

## Full mouth rehabilitation in anterior crossbite and posterior bite collapse patient – A case report

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### ABSTRACT

**Background:** Esthetically and functionally successful full mouth rehabilitation requires careful attention and meticulous treatment planning. Successful restoration in a patient with anterior crossbite and a partially edentulous situation can be challenging especially when bilateral posterior segment teeth is missing. Combination restoration using attachment retained removable partial denture (RPD) and removable partial overdenture (RPO) is such kind of treatment modality in prosthodontics. **Purpose:** This study was to provide an overview of a case about full mouth rehabilitation in anterior crossbite and posterior bite collapse patient. **Case:** A 64-year-old female patient came to Prosthodontic Department of RSGMP Universitas Airlangga to have dentures replacing her missing teeth with aesthetic issue on her anterior teeth in order to eat well and be more confident. The patient wants to change her smile into new smile with acceptable aesthetic and function. **Management:** Diagnostic wax-up was made to capture the right occlusal vertical dimension (OVD) in centric relation (CR) that will be used in the first stage of full mouth rehabilitation, followed by management of the remaining teeth by endodontic and periodontal intervention by crown lengthening. Then, definitive restorations were made by maxillary attachment retained RPD with splint four anterior crowns and mandibular RPO with two single crowns on the lower teeth to correct anterior crossbite and posterior bite collapse. **Conclusion:** Patient had a satisfactorily aesthetic and functional results with new occlusion using maxillary attachment retained RPD and mandibular RPO.

**Keywords:** full mouth rehabilitation, attachment, anterior crossbite, posterior bite collapse

### INTRODUCTION

Esthetically and functionally successful full mouth rehabilitation requires careful attention and meticulous treatment planning. Rehabilitation of anterior crossbite with partially edentulous situation can be challenging especially when bilateral posterior segment teeth are missing.

Anterior crossbite is the term used to define an occlusal problem involving palatal positioning of the maxillary anterior teeth relative to the mandibular anterior teeth. Anterior crossbites can be either dental or skeletal in origin, whereas, anterior dental crossbites originating from the abnormal axial inclination of the maxillary anterior teeth.<sup>1</sup>

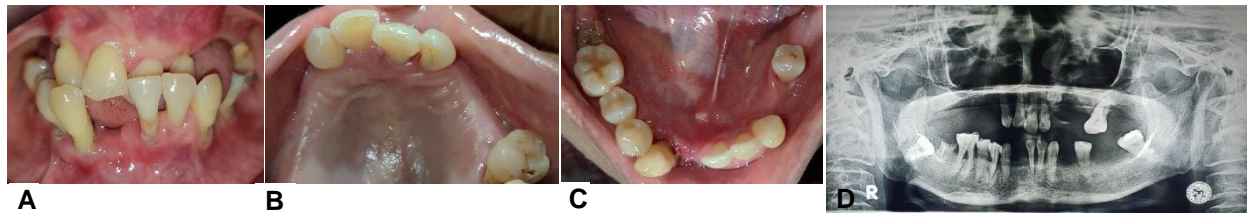
Anterior dental crossbite has a reported incidence of 4-5% and is usually the result of a palatal malposition of the maxillary incisors resulting from a lingual eruption path. Other etiiological factors include trauma to the primary maxillary incisors resulting in lingual displacement of the permanent tooth buds, presence of supernumerary anterior teeth; crowding in the incisor region; a habit of biting the upper lip; an over-retained, necrotic or pulpless deciduous tooth or root; delayed exfoliation of the primary incisors; and odontomas.<sup>1</sup>

Posterior bite collapse is a sequale of advanced break down. The presence of periodontal

inflammation and loss of osseous support can induce teeth migration in a direction partially imposed by occlusal forces. Posterior bite collapse often causes mesial drifting of the posterior teeth and flaring of the anterior segments. It may be aggravated by early loss of teeth that are not replaced, by malocclusion or by a neuromuscular disorder.<sup>2</sup>

Full mouth rehabilitation for patient with anterior crossbite and posterior bite collapse to capture the right OVD in CR is using attachment retained RPD and RPO. The right OVD in CR we can get from reorganized approach occlusion when a new occlusal scheme is established around a suitable condylar position which is the CR position. The patient's occlusion may be reorganized if the existing intercuspal position is unacceptable and needs to be changed or when extensive treatment is to be undertaken to optimize patient's occlusion.

