

CASE REPORT

Bar Attachement Retained Mandibular Complete Denture: A Case Report

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ABSTRACT

The mandibular complete denture is a challenge for the dentist. Unfavorable anatomical and physiological conditions such low bearing surface and a significant bone resorption, often compromise the prosthetic retention.

The exploitation of root stumps is a reliable alternative that leads to a better prosthetic integration by increasing the retention, if the total prosthesis is connected to these root stumps via axial ball or bar attachments.

In addition, this prosthetic alternative considerably improves the patient's comfort and masticatory coefficient and favors the preservation of the bone capital, provided that the requirements of root preservation as well as clinical and laboratory techniques are respected.

We would like to illustrate this by presenting a clinical case in which we used the connecting bar in the mandibular arch.

KEYWORDS: Edentulous, Complete Prosthesis, Supra-Radicular, Connecting Bar.

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INTRODUCTION

Retention and instability problems are the main complaint in mandibular complete prosthesis. However, 70% of the complaints are of a functional nature: low retention, mastication difficulty and prosthetic instability. (1,2) However, the use of additional means of retention, when conditions permit, is a valuable recourse. The PACSR on an connecting bar is a prosthesis with additional retention, often considered in cases of subtotal mandibular edentulous. (3)

The connecting bar has good mechanical strength, better retention than axial attachments, and improved masticatory function due to the additional stability that the bar provides to the prosthesis. However, its use requires a straight anterior edentulous ridge, sufficient width between the two abutments and sufficient prosthetic space.

When persists on the arch of isolated teeth or roots, distributed symmetrically, their conservation and

solidarization by means of a bar can solve many problems of order: (4)

- Aesthetic: it avoids the rupture of the false gingiva, the disharmony of shade, shape, size and position.

- Biomechanics: It increases retention and prevents the prosthesis from tilting around the abutments.

- Periodontal: when the periodontal support is reduced, the section of the coronal part of the tooth removes the unfavourable lever arm and reduces the stresses undergone during mastication. In addition, the use of the connection bar allows the roots to be solidarized, ensuring their contention and optimizing the distribution of forces. (5)

CASE REPORT

A 64-year-old patient consults for a removable prosthetic rehabilitation. the patient is aesthetically and functionally demanding. He has expressed the desire to keep his residual teeth (canines 33/43).

Endobuccal examination shows total edentulous in the maxilla (Fig. 1a) and subtotal edentulous in the mandible with persistence of the canines (Fig. 1b).

Periodontal examination of the residual teeth shows marginal bone lysis, 1 mm vestibular recession and a straight anterior crest.

The quality of the periodontal, the location and axis of the residual teeth, and the straight anterior ridge oriented us towards the realization of a supra-radicular mandibular prosthesis with connecting bar.

Diagnostic Approach:

The study phase is an essential prerequisite, it allows to analyze and validate the prosthetic project from an aesthetic and functional level.

Therefore, a mounting of the study models on an articulator makes it possible to analyze the inter-ridge relationships and to evaluate the height necessary for a good integration of the attachments and the prosthetic teeth within the framework of a suitable aesthetic (fig. 2 a,b).

The realization of a direct assembly (fig. 2c) materializing the prosthetic project will make it possible to:

- Validate the aesthetic result
- Realize the vestibular and lingual keys guiding the positioning of the attachments
- Validate the occluso-prosthetic scheme (bilaterally balanced occlusion) (6)



Figure 1: a- Endobuccal view of the maxillary arch
b- Subtotal mandibular edentulous with persistence of 33 and 43.



Figure 2: a- Assembly of the study models on articulator after determination of the DVO and recording of the RIM in RC.
b- Simulation of canine preparation on mandibular plaster model.
c- Fitting of the director assembly meeting the aesthetic and functional requirements aesthetic result.

Therapeutic approach:

Pre-prosthetic phases:

The Canines have long roots, with good bone anchorage. The endodontic preparation is performed followed by a tight filling of the 33 and 43 (Fig. 3a)

Prosthetic phases:

Dental preparations :

- Peripheral juxta gingival preparation with a peripheral leave of 1.5 mm which follows the shape of the gingival festoon (fig. 3b)
- Occlusal tray with 1mm thick residual walls
- Ovoid preparation of the canal entry orifice
- Canal preparation at 2/3 of the root and leaving 4 mm of obturation apically.

