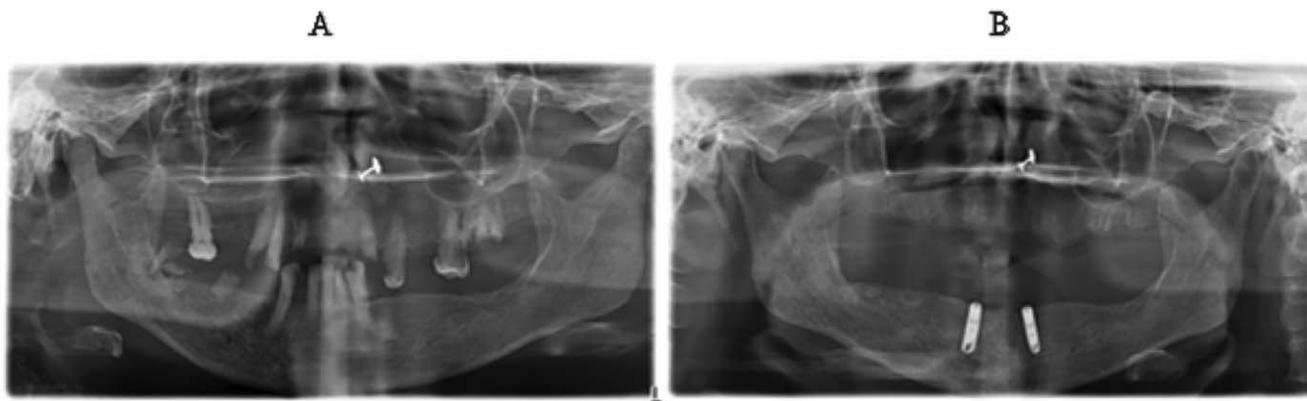


Figure-1: A) Pre-operative radiograph.

Figure1: B) Radiograph after implant placement.

teeth #13, #14, # 17, # 23, # 26, # 31, # 32, # 33, # 43 (FDI) (Figure-1 A).

Treatment plans given to the patient were:

Extraction of all teeth followed by replacement by

- Conventional upper lower complete denture
- Implant retained or supported over denture (Removable and Fixed).
- Six upper and four lower implant retained fixed bridge

Patient had some financial constraints but wanted a stable prosthesis. After thorough discussion regarding all

Prosthetic Phase 1:

Six weeks after the extractions primary impressions of upper and lower arch were taken with alginate for fabrication of upper and lower complete denture. Customized trays fabricated, and border moulding was done followed by final impression. Impression was poured, master casts made, occlusion rims fabrication for jaw relation and tooth selection done. Tooth setup trial was done to correct and verify maxillomandibular relations. Fabrication of upper and lower removable complete denture was completed after investment and processing using master cast. The dentures were delivered to the patient after adjustment and polishing.

Surgical and Prosthetic Phase 2:

After 2.5 months of implant placement second stage surgery was performed, implants exposed, and healing collar placed on the implants. Two weeks later healing

collar was removed, and impression was taken for fabrication of cast bar for screw retained fixed hybrid overdenture. (Figure-2 A) Impression copings were placed on the implants and impression taken using polyvinyl siloxane impression material. Impressions poured, and

