Full mouth rehabilitation of a patient with mandibular implant screw-retained fp-3 prosthesis opposing maxillary natural dentition: A case report

Ashish R. Jain*

INTRODUCTION

Mandibular implant-supported hybrid prostheses have been used for edentulous patients who could not adapt to long-term use of conventional complete dentures. A hybrid denture is one that is fabricated over a metal framework and retained by screws threaded into the implant abutments. The anterior part of a mandibular hybrid denture is fixed on implants, while the posterior part of the denture is extended and cantilevered from implants producing a passive-fitting substructure for a fixed removable screw-retained hybrid prosthesis which is arguably one of the most technically complex tasks in implant dentistry. The technique presented may not initially produce a perfectly passive framework, but the use of disclosing media and adjusting the internal aspect of the casting can result in nonbinding, fully seated prostheses. The rehabilitation of edentulous patients with hybrid dentures has been observed to achieve greater masticatory function and psychological satisfaction than with conventional complete dentures. This article presents the fabrication of a mandibular implant retained hybrid prosthesis opposing a maxillary dentition.

CASE DESCRIPTION

A 55-year-old woman was initially seen with an existing mandibular complete denture opposing dentulous maxillary arch. The patient had initiated treatment previously with a general dentist but was not satisfied with the treatment provided and decided to seek specialty care for the completion of her treatment. Fabrication of screw-retained hybrid prosthesis was planned for the mandibular arch [Figure 1]. The treatment options presented to the patient also included the fabrication of an implant-supported overdenture, but the patient’s desire was to eliminate a removable prosthesis in the mandible. The following clinical and laboratory procedures were performed.
Stage I Implant Surgery
A full thickness mucoperiosteal flap was raised in the mandibular arch from distal to mental foramen on one side to mental foramen on other side. In the right quadrant, implants (Normo Implants, Genesis implant system) were placed in the second premolar (3.75 × 10 mm), Canine (3.75 × 10 mm) regions. In the left quadrant, implants were placed in the second premolar (3.75 × 10 mm), canine (3.75 × 10 mm), and regions. The implant dimensions were selected with the help of a computed tomography scan. A total of four implants were placed in the mandibular arch with the help of surgical stent [Figure 1]. The flap was closed using horizontal interrupted sutures. After 1 week, the sutures were removed and a conventional denture was relined with a permanent soft denture liner (Permasoft, Dentsply, York, PA, USA) and inserted. A total of four implants were placed in the mandibular arch with the help of surgical stent [Figure 2].

Stage II Implant Surgery
After a waiting period of 4 months, the bone to implant contact percentage was evaluated with the help of a radiograph and later Stage II surgery was performed under local anesthesia cover screws were exposed, and healing abutments were placed and the flap sutured [Figure 3].

Prosthetic Phase
Maxillary and mandibular arch impressions were made using alginate (Tulip Alginate Impression Material, Cavex, Holland Bv, Haarlem, Holland). A custom open tray was fabricated in acrylic resin (Autopolymerizing acrylic resin, ALIKE™; GC America, ALSIP, USA) for the mandibular arch. The open tray was verified in the patient’s mouth. 1 week later, the healing abutments were removed, and impression copings were connected to the implants (Impression Coping Pick-up type, Genesis Implant System.). These open tray impression copings were stabilized with 23 gauge ortho wire and blocked out with acrylic resin (Autopolymerizing acrylic resin, ALIKE™; GC America, ALSIP, USA). The mandibular impression was made with monophase polyvinyl siloxane impression material (AquasilLv Ultra, Smart Wetting Impression Material, Dentsply, Detrey Gmbh, Konstanz, Germany). The impressions were poured in die stone (Ultrarock, Kalabhai Karson Pvt., Ltd., Mumbai, India). Master casts were recovered, trimmed, and record bases and occlusion rims were fabricated. The patient returned for recording of maxillomandibular relations and tooth selection. Master casts were then mounted on a semi-adjustable articulator (Hanau Modular Articulator System, Waterpik Technologies Inc., Fort Collins, Colo.). Wax up for framework fabrication was done. The framework was waxed, cast, recovered, and fitted on the master cast. Disclosing media (Kerr’s Disclosing Wax; Kerr, Romulus, Mich. and Occlude; Pascal Co Inc, Bellevue, Wash.) were used to evaluate the fit of the framework and to guide adjustment procedures. The fit was refined until the framework seated passively on the master cast. The mandibular denture teeth were waxed to the hybrid framework, and a final wax try-in was performed to verify and correct
maxillomandibular relations. At this appointment, the customized abutments along with the framework were connected to the implants for the final wax try-in. The investing, flasking, and processing procedures were then completed. The prostheses were finished and polished, a clinical remount was performed to allow for refinement of occlusal contacts, the hybrid prosthesis was screw retained, and provisional cement (Temp-Bond; Kerr) was used to cover screw access hole [Figure 4]. Hygiene techniques were reviewed, and the patient was scheduled for recall and maintenance.

