

# Combination of 2 Three Point Articulators for Preclinical Work Demonstration of Teeth Arrangement and Anatomical Landmarks

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**Abstract** The combination of 2 three point articulators was done to visualize and appreciate the various teeth setting principles and anatomical landmarks both in occlusion and out of occlusion. In other words this technique would give a simultaneous image of the various teeth arrangement principles at a glance. The various teeth arrangement principles highlighted in this article would be the following: individual tooth arrangement principles of anterior and posterior teeth, arch form, midline, incisive papilla, retromolar pad, overjet and overbite.

**Keywords** 3 Point articulator · Teeth setting principle · Anatomical landmarks

## Introduction

Three point articulators were used and are being used for demonstration of teeth arrangement along with the respective anatomical land marks. The disadvantage of using three point articulators in demonstration exercises is that both the labial view and occlusal view could not be viewed simultaneously. Another disadvantage with the three point articulator is that the lingual view of the teeth arrangement cannot be visualized properly. Hence a new articulator is needed so that demonstration of teeth arrangement could be done with

simultaneous views of labial, lingual and occlusal aspect of teeth arrangement. In the following article a new articulator is fabricated by combining 2 three point articulators so that the disadvantages of using a single three point articulator is overcome. The use of two maxillary or mandibular casts opposing single opposing cast is not new as this technique is the key concept behind the twin stage occluder [1, 2] utilized for functionally generated technique. This article will highlight the positives in combining 2 three point articulators in order to study the various teeth setting principles and the respective anatomic landmarks.

## Materials and Methods

### Articulator Modification

The two articulators were attached by means of their respective lower members. Precision was required in attaching them as the upper members of the two articulators should not interfere with the opening and closing movement and to some extent lateral movement as permissible in a three point articulator.

### Procedure of Attaching Two Articulators (Fig. 1)

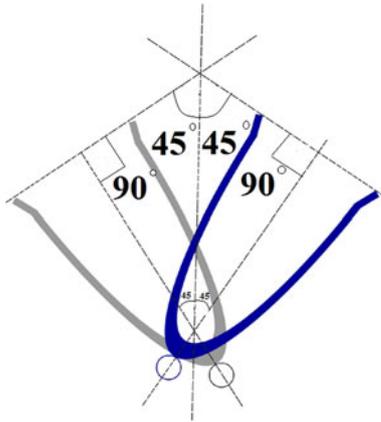
White drawing sheet was taken and the articulators were kept over it and the angles which the articulator makes are transferred to the white sheet. The articulator attachment definitely needed precision.

The lower members were so attached that the midlines of both members intersect at 90°. Hence we obtained a common midline passing through the intersection creating an angle of 45° to the individual midlines of each articulator. The articulators were secured with sticky wax in this

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**Fig. 1** Schematic diagram showing how two articulators were attached

position and the mandibular cast was mounted onto the attached articulators by means of plaster of paris with the help of the common midline. Hence the two articulators were made as one with a common lower member mounted with a common mandibular cast. The upper member midline perished with the creation of a common midline.

#### Fabrication of Trial Denture Base

Since only one mandibular cast was used to articulate with two maxillary cast we required one mandibular occlusal rim and two maxillary occlusal rims. The mandibular and maxillary rims were fabricated according to standard specifications [3]. The temporary denture base (i.e. shellac base plate) was cut in certain locations namely in relation to incisive papilla, mid palatine raphe and retromolar pad so that the correlation of these anatomical landmarks could be demonstrated in relation to teeth arrangement.

#### Mounting of Occlusal Rims

##### Stage I

A Mandibular occlusal rim was placed on the mandibular cast and one maxillary occlusal rim along with maxillary cast was secured onto the mandibular rim in class one relationship. Then plaster of paris was placed on the maxillary cast and left upper member was closed in the articulation with the lower member. After plaster of paris had set, the maxillary member was separated from mandibular member.