Attachment retained RPD is the treatment therapy that can facilitate both functional and esthetic requirements of patients. The few retrospective studies available show a survival rate of 83.3% for 5 years, of 67.3% up to 15 years, and of 50% when extrapolated to 20 years. Primary indication of attachment retained partial denture is esthetics. When partial denture is essential for distal extension situations, the precision attachment



**Figure 1** A, B, C Pre-operative patient's intraoral; D pre-operative radiograph

is most equitable and definite means of distributing stresses. Precision attachment partial dentures are not retained by clasps, hence, removes wedging effect of clasp and also favorable distribution of horizontal forces. Precision attachment virtually ties abutment teeth together, which limits excessive movement of abutment teeth.<sup>3</sup>

This study discussed full mouth rehabilitation in anterior crossbite and posterior bite collapse patient to regain aesthetic and function performance.

### CASE

A 64-year-old female patient came to Prosthodontic Department of RSGMP Unair to have dentures of her missing teeth in order to eat well and be more confident.

She wants to change her smile into new smile with good aesthetic and function. The patient still used the old removable denture made 1 year ago, but it was broken 2 months ago. The medical history was non-contributory. The patient's intraoral condition and radiograph prior to treatment are shown in fig.1.

On extraoral examination, the temporomandibular joint (TMJ), eyes, nose, lips were normal, the face was symmetrical and oval. Vertical dimension of occlusion was 60 mm. On intraoral examination, missing teeth were 18, 17, 16, 15, 14, 12, 24, 25, 26, 28, 37, 36, 34, 41, 42; residual tooth was 47; movable teeth were 31, 43, 44; rotation teeth, supraposition tooth, redness of the gums. Dental calculus was slightly found in almost all region; occlusion was not presented, overjet -3 mm and overbite -4 mm.

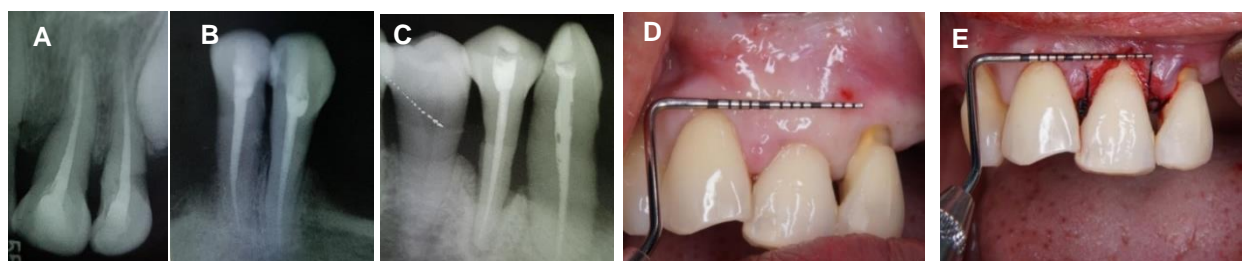
At the same time, radiographic interpretation shows there were radiolucent diffuse below 17 tooth root, radiopaque in root canal of tooth 47, decreased alveolar bone in 13, 11, 21, 22, 27, 35, 33, 31, 43, 44, 45, 46; the lowest part of the upper left canine appears to be higher than the cervical line of the incisor and there is no limit between the sinus and the impacted tooth; the crown until the tooth root completely submerged in the ramus of the mandible and the occlusal plane of the tooth is hidden below the cervical line of the second molar in the 48.

Based on Kennedy's classification system and Applegate's rules, the maxillary arch was classified as class II modification 1 and mandibular arch as class III modification 2. In this case, the patient was diagnosed for full mouth rehabilitation using maxillary attachment retained RPD and mandibular RPO to correct anterior crossbite and posterior bite collapse.

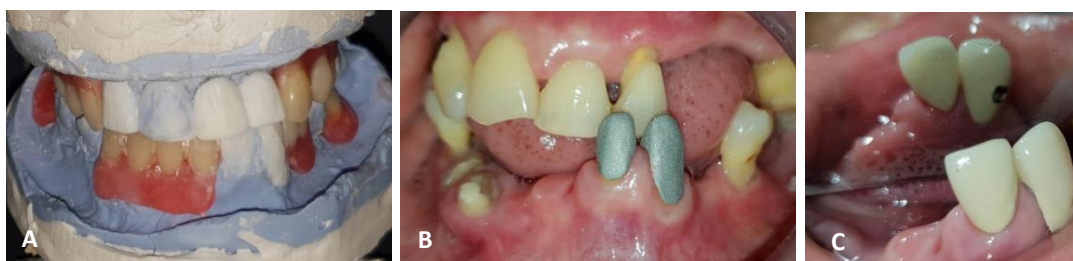
### MANAGEMENT

The initial treatment was done by removing dental calculus; extracting 31 and 47; endodontic treatment on 21, 22, 32, 33, 43, 44 by Conservative Department followed by periodontal treatment which was performed by crown lengthening on 21 and 22 (fig.2) by Periodontal Department. After completing the initial treatment, the patient was advised to report back for full mouth rehabilitation by Prosthodontic Department.

