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COMPARATIVE STUDY OF SAGITTAL INCLINATION OF OCCLUSAL PLANE WITH TWO DIFFERENT ANTERIOR REFERENCE POINT OF FACEBOW

Dental Science

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ABSTRACT

Aim- To compare sagittal inclination of occlusal plane with two different anterior reference point of facebow

Setting and design- The study consisted twenty subjects comprising both sexes (M/F) between the ages of 18 to 30 years and all having a full complement of natural teeth.

- **Material and methods-** Two face bow records were made

1. Hanau spring bow facebow record with orbitale as anterior reference point
2. Gnatus jp 30 face bow with nasion as anterior reference point.

Facebow records were transferred to their respective articulators and mounting of cast were done. A vernier caliper was used to measure linear distances between several points. Lateral cephalogram of each patient was taken and cephalometric tracing was done to measure the angle between axis orbitale plane and occlusal plane.

Statistical analysis used- Average values

Results- The difference of angle between axis orbitale plane and occlusal plane between cephalometric tracing and hanau articulator was 4.35 and between cephalometric tracing and gnatus articulator was 7.65.

Conclusion- Sagittal inclination of occlusal plane with orbitale as anterior reference point is closer to orientation of maxilla compared to anterior reference point as nasion.

KEYWORDS

nasion, orbitale, porion

INTRODUCTION-

Facebow is a caliper-like instrument used to record the spatial relationship of the maxillary arch to some anatomic reference point or points and then transfer this relationship to an articulator; it orients the dental cast in the same relationship to the opening axis of the articulator.[1] It permits a more accurate use of lateral rotation points for the arrangement of teeth. It aids in securing the anteroposterior cast position with relation to the condyles of the mandible. Customarily the anatomic references are the mandibular condyles transverse horizontal axis and one other selected anterior point.[1] Various anterior reference points are used with different type of face bow like orbitale, orbitale minus 7 mm, nasion, ala of nose. These anterior reference points were advocated based on how accurately anatomical points of the Frankfort horizontal plane could be located in relation to the axis-orbitale plane in the patient. The idea of an anterior reference point found acceptance on the premise that a horizontal reference plane in the patient needed to be related to the articulator for better esthetic and functional results.[2,3,4,5,6] In this study the comparison of sagittal inclination of the occlusal plane of the maxillary casts transferred to the Hanau wide vue articulator by a Hanau spring bow face-bow (anterior reference point orbitale) with those transferred to the Gnatus JP 30 articulator by face-bow (anterior reference point nasion) was done.

SUBJECT AND METHODS- The present study consisted twenty subjects comprising both sexes (M/F) between the ages of 18 to 30 years and all having a full complement of natural teeth

Inclusion criteria-

- Normal alignment of maxillary teeth
- Teeth free from attrition of occlusal surface
- No temporomandibular joint disorder
- No missing or grossly carious teeth
- Third molar may or may not be present

Exclusion criteria-

- Missing teeth
- Temporomandibular joint disorder
- Facial asymmetry
- Supra errrupted teeth
- Attrited or grossly carious teeth

Each subject was required to sit upright in a dental chair with the Frankfurt horizontal plane parallel to the floor. Two face bow records were made for each subject. 1. Hanau spring bow facebow record with orbital as anterior reference point (figure 1) 2. Gnatus jp 30 face bow with nasion as anterior reference point(figure 2), Facebow records were transferred to their respective articulators and mounting of cast were done. Markings were made on mesiobuccal cusp tip of the right maxillary second molar (M),mesioincisal edge of the right central incisor (A), center of the condylar axis (C), on the incisal pin at the orbital plane level (I). The line from A to M represented occlusal plane, marks C and I were made to maintain stationary reference points on the articulators. (figure 3)

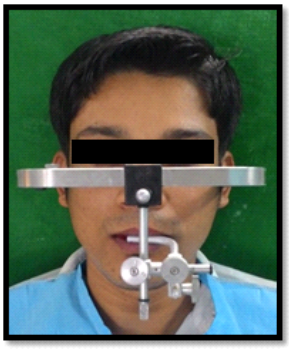

Figure 1: making of face bow record with spring bow

Figure 2: making of face bow record for Gnatus jp30 articulator

A vernier caliper was used to measure linear distances between several points: C and M (condylar axis and tip of mesio- buccal cusp), I and M