##### Stage II

The second maxillary occlusal rim with maxillary cast was placed on the mandibular occlusal rim in class I

relationship. Plaster of paris was placed on the maxillary cast and right upper member of the articulator was closed in articulation with the common lower member. Hence both maxillary casts with occlusal rims were mounted on to the right and left upper members respectively.

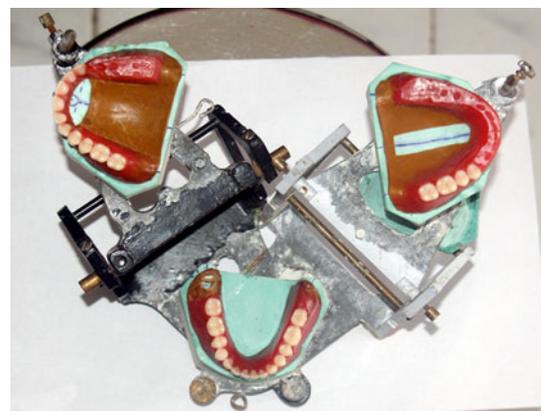
#### Teeth Arrangement

Segmental teeth arrangement (Fig. 2) was done in the maxillary occlusal rims. In the left maxillary occlusal rim teeth arrangement (anterior and posterior) was done in the first quadrant where as in the second quadrant only the anterior teeth arrangement was done.

In the right maxillary occlusal rim posterior teeth arrangement was done only in the second quadrant. Whereas in the mandibular occlusal rims complete teeth arrangement was done so that the occlusal relationships are maintained between the arranged maxillary and mandibular teeth. Teeth arrangement was done based on the setting principles advocated by Sheldon Winkler [3].

The various views by which the teeth setting principles could be studied include

- I. Eagle's eye view No. 1 comprises of
  - (a) Left side view of LMC (left maxillary cast) in occlusion
  - (b) Right side view of LMC (left maxillary cast) in occlusion
- II. Eagle's eye view No.2 comprises of
  - (a) Left side view of RMC (right maxillary cast) in occlusion
  - (b) Right side view of RMC (right maxillary cast) in occlusion
- III. Occlusal view comprises
  - (a) Occlusal view of the LMC(left maxillary cast)



**Fig. 2** Top angle view

- (b) Occlusal view of the RMC(right maxillary cast)
- (c) Occlusal view of the mandibular occlusal rim

### I. Eagle's Eye View No. 1

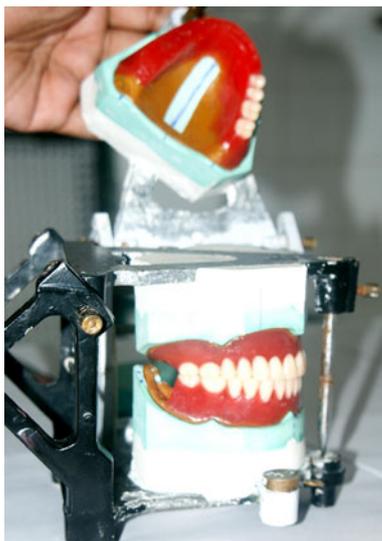
(a) *Left Side View of LMC in Occlusion* This view shows both the maxillary and mandibular anterior and posterior teeth in occlusion (Fig. 3). We can also view the non-occluded RMC which reveals the arch form in the wax occlusal rim in the first quadrant and arranged posterior teeth in the second quadrant which are arranged slightly buccal to the maxillary ridge [3]. Hence we can view both arch form of the maxillary occlusal rim and the occlusion of anterior and posterior maxillary as well as mandibular teeth.

(b) *Right Side View of LMC in Occlusion* This view reveals the occlusal plane and its relationship with the mandibular posterior teeth (Fig. 4). The mandibular posterior teeth interdigitates with the occlusal rim revealing that anteroposterior plane is a curve [4, 5] and the posterior teeth are slightly superior in position in relation to the mandibular occlusal rim.

