

Comparative Assessment of Occlusal Plane Orientation on Semi adjustable Articulator with Modified Mounting Technique on Mean Value Articulator

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ABSTRACT

Background: Mounting for mean value articulators is generally accepted such that the occlusal plane of maxillary rim made parallel to the horizontal plane. A new modified mounting technique was tried at Narsinhbhai Patel Dental College and hospital taking occlusal plane orientation into consideration.

Materials and Method: Total 12 edentulous subjects were selected. Final casts with standard bases were duplicated and maxillary rim was made parallel to campers' plane intraorally. Facebow was recorded and transferred on semi-adjustable articulator. Same maxillary rim was used and another cast was mounted on the mean value articulator making the base of the cast parallel to horizontal plane. The angle formed by the maxillary occlusal rim on mean value articulator and semi adjustable articulator were compared.

Result: Out of 12 patients the variation of occlusal plane angle to the horizontal plane for the mounted rims ranged from 0 to 2 degrees of angle.

Conclusion: This new method may seem to give the orientation of occlusal plane near to that in semi adjustable articulator but still further studies with the improvement obtained in final prosthesis are required.

Keywords: Mean value articulator, Semi adjustable articulator, Orientation of occlusal plane, Modified mounting technique.

INTRODUCTION

Mean Value articulator also known as average value articulator, is an anatomic, non adjustable, non arcon articulator with fixed condylar path and average values for protrusion angle and incisal table. Moreover it doesn't support the facebow transfer for occlusal plane orientation^[1]. With evolution due to its non adjustability and availability of better adjustable and semi adjustable articulators, its use has reduced to a great extent. But the ease of use, affordability, availability and

less technique sensitivity has lead to its use in undergraduate students^[2] as well as in private practice and laboratories in complete denture construction and short span fixed partial dentures or single crowns. Occlusion is an important aspect of any prosthesis which is developed extraorally using one of the articulators. Orientation of occlusal plane is one of the mechanical factor of anatomic type artificial teeth arrangement^[3]. So occlusal plane orientation is important for esthetic and function of a complete denture.

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When considering the occlusal plane, the occlusal rim mounted on mean value articulator, occlusal orientation is simply made parallel to the horizontal plane using thread relation as shown in fig. 1 which had been adjusted parallel to camper's plane intraorally. Taking this into consideration, a study was done at Narsinhbhai Patel Dental College and Hospital to modify the mounting technique for mean value articulators to evaluate a modified mounting technique

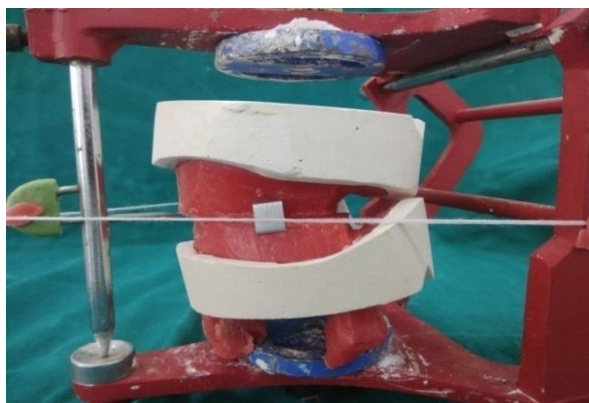


Fig 1: Use of thread relation for mounting the jaw relation on mean value articulator.



Fig 2A and 2B: Facebow recorded at jaw relation appointment after adjusting maxillary plane according to camper's plane.

MATERIAL AND METHODS

Total 12 completely edentulous subjects who came to Narsinhbhai Patel Dental College with given inclusion parameters were selected for the study.

Inclusion criteria

All healthy subjects with good ridge height, good neuromuscular conditions and adequate vertical dimension were selected. Both male and female

subjects with age ranging from 50 – 75 years were included in this study.

Exclusion criteria:

Subjects with too less vertical dimension, bilateral asymmetry, paralysis or facial muscle abnormalities were excluded from the study.



Fig 3: The device to measure the angle formed with horizontal plane.

After thorough diagnosis and treatment planning, informed consent was taken from all the patients. Primary impression was made using compressive impression compound (Y- Dents, MDM corporation, Delhi, India) and final impression were made after border molding with green stick (DPI Pinnacle tracing sticks, DPI, India) by selective pressure impression technique using zinc oxide eugenol (DPI Impression Paste, DPI, India). Master cast was poured in dental stone (Kalstone, Kalabhai Karson pvt ltd, India) keeping the base of standard dimensions (depth of 10 – 15 mm height from the lowest deepest point, 2-3 mm of thickness of land area all around) by beading and boxing. On the maxillary final cast, a denture base was prepared using cold cure acrylic (rapid repair, DPI) and the cast was duplicated. Occlusal rim was prepared on the denture base

During the jaw relation appointment, the maxillary rims were adjusted according to the camper's plane intraorally for each patient. Facebow was recorded in the patient as seen in figure 2 using Hanau Springbow (Whipmix, USA) Facebow transfer was done on the Hanau Wide Vue articulator by indirect technique and mounted using type 2 dental plaster (Kaldent, Kalabhai Karson pvt ltd, India) with the maxillary same rim. The same maxillary rim was used for mounting on the mean value articulator after careful removal of the bite fork. For mounting on mean value articulator instead of thread relation or use of a plane to orient the occlusal plane parallel

to the horizontal, the base of the master cast was made parallel to the horizontal plane. The guide pin was considered for the anterior reference. The duplicated cast was then mounted using the same rim on mean value articulator using dental plaster. The angle formed by the rim to the horizontal plane on both the articulators was measured and compared using a specially designed device. This device was made using the mounting jig of the semi adjustable articulator. A custom made rod attached to a protractor with a hand attached was placed into the mounting jig to measure the angle as shown in figure 3.