A parallelism between the drillings of the two support teeth of the connecting bar is sought.

Residual teeth impression :

The impression of the root copings is made using the classic double-mix impression technique: a low-viscosity silicone is injected into the canal, stakes are placed in the root housing, and a high-viscosity silicone is charged in the intrados of the individual impression tray (Fig. 4a). After casting, the Ackermann bar is produced in the laboratory, respecting the space reserved for the assembly of the prosthetic teeth (Fig. 4b). After validating the adaptation of the bar in the mouth, a primary plaster impression (Fig. 5a) of the entire mandibular support is made with a commercially impression tray in order to make an individual impression tray. The latter is fenestrated opposite the bar and adjusted to the level of the ridges. (fig. 5b)

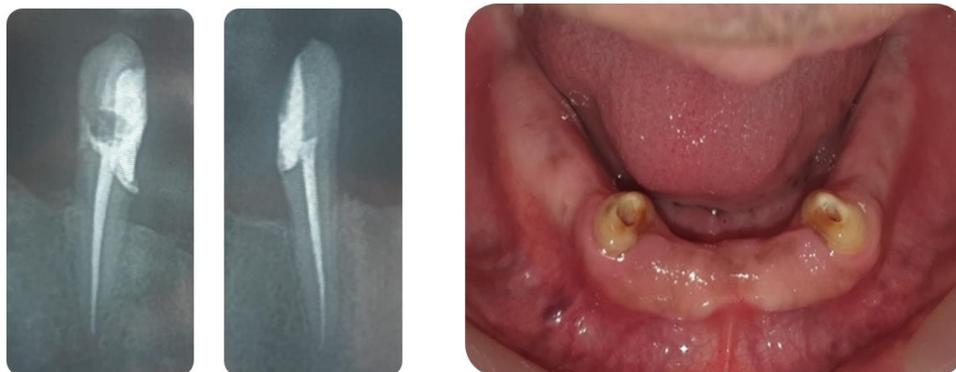


Figure 3: a- Endodontic treatment on the 43/33. b- Peripheral chamfer preparation of 1.5 mm.



Figure 4: a- Impression of the preparations according to the double mixing technique. b- Realization of the Ackermann bar in the projection of the anterior crest.

Functional secondary impression:

The remarginage (fig. 6a) is carried out classically as in conventional PAT after having closed the fenestrations with a high viscosity elastomer (fig.5c), the objective of which is to ensure the continuity of the bead and the hermeticity of the base of the PEI, necessary for check the effectiveness of the sublingual joint. After insertion of the bar, the posts coated with Light Silicone, the PEI filled with a Permlastic Regular® type polysulfide is

inserted in the mouth, applied to the osteomucosal bearing surfaces, and then finger pressure is exerted on the beads while the patient is invited to mobilize his peripheral and lingual musculature in extreme functional movements (Fig.6b) (7). Obtaining a global impression leading to the bar and taking into account the maximum tissue depressibility of the fibromucosal support surface and of the desmodontium of the residual roots (fig.6c) (8)



Figure 5: a- Primary plaster impression. b- Mandibular PEI perforated opposite the roots. c- Closed PEI perforations with a high viscosity elastomer.



Figure 6: a- Joint registration peripheral and sublingual. b- Anatomic-functional mandibular impression resulting in the connective bar with a Permlastic Regular polysulfide type. c- Global impression Formwork.

- **Recording the RIM and the assembly of the teeth:**

After adjusting the occlusion plane and recording the intermaxillary report (fig. 7a) using the conventional occlusion models, the working models are placed on the articulator. the choice of prosthetic teeth is made followed by the assembly respecting the aesthetic and functional rules: respect of the prosthetic corridor, orientation of the occlusal curves, inter- arch relationships and respect of the fully balanced occlusion scheme (fig. 7b) (9).