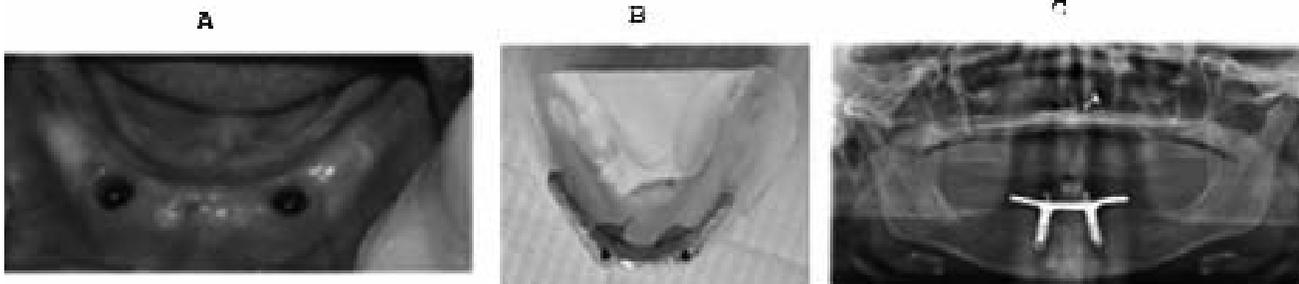


Figure-2: A) Healing collar removed. B) Trial of bar attachment framework on cast. C) Trial of bar attachment seen on radiograph .

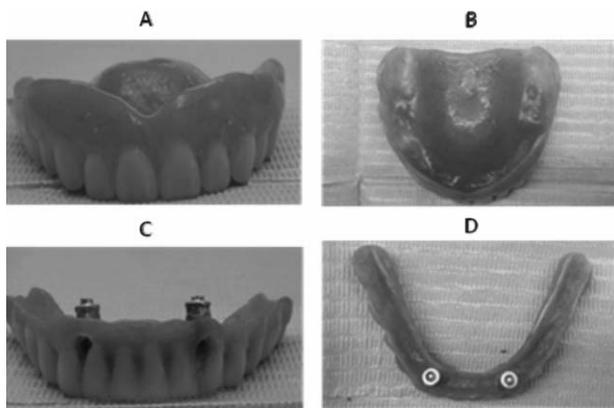


Figure-3: published from different parts of the globe. These values

master cast made. Wax up for bar framework fabrication was done after mounting on semi-adjustable articulator followed by casting. An adjustment of the casting was done to ensure the passive fitting on the master cast and intraorally (Figure-2 B). Radiograph was taken to evaluate the fit between bar frameworks and implant interface, (Figure-2 C) then the bar was incorporated into the lower denture. Upper conventional denture and lower hybrid overdenture was then delivered to the patient after adjustment. Lower hybrid denture was then screwed into place and screw hole was closed with self- cure acrylic (Figure-3 & 4). Patient was advised to follow-up after two weeks for any adjustments if needed.

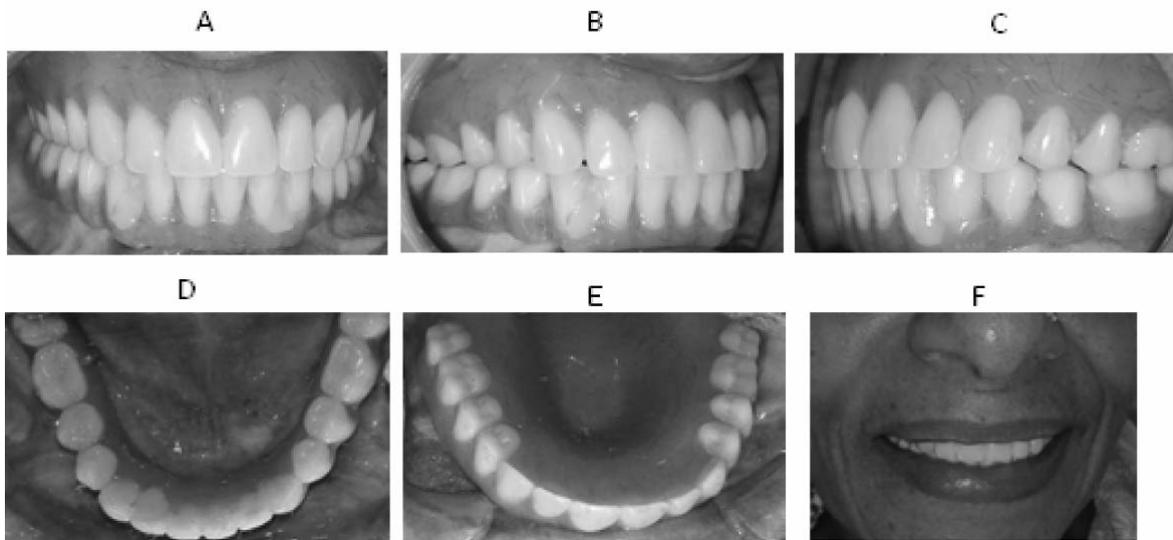


Figure-4: Post-operative photographs.