The readings were noted by 3 observers for each subject and then the average was used. The results obtained were only to be in whole numbers. The decimals were not taken into consideration. The observers were instructed to observe the occlusal plane angle with their eye at level of the occlusal plane as seen in figure 4 and 5

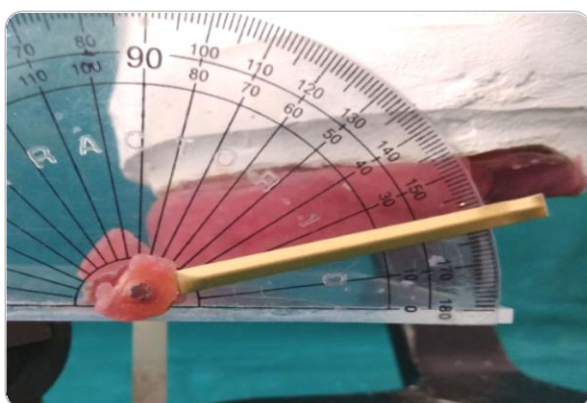


Fig 4: Angle formed with horizontal plane on hanau wide vue articulator.

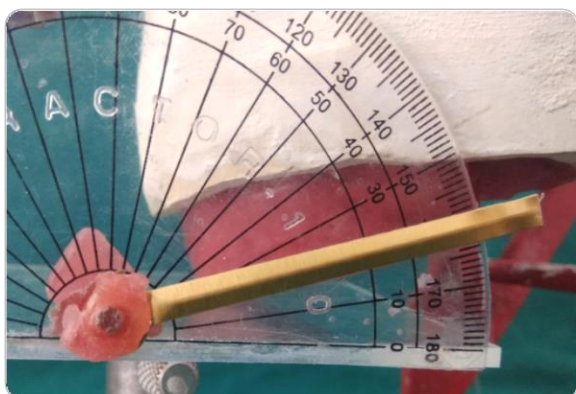


Fig 5: Angle formed with horizontal plane on mean value articulator.

RESULTS

As shown in figure 4 and 5, angle for each rim was measured twice, once on the semi adjustable Hanau wide vue and another on mean value articulator. Out of 12 subjects, 1 subject had no difference in the angle obtained, 7 subjects had a difference of 1° and 4 subjects had the difference of 2°. Obtained results are tabulated in table 1 along with the difference in two groups.

Table 1: Results achieved on both the articulators and the comparison in all 12 subjects

Subject no.	Angle on Hanau wide vue	Angle formed on mean value	Difference
1	9°	10°	1°
2	15°	14°	1°
3	10°	12°	2°
4	10°	10°	0°
5	12°	11°	1
6	9°	10°	1°
7	11°	13°	2°
8	17°	16°	1°
9	9°	11°	2°
10	10°	11°	1°
11	10°	12°	2°
12	11°	10°	1°

DISCUSSION

Complete denture success is dependent on many factors out of which occlusion is one of the main criteria to be considered. For this we record the orientation jaw relation where the maxillary plane is arranged according to the camper's plane and then mounting is done with or without facebow record as per the articulator used. Mounting on a Hanau Wide Vue, a semiadjustable, arcon articulator is found near to cephalometric values in various studies.^[4,5]

Mean value articulator mounting is not much discussed due to its various limitations including fixed condylar guidance and no facebow transfer. While mounting on the mean value articulator, the rim which is parallel to camper's plane intraorally,^[6] is mounted with its plane parallel to the horizontal plane using thread relation or a plane available. This can be one of the root of an occlusal discrepancies obtained when the complete denture is constructed on the mean value articulator.^[1] According to one study, In Hanau Wide-Vue the sagittal inclinations of occlusal plane of maxillary edentulous casts varied from a maximum of 16.8° to minimum of 4.5° with a mean of 11.41±3.07°. In Mean Value group the sagittal inclinations of occlusal plane of maxillary edentulous casts varied from a maximum of 1.9° to a minimum of 0.4° with a mean of 1.22±0.35.^[1] Morneburg et al showed that the occlusal errors evoked by the use of Mean Value articulator was shown to be ≥440 µm.^[7]

In patients, maxillary occlusal plane is recorded parallel to camper's plane intraorally. By mounting the standard cast with base parallel to the horizontal plane, we assume that the occlusal plane on the articulator will be oriented in the same angle to the horizontal plane which can be concluded from this study.

CONCLUSION

Within the limitation of this study, it was proved that modifying the mounting technique may lead to acceptable orientation of the occlusal plane on mean value articulator. Inability to adjust the condylar and incisal guidance, intercondylar distance, facebow record are some limitations of mean value articulator which cannot be modified but the modification of the mounting technique may improve the final prosthesis occlusion and reduce the discrepancies. Further comparison and study of the occlusion achieved in final prosthesis is required.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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