



Treatment Approaches to Improve Retention and Stability of Mandibular Complete Dentures

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Abstract

Retention and instability problems are the main complaints of mandibular total dentures, depending on the clinical situation; several therapeutic proposals can be considered to improve them. This article discusses and presents, through clinical cases, three therapeutic approaches to provide more stable and retentive dentures. The first approach is the piezographic technique, an excellent tool for patients with high muscle tone. The second approach is the overdenture, a solution to be used whenever possible to improve chewing efficiency. Finally, an implant-supported prosthesis is a reliable alternative that leads to better prosthetic integration by increasing retention. This in turn improves the edentulous patient's quality of life.

Subject Areas

Dentistry

Keywords

Complete Denture, Denture Retention, Denture Stability

1. Introduction

It is usually a challenge to rehabilitate the edentulous mandibular arch. Patients often report retention and instability problems as their main concerns.

Depending on the clinical situation, several therapeutic options can be considered to improve the quality of life of fully edentulous patients. Keeping residual roots and making an overdenture is a solution that should be adopted whenever possible. The presence of a few remaining teeth minimizes alveolar bone resorption. It also maintains proprioception by preserving the periodontal fibers. The abutment teeth can be covered with plastic restorative materials such as glass ionomer cement or composite, or filled with cast copings. Cast copings can be

combined with attachment systems to provide additional retention to the prosthesis [1].

Implant-retained removable dentures and piezographic impressions also provide an excellent solution to prosthetic instability for many patients. These different treatment options offer many advantages for the patients: Increasing retention, restoring phonation and chewing function, improving prosthetic instability, addressing esthetic concerns, and compensating for bone changes and abnormalities [2]. This paper aims to illustrate and discuss the proposed therapeutic approaches using clinical cases.

2. Clinical Cases

2.1. Complete Overdenture Prosthesis

A 61-year-old female patient presents for bimaxillary prosthetic rehabilitation. The intraoral examination revealed a completely edentulous maxillary arch and a mandibular arch with the persistence of 2 canines (**Figure 1**). After a pre-prosthetic study, an overdenture, without an attachment system, with composite fillings on the abutment teeth was chosen.

The preservation of remaining roots offers comfort during mastication and phonation. The indication for overdenture requires good intrinsic and extrinsic value of the residual teeth, with sufficient prosthetic space confirmed by articulator mounting.

It is contraindicated in cases of diminished periodontal health or vestibular undercuts. The mandibular complete prosthesis must be made according to the classic requirements of the removable complete prosthesis [3].



Figure 1. Intraoral view.



Figure 2. Dento-alveolar radiography of endodontic treatment on 43/33.

After periodontal treatment on both canines, endodontic treatment was performed on both teeth (**Figure 2**). The height of the crowns was then reduced to within 2 mm of the marginal gingiva. A composite filling was then placed and domed (**Figure 3**). Finally, polishing was performed. The following steps are those of a conventional full denture (**Figures 4-8**).



Figure 3. Dome-shaped composite modeling on 33 and 43.



Figure 4. Primary plaster impression



Figure 5. Secondary impressions using hydrophilic vinyl polysiloxane.



Figure 6. Maxillo-mandibular Relationship.



Figure 7. Tray in of teeth.



Figure 8. Insertion of the prosthesis.

2.2. Mandibular Two-Implant-Retained Overdenture

A 57-year-old female patient presented for renewal of her old complete prosthesis, which had insufficient retention due to residual ridge resorption (**Figure 9**). A pre-implant design was performed. Two implants were placed using the radiological guide (**Figure 10**).



Figure 9. Intra-oral view showing a highly resorbed mandibular ridge.

After the osseointegration period, the healing abutments were removed, and the male parts of the attachments were screwed onto the implants. The prosthetic intaglio surface corresponding to the male parts was hollowed out to accommodate the female parts, and the resin ensured the bonding [4].



Figure 10. Radiological guide.

Choosing an attachment system for Removable Supra-Implant Prosthesis is based on specific clinical criteria and the characteristics of each connection system [5]. In this case, ball attachments were used.