In prosthodontic phase, primary impressions were made for maxillary and mandibular arches. Master casts were fabricated, preliminary bite de-



**Figure 2** Endodontic treatment on A 21, 22; B 32, 33; C 43, 44, crown lengthening treatment on D 21 and E 22



**Figure 3** A Diagnostic wax up and preliminary bite rim, B decapitation on 43 and 44, C single crown PFM on 32 and 33



**Figure 4** A Try in metal frame, B try in wax denture, C insertion of RPO on lower jaw

termination with diagnostic wax up and bite rims were made (fig.3A). Using the maxillary bite rims and camper's plane as guide an occlusal plane was established and bite was taken using lower teeth to capture the right OVD in centric relation; 60 mm.

The lower part was done first because of the patient's willingness. Decapitation was done on 43 and 44 with a height of 1-2 mm from the gingival margin and dome-shaped shape (fig.3B,3C). Then, cover the surface of 43 and 44 with GIC Fuji 9. After that, 32 and 33 were prepared to change the inclination to more lingualized and we made a single crown PFM on 32 and 33. The next step, preparation mesial was rested on 37, 45 and distal rest on 35. Impression was done with double impression. Maxillary and mandibular working models with the diagnostic wax up on articulator was sent to dental laboratory for further process of metal frame.

On the following visit, the metal frame was tried in in patient's mouth and checked if the metal frame seated perfectly in patient's mouth, then tried the mandibular wax denture with tooth color A3 VITA shade guide. Evaluation was done to determine whether the condition and the occlusion are appropriate for the patient. The next step was processing the mandibular RPO in the laboratory (fig.4).

After the mandibular RPO, a putty index from diagnostic wax up of the maxillary arch was made. Then, 22, 21, 11, 12 were prepared as fixed splint based on the putty index and preparation mesial rest on 27 (figure 5). Gingival retraction using retraction cords that were applied to cervical on 22, 21, 11, 12, awaited 3 minutes.



**Figure 5** Preparation fixed splint on 13, 12, 21, 22

Fixed splint porcelains were tried in at 22, 21, 11, 12. Note the cervical edge coping with the metal must be precise and close the cervical teeth tightly.

Metal frame RPD was tried on the patient. After that, the attachment of male and female parts was examined, and occlusion and stability of the metal frame RPD were checked.

Fixed splint 22, 21, 11, 12 was inserted, along with maxillary metal frame RPD. Fixed splint was cemented using luting cement (GIC type I). This cementing procedure was carried out simultaneously with a metal frame. Check occlusion and articulation of maxillary and mandibular dentures using articulating paper to see premature contact. After the insertion, the patient was taught how to remove and install the denture. Patient was also taught how to clean the dentures and how to store them. Then the patient was instructed to eat soft food first and control the next day.

Control I was carried one day after insertion. Control II was performed three days after control I. Control III was 7 days after control II. There were no complaints from the patients, there was no redness of the performed mucosa under the denture. Aesthetic, occlusion, retention, and stability of the denture were good. Patient was instructed to main-



**Figure 6** Try in fixed splint attachment on 13, 12, 21, 22



**Figure 7** **A** Post insertion of maxillary attachment retained RPD, patient's performance **B** before treatment, **C** after treatment

toothbrush and bath soap. Patient was instructed to improve oral hygiene and are allowed to chew delicate food for the next week. The patient was advised to have a regular control every 6 months for follow up.

## DISCUSSION

Loosening of posterior teeth with anterior crossbite can disturb aesthetic and function. This is in accordance with Okeson that vertical pressure on the anterior causes the anterior teeth to move toward labial and loss of some posterior teeth support caused a greater load in the anterior region.<sup>4</sup>

A full-arch fixed prosthesis can be fabricated, if sufficient and properly situated abutments remain or sufficient number of implant can be placed. However, both extensive fixed dental prosthesis and implant-supported prosthesis can be financially burdensome to patient.<sup>5</sup> Since the patient was averse to surgical procedure, implant supported prosthesis was not considered. FPD also was not indicated for this case because of some missing posterior teeth, so the abutment cannot afford the occlusal load.

