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A Novel Technique to Restore An Edentulous Patient with A Mandibular Overdenture Retained By two Immediately Loaded Single Piece Implants with Ball Attachment: A Case Report

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Abstract: *Complete maxillary and mandibular dentures have been used as a conventional treatment modality for the rehabilitation of edentulous patients. However complete maxillary dentures are usually well tolerated but many patients encounter problems like difficulty to chew and swallow with the complete mandibular denture because it is too unstable. Studies have shown that a mandibular two-implant retained overdenture is superior to the conventional denture in terms of retention and stability. Thereby, the two-implant supported mandibular overdenture should be the first treatment option for mandibular edentulous patients. The following is a case report of a novel technique to restore a edentulous patient with a mandibular overdenture retained by two immediately loaded single piece implants with ball attachment.*

Keywords: *Implant-retained, Overdenture, Retention, Stability,*

I. Introduction

The prosthetic rehabilitation of edentulous patients has always been a challenge for prosthodontists. Conventionally these patients are managed by complete maxillary and mandibular dentures. Problems with adaptation to complete dentures are observed with a higher incidence for mandibular dentures than for maxillary dentures[1]. Patients usually complain about the lack of stability, retention, an increase in pain, soreness, inability to chew and eat. The concept of implant supported overdenture has been successfully used for many years. Recent scientific studies have shown that the mandibular two-implant supported overdenture are more comfortable to patients rather than the conventional denture[2]-[4].The advantages of using implant supported over dentures are enhanced stability, improved retention and support, better occlusion, minimum anterior boneloss and a substantial reduction in the size of prosthesis. Majority of mandibular overdentures are supported by two implants anterior to mental foramen[5]. Implant Supported overdentures have become a treatment modality for edentulous patients for the past 25 years with predictable clinical results. A majority of patients who are uncomfortable with conventional dentures, enjoy the enhanced retention and support provided by implant supported over denture. The following is a case report of a novel technique to restore a edentulous patient with a mandibular overdenture retained by two immediately loaded single piece implants with ball attachment.

II. Case Report

A 76 year old male Patient reported to the Government Dental college Thiruvananthapuram, Dept of Prosthodontics with the chief complaint of missing teeth and wants replacement for the same. The patient expressed his dissatisfaction with the fit of his old denture and wanted a more stable fitting lower denture. He got his teeth extracted 2 yrs back. Medical history was non- contributory. The patient was moderately built and had a normal gait. On Intra oral examination completely healed maxillary and mandibular ridge with adequate width and height and without any bony undercuts were found. Adequate amount of keratinized tissue was also present. The treatment opted by the patient was upper complete denture with implant supported mandibular overdenture. Panoramic radiographic examination revealed that mandibular residual ridge was having good bone quality and quantity. Two single piece implants of 11mm length and 3.3mm diameter with ball abutments (Myriad-snap, Equinox) were planned to be placed at the 'A' and 'E' position using a single stage protocol.