After relieving all compression, a small amount of auto-polymerizing acrylic resin is applied to the intaglio at the exact location of the female parts in the prosthesis, followed immediately by the insertion of the mandibular prosthesis, and holding it under occlusal pressure until polymerization (**Figures 11-13**).



Figure 11. Resin relief around the implants.



Figure 12. The female parts are placed on the male parts using the rubber dam sheet.

A systematic review by Kutkut *et al.* indicates the superiority of dentures retained by two mandibular implants compared to conventional complete dentures regarding efficacy, satisfaction, and quality of life [6].



Figure 13. Fitting of the prosthesis.

Also, Fueki *et al.* conclude in their systematic review that the combination of a mandibular implant-retained overdenture and maxillary conventional complete denture (CD) provides significant improvement in masticatory performance compared to Complete dentures in both the mandible and maxilla for the population having severely resorbed mandible [7].

Implant-retained dentures have many advantages compared to conventional removable dentures. It provides better stability of mandibular dentures and decreases the severity of mandibular atrophy. Furthermore, patients feel more security, efficient masticatory, and overall satisfaction with the prosthesis.

2.3. The Piezographic Impression

A 63-year-old edentulous female patient is presented to the consultation of the removable prosthodontics department for a bimaxillary prosthetic rehabilitation.

Intra-oral examination revealed a severely resorbed mandibular ridge (**Figure 14**). Considering this significant bone resorption, it was decided to produce a complete removable prosthesis using a piezographic impression.

Highly resorbed mandibular ridges remain a real challenge for the clinician. In this case, the implant solution is essential, but it may be contraindicated or refused by the patients. The piezographic technique can be included in the therapeutic protocol of complete supra-implant prosthetics. It will enhance prosthetic success by increasing stability, complemented by implant retention, and therefore prosthetic integration.

Piezography less the prosthesis to be placed where the forces of the tongue, and buccinator-labial strap are balanced, thus contributing to its stability [8]. There are 2 types of piezography: phonetic piezography and deglutition piezography. In this clinical case, phonetic piezography was performed.

Primary impressions were taken with alginate. The reduced-base custom tray was fabricated with a knife-edge border, perfectly centered on the arch. Its stability on the edentulous ridge was checked and corrected if necessary. Border molding of the retro mylohyoid fossa area was done using low-fusing material (green stick). A medium viscosity polysulfide (Permlastic®) was prepared and applied to the intaglio and periphery of the custom tray (**Figure 15(a)** and **Figure 15(b)**). Then, it was placed into the mouth. The patient was asked to articu-

late a series of phonemes. This continued until the final hardening of the impression material. The index was made using putty consistency addition of polyvinyl siloxane impression material. This impression defines the prosthetic corridor where the teeth will be mounted (**Figure 16**). The upper surfaces of these keys must be aligned with the occlusal plane determined by the piezography. The mandibular teeth were positioned according to this index and equilibration was performed on the articulator [9]-[11]. The remaining steps follow conventional sequences.



Figure 14. Resorbed mandibular ridge.



Figure 15. (a) and (b). Polysulfide piezographic impression/lower and upper view of the surface impression.



Figure 16. The gap between the two silicone keys was filled with melted wax to create the wax edge.

3. Conclusions

Rehabilitating the edentulous mandibular arch remains a challenge for clinicians. The complete overdenture prosthesis is performed particularly when the patient has two residual symmetric roots, the practitioners must ensure the pre-

servation of the natural roots and avoid extraction whenever possible, this therapeutic option offers the patient a result similar to the placement of two implants at a lower cost, for those who have lost all their teeth, the prosthesis is reinforced in this case by the placement of two implants.

These two approaches can be combined with the piezographic impression technique for a superior definition of prosthesis corridors.

The use of these various techniques to improve stability, and retention does not exempt the practitioner from meticulously carrying out the conventional steps of complete prosthesis fabrication. These steps must be carried out with precision to ensure the longevity of the retention supports and to avoid possible therapeutic failure.

Conflicts of Interest

The authors declare no conflicts of interest.

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