Occlusion and Articulation

Occlusion was evaluated using guided closure and was considered as good, if centric relation (CR) coincided with centric occlusion (CO); moderate, if minor (<0.5 mm) deviation was observed between CR and CO; and poor, if clear (>0.5 mm) deviation was observed between CR and CO. Articulation was considered as good when it was fully balanced during lateral movements performed from CO, otherwise it was considered poor [Figure 6]. The presence or absence of frontal contact in CO was also noted.[4-7]

DISCUSSION

Goodacre et al.[8] found greater annual maxillary bone resorption in patients with mandibular implants supported fixed prostheses than in patients with mandibular overdentures supported by two implants. A maxillary complete denture occluding with a hybrid denture has also been said to increase vulnerability to midline fracture. Based on these findings, it is recommended that the stability and retention of a maxillary denture be checked more often and the occlusion adjusted more frequently to relieve anterior tilting for the hybrid denture wearer [Figure 5]. Producing a passive-fitting substructure for fixed removable screw-retained hybrid prosthesis is arguably one of the most technically complex tasks in implant dentistry. In spite of a number of techniques to prevent or correct distortions that occur during impression making, cast pouring, waxing, casting, indexing, and soldering, errors in the fit of framework persist.[9] The gap between an implant fixture and an abutment should be 10 m or less to be considered passive.[10] This degree of fit may be almost impossible with the geometry of most screw-retained fixed detachable hybrid prostheses. The technique presented may not initially produce a perfectly passive framework, but the use of disclosing media and adjusting the internal aspect of the casting can result in nonbinding, fully seated prostheses. Disclosing media were used to evaluate the fit of the framework on the implant abutments in the same manner as are used to ensure complete seating and passivity for conventional fixed and removable partial dentures. Adjustments to the internal surfaces of the framework can then be made to eliminate binding as in conventional prostheses. Although the possibility exists that sectioning, indexing, and soldering may be required to obtain a passive-fitting substructure of this design, modification of the internal aspects should be sufficient in the majority of situations. There may be several disadvantages of this technique. First, selection and milling of modification (prepable) abutments require an experienced clinician and technician working together with adequate communication. Implant angulations beyond 15° may require an angled abutment or a castable abutment to achieve an acceptable path of insertion. Furthermore, numbering or other methods of matching the correct abutment and orientation with the correct implant fixture is imperative. Patients with limited interarch space may present several problems. It may result in a framework with deficient thickness or insufficient space for setting denture teeth.

The rehabilitation of edentulous patients with hybrid dentures has been observed to achieve greater masticatory function and psychological satisfaction than with conventional dentures.[11-14] Occlusal forces have been increased considerably following the placement of an implant-supported prosthesis opposing natural dentition. Many investigators have studied occlusal force measurements in patients with implant-supported prostheses opposing complete maxillary dentures, but their force measurements vary significantly.[11-14]

CONCLUSION

Every patient has unique treatment needs. Proper diagnosis and treatment plan are important but cannot
be all-inclusive. A comprehensive examination, including a thorough medical and dental history, orofacial and dental clinical examination, dental radiographs, impressions, and jaw relation records for mounting casts is important steps, leading to a successful oral rehabilitation. Careful integration and sequencing of the different areas of treatment needed enhance the final result. Dentists must consider the advantages and disadvantages the available implant prosthetic options and match them to the patient’s expectations. This article reports on the fabrication of a maxillary natural dentition opposing a mandibular implant - screw-retained hybrid prosthesis. Occlusion and articulation were found to be good over a period of 1 year. Retention and stability were found to be good up till the 13-month review.

REFERENCES

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