

Correlation of the Camper Planes with Respect to Occlusal Plane in Prosthodontic Rehabilitation

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ABSTRACT:

Objective: To measure the mean camper planes I, II and III with reference to the occlusal plane to determine the smallest angle in Prosthodontic rehabilitation.

Methodology: This study was carried out in the department of Prosthodontics, de' Montmorency College of Dentistry and Punjab Dental Hospital, Lahore from 19th May to 18th November 2012. Total 50 patients were included. Cephalometric radiographs were taken. On Cephalogram angles were measured between Camper's I, II, and III with occlusal plane. All measurements were calculated and data analysis was done by using SPSS version 17.

Result: Mean Camper plane I-OP was $1.67^{\circ} \pm 0.94$, Camper plane II-OP was $2.60^{\circ} \pm 1.07$ and mean for Camper plane III-OP was $3.60^{\circ} \pm 1.19$.

Conclusion: According to this study, angle between Camper's I (superior border of the tragus to the lowest point of ala) was most precise in orienting the occlusal plane.

Key words: Camper's Plane, Occlusal Plane, Prosthodontic Rehabilitation.

INTRODUCTION:

The occlusal plane is established by the incisal and occlusal surfaces of the teeth. The inclination of the occlusal plane is one of the key factors governing occlusal balance, function, aesthetics and stability of the prosthesis in prosthodontic rehabilitation.¹⁻³ The failure to reproduce the occlusal plane can jeopardize the interaction between the tongue and the buccinator muscle.⁴ The most widely used method in determining the occlusal plane is the camper's plane as a reference point.⁵

There is controversy in determining camper's plane. Spratley, Boucher, Neill and Naim claim that camper's line runs from the center of the ala of the nose to the

center of the tragus of the ear⁵. Glossary of Prosthodontic Terms⁶ states that the Camper's line runs from the inferior border of the ala of the nose to the superior border of the tragus of the ear. Lundström⁷ measured camper's I, II, III with the occlusal plane. Camper I was formed from the superior border of the tragus of the ear to the lowest point of the ala of the nose. Camper II was formed from the middle border of the tragus of the ear to the lowest point of the ala of the nose. Camper III was formed from the inferior border of the tragus of the ear to the lowest point of the ala of the nose. They found that the mean value of camper I was $2.06^{\circ} \pm 2.1^{\circ}$, camper II was $3.15^{\circ} \pm 1.6^{\circ}$ and camper III was $6.1^{\circ} \pm 1.6^{\circ}$. This study showed that the angle between occlusal plane and camper I was more accurate and the differences between the three planes in relation to the occlusal plane were significant ($p < 0.001$)⁵. Another study conducted in 2009 concluded that the magnitude of Camper's I was $1.801^{\circ} \pm 3.123$ Camper's II was $4.160^{\circ} \pm 3.893$ and Camper's III was $5.839^{\circ} \pm 4.770$ ².

The aim of this study was to determine the mean Camper's plane I, II, III as a guide for the orientation of the occlusal plane in prosthodontic rehabilitation. Use of cephalometric landmarks on dentate individuals to measure the occlusal plane was done in relation with Camper's I, II, III planes. This study could provide a guide line that which plane should be used for the orientation of occlusal plane on edentulous patient for their better management and to achieve more patient satisfaction.

METHODOLOGY:

A total of 50 subjects, fulfilling the inclusion criteria were enrolled. The radiographs of subjects having 28 to 32 teeth of either gender, with Angle's class I molar relationship assessed on visual bases, were selected from the department of Prosthodontics of de' Montmorency College of Dentistry and Punjab Dental Hospital, Lahore from 19th May 2012 to 18th November 2012. An informed consent was taken from every subject. A cephalometric radiograph was taken in standing position for each subject, using an orthopantomograph model Orthophos-5 (Siemens) with a focal film distance of 5 feet. Subjects were asked to close in centric

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occlusion. Using cephalostat the patient's head was fixed bilaterally by the ear rods and anteriorly by a plastic stopper on the bridge of the nose. The cassette with the film inside was at the right side of the patient's face. Radiographs were obtained at 66 to 69 kVp and 15 to 16 mA according to individual's status. Kodak T-MAT films with Siemens special screens were used for conventional cephalometric radiography. Barium sulfate creamy mix was applied to the teeth; one drop on the incisal edge of the left central incisor, another drop was painted to cover the mesio-palatal cusp of the left first molar. Another creamy mix of barium sulfate was painted on the skin on the left side of each subject's face in the shape of a triangle to mark required landmarks to be shown in the final radiograph. The apex of the triangle was superiorly pointed to the lower border of the ala of the nose, and the other one was applied to mark the whole tragus of the ear. The apex of the painted triangle of the tragus was pointed posteriorly to the tragus so that the lowest angle between occlusal plane and ala tragus line at the superior, middle and inferior border of the tragus would be identified.