- **Polymerization and insertion in the mouth:**

The bar was luted using a glass ionomer luting cement under digital pressure. (fig. 8a). The attachment of two female nylon part, which is retained in prosthesis. (Fig. 8b) can be carried out in the laboratory or directly in the

mouth. (10). In our case, it was made in the laboratory, then the prosthesis is placed in the mouth under occlusal pressure, the patient is not allowed to remove it for 24 hours until the final setting of the luting cement to avoid any risk of loosening. (Fig. 8c).

- **Maintenance and prosthetic follow-up:**

Prosthetic success in the medium and long term is closely linked to the Control and maintaining rigorous hygiene of both at the level of the dental abutments and at the level of the prostheses using small-headed toothbrushes and interdental brushes, (5) and dento-periodontal-prosthetic maintenance sessions are carried out at 1 week after placement of the prosthesis, then at 1 month and then every 6 months for 2 years and then once a year.



Figure 7: a- Registration of the RIM. b- Assembly of the teeth.



Figure 8: a- Definitive sealing of the bar with glass ionomer cement. b- Fixation of the attachment of two female nylon part to the intrados of the prosthesis is performed in the laboratory. c- Patient satisfaction smile.

DISCUSSION

The complete prosthesis presents many disadvantages related to its removable and bulky nature. The bearing surface favors, due to the depressability of the mucosa and the disappearance of the desmodontal proprioception, a prosthetic imbalance and a reduced masticatory efficiency(11). This phenomenon is exacerbated at the mandibular level due to the unfavorable anatomical-physiological context in relation to the reduced bearing surface, the resorption of crest, the presence of the tongue as well as the importance of salivary flow (11). The overdenture therapy constitutes an interesting therapeutic option alternative, especially when additional means of retention are provided (12).

Several authors have underlined the advantages of using complementary means of retention (roots or implants) as an alternative to the conventional complete prosthesis, essentially represented by the conservation of bone volume by opposing the phenomena of resorption, a good masticatory efficiency and a better psychological

integration of the complete removable prosthesis (13,14).In this clinical case, the therapeutic choice was a mandibular bar supported overdenture. The overdenture with bar is a prosthesis with retention complement, (15) considered in cases of subtotal mandibular edentulous with recoverable roots on the endodontic and periodontal planes.

The overdenture bar-supported rehabilitation requires compliance with many parameters, namely: a favorable distribution of the abutments, the roots of the teeth must be parallel and distributed on both sides of the arch, a straight anterior ridge and sufficient available prosthetic space >7mm is required for the placement of the attachment, a distance between the abutments of 8mm to 10mm allows the placement of a single female part, when the distance reaches 20mm, two females part are required to optimize retention(16,17,18).

The connective Bar is a strong, cast metal retention element that can connect multiple arch roots. It is surmounted by a device (gutter or rider) that ensures

retention of the prosthesis by friction on the parallel walls of the bar, and is attached to the prosthetic intrados with resin (5). It is preferred to axial attachments (press stud) whenever the teeth can be joined together. (3)

The most frequently used Ackerman's bar is less bulky, it is of the cylindrical type and allows the rider to rotate around it, thus adapting to the movement of the prosthesis. (7) However, the long-term therapeutic success of this restoration depends on many factors, including mastery of the technique, the appropriate choice of retention means and quality of occlusion. The prognosis, on the other hand, remains dependent on the patient's oral hygiene and the quality of maintenance during periodic check-ups at the dental office.

CONCLUSION

The overdenture therapy remains a high-performance technique for optimizing the prosthetic balance of a complete removable prosthesis. The conservation and exploitation of residual roots is of major interest in the stability, aesthetic and function improvement of complete

removable prostheses. The connective Bar is the complementary means of retention of choice for edentulous at the mandibular level, provided that the indication is correctly placed and that the fabrication steps are scrupulously followed.

AUTHORS' CONTRIBUTIONS

The participation of each author corresponds to the criteria of authorship and contributorship emphasized in the [Recommendations for the Conduct, Reporting, Editing, and Publication of Scholarly work in Medical Journals](#) of the [International Committee of Medical Journal Editors](#). Indeed, all the authors have actively participated in the redaction, the revision of the manuscript and provided approval for this final revised version.

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COMPETING INTERESTS

The authors declare no competing interests.

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