Retainer selection for removable prosthesis mainly depends on the remaining tooth structure, the intra- and intermaxillary relationships, aesthetics, and financial aspects. While clasps potentially interfere with aesthetic demands in the anterior region, attachments were almost invisible in the labial region. Because of that, maxillary attachment retained RPD was chosen to rehabilitate an-

terior cross bite and correct the posterior bite collapse to get good aesthetic and functional.

Before making dentures, preliminary treatment and making diagnostic wax up on the anterior teeth, as well as setting the preliminary bite with a reorganized approach were performed. Then, mandibular RPD was made the first because patient wanted to immediately replace some missing teeth while waiting for the healing process of crown lengthening on the maxillary anterior teeth.

The treatment for maxillary teeth is carried out by preparation of the four maxillary anterior teeth to make a fixed splint with retention of precision attachments on the distal anterior teeth with the aim of obtaining a good aesthetic because the patient does not want the clasps to be seen when smiling.

Precision attachments have two parts, namely the part of matrix or male, and matrix or female; both of which forms a very precise relationship. Matrix is usually placed in the distal part of the supporting tooth and the matrix is part of removable denture.<sup>6</sup>

The use of precision attachments has the advantage of being comfortable in its use, can improve aesthetics and has a better ability to distribute load to supporting teeth so as to maintain the health of periodontal tissues. But the disadvantage is that the cost is quite expensive and requires a long maintenance time.<sup>7</sup>

According to Sterngold,<sup>8</sup> the selection of resilient and non-resilient attachment designs is based on (1) bone support around the supporting teeth. Buf-

fer bones are categorized as good if bone loss reaches 0-20%, but if the teeth can be splinted, non-resilient attachments can be chosen, whereas if bone loss is 20-40%, the resilient type should be chosen; (2) ridge condition, if the alveolar resorption is small, the resilient and non-resilient types can be used, but if the alveolar undergoes considerable resorption the non-resilient type is recommended; (3) whether the condition of the antagonist jaw uses denture with a non-resilient or resilient attachment. Two resilient prostheses should not be the opposite because the two moving occlusal fields can interfere with the efficiency of mastication.<sup>8</sup>

The attachment used in this case is the type of non-resilient/rigid attachment, which is a stable attachment with very little movement at the time of function, because the bone around the maxillary supporting anterior teeth in the radiographic results still looks good, the maxillary anterior teeth can be strengthened by splinting, the ridge experiences a little resorption, the opponent's jaw is non-resilient denture, so it doesn't interfere with the efficiency of chewing.

In this case, periodontal support and residual ridge are still good, therefore rigid and resilient type precision attachments can be used. The use of extracoronal attachments in this case is preferred over intracoronal attachments reasoning that there is relatively little reduction in tooth tissue. Intracoronal attachments is not used here because more tooth reduction that can cause pulp perforation and at least 3 mm of height is needed.<sup>9</sup>

The use of extracoronal attachments can be advantageous because attachments do not asso-

ciate dentures and supporting teeth, but are joints that can allow for multiple movements between the two components of RPD.<sup>10</sup> With the stress breaker component as a load breaker so that the chewing load is not received directly by the fixed tooth or fixed splint it will minimize the pressure received by the buffer teeth. Chewing load received by the metal frame of RPD will be channeled through precision attachments which are forwarded to the fixed splint.

Extracoronal attachment is chosen because of vertical height distance from the ridge crest to the occlusal surface of the antagonist is sufficient (7mm), mesiodistal space of the tooth structure where the attachment is narrow, some of the teeth for attachment are still vital, buccolingual distance from the attachment structure narrow.<sup>7,8</sup>

Staubly and Bagley stated that abutment teeth for extracoronal rigid attachments should use double abutments to get strong support from abutment teeth.<sup>7</sup> Therefore, in the upper jaw a fixed splint was made for teeth 13, 11, 21, 22 with extracoronal ball attachments on 13 and 23. This fixed splint also added milling on palate of the splint crown. This milling on fixed splint can function as a rest cingulum as indirect retainer. The use of this milling also made the denture more retentive, stabilize, and comfortable because of its shape in accordance with the contours of the palatal teeth.

It can be concluded that attachment retained maxillary RPD and mandibular RPO can be used alternative treatments for full mouth rehabilitation in anterior crossbite and posterior bite collapse patient to improve aesthetic and function

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