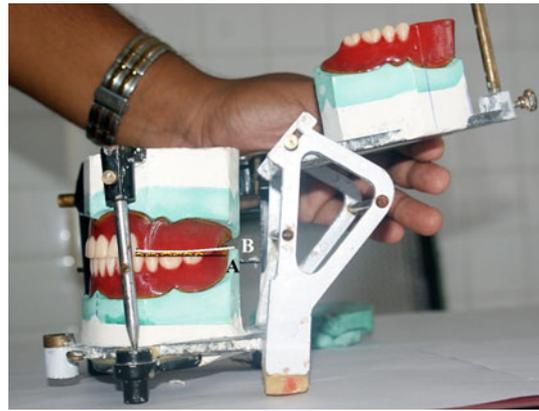
### II. Eagle's Eye View No. 2

(a) *Left Side View of RMC in Occlusion* This view shows the occlusal plane in relation to lower posterior teeth and antero posterior compensatory curve (curve of spee) created by the mandibular teeth (Fig. 5).

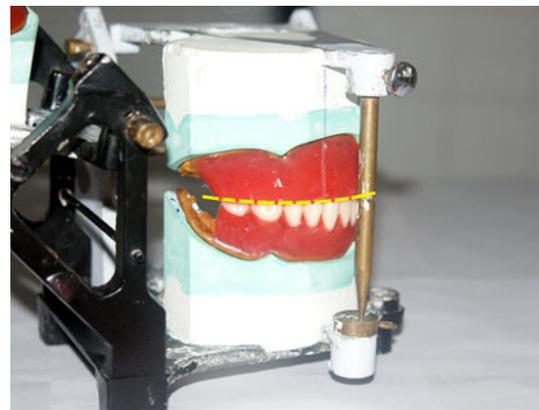
(b) *Right Side View of RMC in Occlusion* This view shows the unaltered anterior portion of maxillary occlusal



**Fig. 3** Left side view of LMC in occlusion



**Fig. 4** Right side view of LMC in occlusion (*line A* indicates the occlusal plane and *line B* indicates anteroposterior compensatory curve)



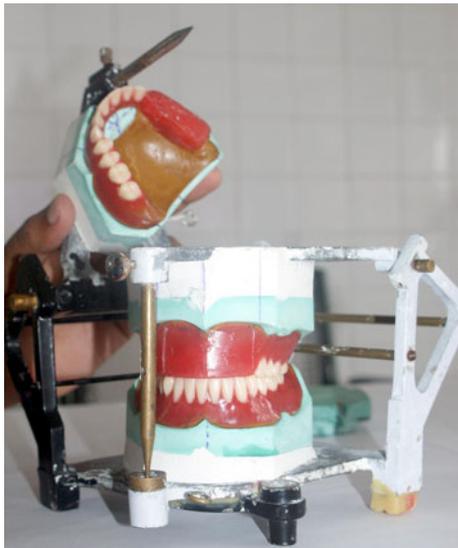
**Fig. 5** Left side view of RMC in occlusion (*dotted line A* indicates anteroposterior compensatory curve)

rim showing 1–2 mm of overjet (Fig. 6). The non occluded LMC reveals arranged anterior maxillary teeth and posterior teeth in the first quadrant. Hence we can appreciate both the arranged anterior maxillary teeth as well as the overjet required for establishing a proper teeth set up.

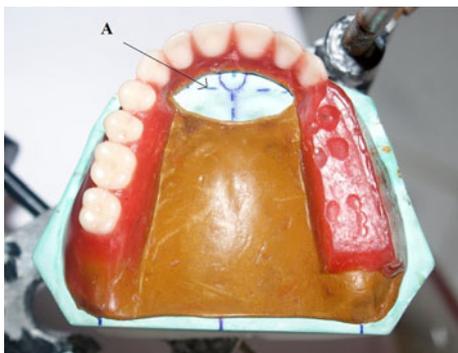
### III. Occlusal View

(a) *Occlusal View of the LMC* This view shows the anterior maxillary teeth set up as well as the first quadrant posterior teeth set up (Fig. 7). Occlusal marks are also seen on the second quadrant occlusal rim.