Figure 1: Preoperative frontal view of mandibular arch

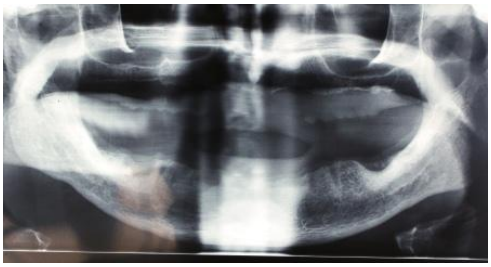

Figure 2: Pre operative OPG

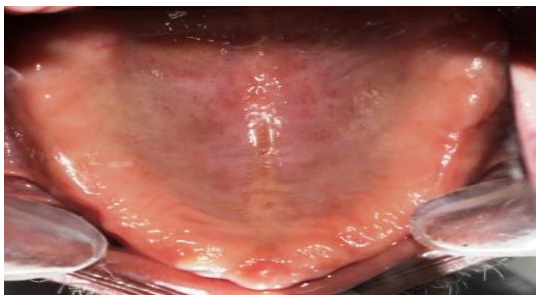

Figure 3: Preoperative occlussal view of maxillary arch

Figure 4: Preoperative occlusal view of mandibular arch

III. Treatment procedure

Treatment consisted of making conventional dentures for maxillary and mandibular arches. Preliminary impressions of maxillary and mandibular ridge are made using impression compound. Border moulding with green stick and final impressions were made using zinc oxide eugenol paste. Tentative Jaw relation was done and the maxillary cast was mounted on a semi adjustable articulator using face bow transfer. Mandibular cast was mounted using a centric relation record Gothic arch tracing and interocclusal records were made. Teeth arrangement was carried out. Balancing was done so as to make denture stable. Try in was done prior to processing of denture. The acrylized denture was duplicated in clear acrylic resin (Pyrex Polymers, Roorkee, India) this was used as both surgical guide and radiographic guide. The duplicated denture is mounted on an implant surveyor and osteotomy sites were marked and prepared after planning optimum parallelism. Gutta-percha cones were placed in the osteotomy site of surgical guide sites and an orthopantomogram (OPG) was taken to confirm the position and location of mental foramen.

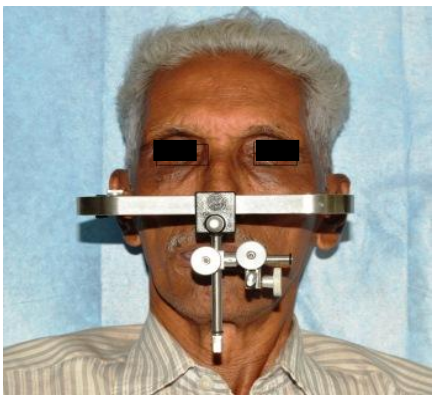

Figure 5: Facebow transfer

Figure 6: Surgical guide

Figure 7: Determination of osteotomy site and angulation

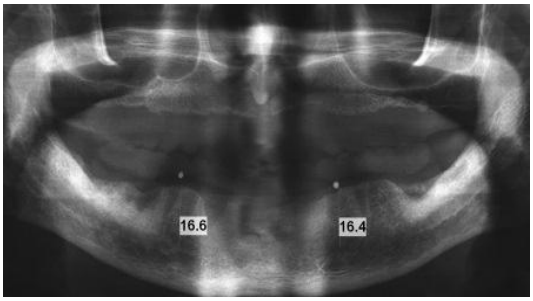

Figure 8: OPG taken with radiographic guide showing the distance from mental foramen

The patient was prepared for the surgery after following regular sterilization protocol. After administering local anaesthesia (2% lignocaine hydrochloride with epinephrine 1:2,00,000) a flapless approach was employed. The surgical guide was placed on the ridge and initial access for the osteotomy was made using the pilot drill and sequentially enlarged to receive an implant of 3.3mm diameter and length of 10mm. To achieve parallelism depth measuring gauge was placed in the first osteotomy site and the second osteotomy site was prepared on the contralateral side. The two implants were then placed in the prepared osteotomy sites using a torque ratchet and primary stability of 30 Ncm was achieved on both the implants. Since the primary stability was adequate for immediate loading, the prosthetic phase was initiated in the same appointment. The fit of the plastic transfer caps over the ball head and onto the prosthetic platform were verified. The surgical guide was relieved and used as a impression tray. The caps were picked up by a double mix impression technique using polyvinyl silox- ane impression material (Aquasil LV, Dentsply). The laboratory analogs were positioned and cast was poured in type IV die stone (Elite Master, Zermack) to obtain a working model. The female housings with the O-ring matrices were snapped into place on the laboratory analogs on the working model. The final mandibular denture was relieved from inside to create space for housing and a pick-up was made on to the cast using autopolymerizing acrylic resin, hence preventing surgical site from exposure to the acrylic monomer . The denture was inserted and checked for retention and occlusion. Postoperative instructions were given, including rinsing the mouth with 0.12% chlorhexidine gluconate three times per day, antibiotics and analgesics in appropriate doses were prescribed. Patient was instructed not to remove denture for next 48 hours. Two days later, he was reviewed the healing was found to be satisfactory. The patient was trained to use the new dentures, and was satisfied with good stability and better retention of the mandibular denture.