Maintenance Phase:

Patient's oral hygiene was reviewed after one month and rest were scheduled after every six months for maintenance. Patient was lost to follow-up after the initial one month follow-up visit

Discussion

Use of hybrid dentures for the rehabilitation of edentulous patient as compared to conventional complete denture has multiple advantages like improved masticatory efficiency, retention and patient comfort.⁹ It is a cost-effective option when compared to fixed partial dentures which usually required more number of implants. Kreisler et al. reported that the amount of maxillary bone resorption is more when the opposing is implant retained fixed bridge than in patients with two implants supported mandibular hybrid over-dentures.¹⁰ The most probable reason could be due to less force generation in implant supported hybrid overdentures.

The number of implants used to support full denture is a debatable issue. Two and four implant options are available but multiple factors should be taken into consideration before planning for either two or four implant supported dentures like patient general health condition, bone morphology, patient expectations, cost, and comfort. Literature reports that two implants are adequate to support and stabilize lower dentures and there is no significant difference in bone resorption in two or four implant supported dentures.^{7,11}

A hybrid restoration is indicated when the intra-arch distance is more than required for implant supported fixed prosthesis.^{6,7} In the present case, the distance present was suitable for placement of hybrid prosthesis. Another important aspect is the material framework that can be high noble metal, titanium or base metal alloy. In the present study, base metal alloy was preferred due to its cost effectiveness and rigidity. Rigid material usually generates less strain on dental implants.¹² Length of cantilever is another factor that should be taken into consideration when fabricating implant supported acrylic screw-retained hybrid prosthesis. Literature has reported that a maximum of 15 to 20 mm extension to reduce the risk of framework fracture.¹³ In the present case the length of cantilever is within 15 mm to reduce the stresses.

Another important factor is the passive fit of the framework, without which there are chances of screw loosening, peri-implant bone loss and abutment

fracture.⁶ In the present case report we also evaluated the passivity of the framework, and it was passive in accordance with the requirement.

Hybrid dentures are attached either directly to implants using screws and by means of rigid splinted cast bar. Literature supports the use of bar attachment due to several advantages such as it provides splinting effect, even transmission of forces, better retention and less maintenance and distal extension can also be achieved that prevent denture shifting therefore enhancing stabilization.^{14,15} Therefore we also preferred bar attachment for better long-term prognosis.

Maintaining oral hygiene is very crucial with such prostheses, therefore regular follow-up should be advised every 6-12 months to assess the condition of peri-implant tissues and bone to avoid any unforeseen complications. Therefore, we planned a scheduled appointment in our patient after every six months for assessment of oral hygiene and denture conditioning.

Implant retained hybrid dentures is a good treatment option and should be considered in patients with high expectations with financial limitations as it provides good masticatory support, retention, stability and phonetics when compared to conventional complete denture and is a cost-effective option when compared to implant supported fixed partial denture. Patient is advised to come for regular follow-up after treatment for maintenance of prosthesis and increase the longevity of prosthesis. The limitation of this case report is the patient was lost to follow-up after the one-month follow-up visit.

Conclusion

Replacement of missing teeth with implant supported prosthesis is often challenging and requires careful treatment planning. A clinician must keep in mind patient expectations and financial limitations while selecting any treatment option, which should be in the best interests of a patient. Prosthetic rehabilitation of edentulous mandible with two-implant retained fixed hybrid prosthesis is not only cost-effective but also provides satisfactory outcomes in terms of mastication, retention, phonetics and esthetics.

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Conflict of Interest: None to declare.

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