The incisive papilla relationship with the anterior teeth is shown by the canine–incisive papilla–canine line [3, 5] which passes through the distal aspect of the incisive papilla and distal of the canines. The central incisors are located at a distance of 8–10 mm from the centre of the incisive papilla.



**Fig. 6** Right side view of RMC in occlusion



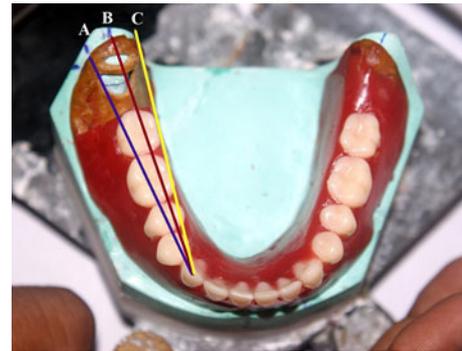
**Fig. 7** Occlusal view of the LMC (arrow A indicating canine–incisive papilla–canine line)



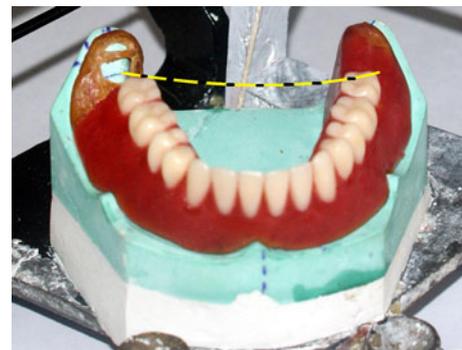
**Fig. 8** Occlusal view of the RMC

*(b) Occlusal View of the RMC*

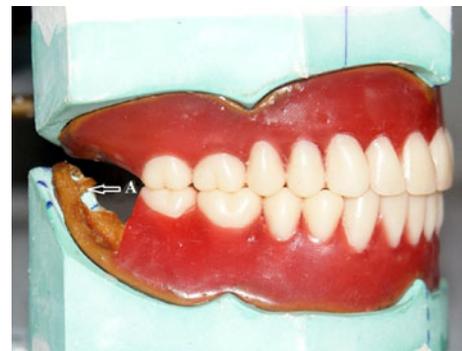
This view shows the midline, the overbite and overjet as evidenced by the indentation marks on the occlusal rim (Fig. 8). This view also reveals that the maxillary posterior teeth are arranged slightly buccal to the ridge.



**Fig. 9** Occlusal view of the mandibular cast (lines A, B, C are lines drawn from lateral, centre and medial aspect of retromolar pad to canine tip)



**Fig. 10** Fronto-occlusal view of the mandibular cast (dotted lines reveal the mediolateral compensatory curve)



**Fig. 11** Buccal view of LMC in occlusion (arrow A indicating position of second molar teeth at the level of junction between anterior 2/3rd and posterior 1/3rd of retromolar pad)

*(c) Occlusal view of the mandibular occlusal rim*

This view shows the full complement of mandibular anterior and posterior teeth arranged according to standard setting principles [3]. The mandibular posterior are set well within the two lines :one line extending from the medial aspect of retromolar pad to the canine tip and the other line



**Fig. 12** Simultaneous image of the combo articulator

extending from the lateral aspect of retromolar pad to the canine tip (Fig. 9).

Mediolateral compensatory curve can be appreciated while viewing the mandibular cast in a slightly fronto-occlusal direction (Fig. 10).

#### Retromolar Pad

The posterior teeth is at the level of junction between anterior 2/3 and posterior 1/3 of the retromolar pad (Fig. 11).

#### Conclusion

This technique could well be used as a teaching guide to study the various teeth arrangement principles which are in

concordance with their respective anatomic landmarks. As this technique gives a simultaneous image (Fig. 12) of the various principles, understanding the teeth arrangement principles will prove to be very effective. Moreover all these principles could be studied under a single set up. This technique offers the advantage of compressing pages of theory into a single practical guide for both undergraduate and postgraduate dental students.

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