Figure 9: Initial access for osteotomy using surgical guide

Figure 1o : implant placement

Figure 11 : Single piece implants and ball abutments in situ

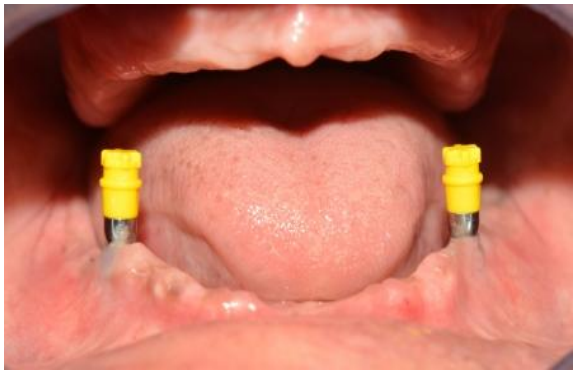

Figure 12 : Transfer caps snapped on ball abutments

Figure 13 : Completed master cast with implant analouges

Figure 14 : Intaglio surface of maxillary complete denture and mandibular overdenture

IV. Follow-Up

A 9 months follow-up revealed a great degree of improvement in retention and stability. An overall improvement in the quality of life was noticed in the follow-up appointments. The general health of the patient was improved because of better nutritional intake.

Figure 15: Post insertion intraoral view

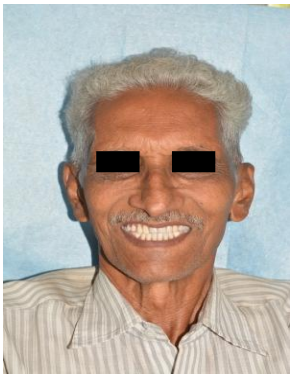

Figure 16 : Post insertion extra oral view

V. Discussion

It is clearly evident from available literature that implant-supported overdentures have greater retention than conventional dentures. Patients are more comfortable with implant-supported overdentures than with conventional dentures. The implant-supported overdenture has been accepted as the standard of care for fully edentulous patients and should be the first choice of Treatment for the edentulous mandible. A high rate of success was observed by Cooper et[6] al in their research of two immediately loaded implants to retain a mandibular overdenture, with ball attachments. A series of studies conducted by McGill[7] University showed that the Implant retained mandibular overdenture is superior to conventional denture not only in overall satisfaction, chewing satisfaction, nutritional status, eating and social activity, but also easier to fabricate. In accordance with McGill group, we have the similar improvements in patient satisfaction and easier task in the fabrication procedures.Several authors believe that the bone loss can be minimized when implant supported over dentures are used. According to a study conducted by Wright et al[8] and Reddy et al[9] showed that prosthesis completely supported by implants in the edentulous mandible actually may increase the posterior bone volume. This also can be considered as a major advantage of implant supported over denture.

In the current case report, the denture was fabricated prior to surgical phase and hence the implant placement was prosthetically driven. Injury to vital structures and complications like lingual perforation can be avoided by a through radiographic evaluation using a radiographic template which is fabricated by duplicating the denture. A chairside pick-up technique using autopolymerizing resin can also be used for connecting the mandibular implant retained overdenture with the locator attachments. This procedure could significantly reduce the clinical time, and the rate of error from clinical impression and laboratory processing. Nissan et al[10] stated that the direct technique for attachment incorporation in mandibular implant-supported over dentures by using ball attachments is superior to the indirect technique in terms of aftercare over a long-term evaluation period. The major disadvantage with direct technique was that it causes monomer exposure to the surgical site. In the present case report an indirect technique is followed where the pick-up is made using the same surgical guide to produce a working model. As we are using the same surgical guide to make the impression a substantial amount of clinical time is saved and precise impression can be made.

VI. Summary

The ability to rehabilitate lost teeth with osseointegrated implants has improved the quality of life. The advantages of implant supported overdenture are improved retention and stability. This enables the patient to have enhanced masticatory efficiency. In this case report a 76 year old edentulous male patient is rehabilitated by a maxillary removable complete denture and an immediately loaded implant supported overdenture on two single piece implants with ball attachments. Implant retained overdentures have evolved as a functionally superior treatment modality than the conventional removable dentures. It is also cost effective and less invasive option to rehabilitate edentulous

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