(point on incisal pin and tip of mesio-buccal cusp), I and A (point on the incisal pin and mesio-incisal angle of maxillary right central incisor), C and A (condylar axis and mesio-incisal angle of maxillary right central incisor), C and I (condylar axis and point on incisal pin). Distances were drawn on a graph paper. The angle formed by lines CI, which represents the horizontal plane, and MA, which represents the occlusal plane (sagittal inclination angle of occlusal plane), was measured with a protractor to the nearest degree. (Figure 4)

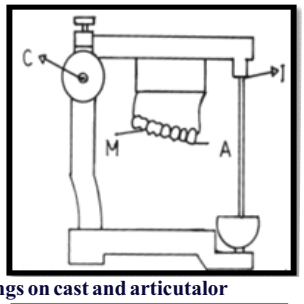

Figure 3: markings on cast and articutalor

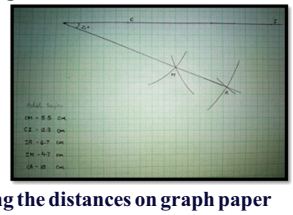

Figure 4: drawing the distances on graph paper

Lateral cephalogram of each subject was taken and cephalometric tracing was done. Line CI correspond to axis orbitale plan and MA represents the occlusal plane (sagittal inclination angle of occlusal plane). (Figure 5)

Figure 5: cephalometric tracing with correspondence marking

Table 1: angulation between two lines CI and MA with cephelometric tracing and two different articulator (in bracket) is shown, and variation from cephalometric tracing is shown with positive or negative sign

s. no.	Cephalometric Tracing Angulation(degree)	Hanau Articulator (degree)	Gnatus Articulator (degree)
1.	16	-5 (11)	0 (16)
2	22	-2 (20)	-10 (12)
3	20	-3 (17)	-8 (12)
4	18	-3 (15)	-4 (14)
5	22	-1 (21)	-8(14)
6	20	-8 (12)	-2 (18)
7	22	-4 (18)	-11 (11)
8	18	-6 (12)	-4 (14)
9	17	-7 (10)	-7 (10)
10	24	-6 (18)	-14 (10)
11	22	-4 (18)	-12(10)
12	22	-7 (15)	-17 (5)
13	22	-11 (11)	-9 (13)
14	16	-4 (12)	-10(6)
15	20	-2 (18)	-6 (14)
16	18	-2 (16)	-6 (12)
17	18	-6 (12)	-4 (14)
18	20	-2 (18)	-5 (15)
19	24	-2 (22)	-7 (17)
20	23	-2 (21)	-8 (14)

RESULTS:

- The average difference between cephalometric tracing and hanau articulator was 4.35 and between cephalometric tracing and gnatus articulator was 7.65.

DISCUSSION:

It has been suggested that bilaterally balanced occlusion is necessary for the stability of complete dentures to maintain the health of the oral tissues.[7,8] An accurate orientation of the sagittal inclination of the maxillary cast is an essential step in the development of balanced occlusion in complete dentures.The idea of an anterior reference point found acceptance on the premise that a horizontal reference plane in the patient needed to be related to the articulator for better esthetic and functional results. In this study comparison of sagittal inclination of the occlusal plane of the maxillary casts transferred to the Hanau wide vue articulator by a Hanau spring bow face-bow (anterior reference point orbitale) with those transferred to the Gnatus JP 30 articulator by face-bow (anterior reference point nasion) was done. The average difference between Hanau and Whip-mix articulators was found to be 3.3 degrees. The reason for this difference between the two articulators is due to the position of the orbital point in the vertical plane. According to **Gonzales and Kingery**[2], the orbital reference point is situated 7 mm above the condylar axis in a vertical plane suggesting that the orbitale indicator should be placed 7 mm above the hinge axis of the articulator. In the Hanau articulator, the orbitale indicator (O) is located 7 mm above the axis (A) whereas in the Whip-mix articulator the crossbar of the face-bow locates the anterior reference point (O), not the nasion positioner. The crossbar of the face-bow is located 23 mm below the midpoint of the nasion positioner which is approximately the position of the orbitale (O). When the maxillary cast is mounted, the incisal edge of the maxillary cast is more inferiorly placed and the angle of the occlusal plane increases.

CONCLUSION:

Sagittal inclination of occlusal plane with orbitale as anterior reference point is closer to orientation of maxilla compared to anterior reference point as nasion.

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