Each traced cephalogram was placed on the conventional viewing box, measuring the angles between Campers's I, II, III with occlusal plane. All measurements were calculated by researcher himself. All this information was recorded on proforma.

SPSS software version 17.0 was used to calculate the mean and standard deviation of all angular measurements of Camper's I, Camper's II, Camper's III and age for the whole sample. Frequency and percentage was calculated for qualitative variables like gender.

RESULTS:

Mean age of the patients was 30.26±1.45 years. Age of patients was also presented in relation to gender (Table-1). Gender distribution of the patients showed that there were 48% female and 52% patients were male (Figure-1). Mean Camper plane I-OP was 1.67°±0.94. Minimum and maximum Camper planes I-OP was 0° and 4° respectively. Mean Camper plane I-OP in male and female patients was 1.82°±0.93 and 1.50°±0.94 respectively (Table-2). Average Camper planes II-OP was 2.60°±1.07. Minimum and maximum Camper planes II-OP was 1° and 4.50°. Average Camper planes II-OP in male and female patients was 2.76°±1.04 and 2.41°±1.10 respectively (Table-3). Mean for Camper planes III-OP was 3.60°±1.19. Maximum and minimum Camper planes III-OP was 5.50° and 1.50° respectively. In female patients mean Camper plane III-OP was 3.37°±1.22 and in male patients mean Camper planes III-OP was 3.80°±1.14 respectively (Table-4).

Figure: 1
Gender Distribution of Patients

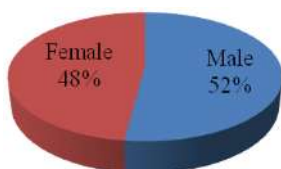


Table:1
Descriptive Statistics for Age in Relation to Gender

	Male	Female	Total
n	26	24	50
Mean	30.84	29.62	30.26
Std. Deviation	1.22	1.43	1.45

Table: 2
Descriptive statistics for camper plane-I with reference to occlusal plane

	Male	Female	Total
n	26	24	50
Mean	1.82	1.50	1.67
Std. Deviation	0.93	0.94	0.94
Minimum	0.00	0.50	0.00
Maximum	3.00	4.00	4.00

Table: 3
Descriptive statistics for camper plane-II with reference to occlusal plane

	Male	Female	Total
n	26	24	50
Mean	2.76	2.41	2.60
Std. Deviation	1.04	1.10	1.07
Minimum	1.00	1.00	1.00
Maximum	4.00	4.50	4.50

Table: 4
Descriptive statistics for camper plane-III with reference to occlusal plane

	Male	Female	Total
n	26	24	50
Mean	3.80	3.37	3.60
Std. Deviation	1.14	1.22	1.19
Minimum	1.50	1.50	1.50
Maximum	5.50	5.00	5.50

DISCUSSION:

The occlusal plane (OP) is important in dentistry, but is difficult to determine exactly in the edentulous patient. An erroneous orientation of the OP may result in tongue and cheek biting, or food accumulation in the sulcus and instability of the dentures.^{8,9,10,11-17}

Extraoral landmarks that have been suggested to orient the OP are the interpupillary line, and Camper's line or ala-tragus line (ATL). Commonly used intraoral landmarks are the lips and the commissures, residual ridges, retromolar pad, hamular notch incisive papilla plane, lateral borders of the tongue and the buccinator grooves. While Nissan, Barnea, Zeltzer and Cardash suggest to consider intraoral structures during OP determination, Spratley believes that the intraoral landmarks are valuable guides for the experienced clinicians but they are rather difficult to follow.^{11,15,17,18,19,20} Although the technique for using the ATL is well

documented, there is some controversy over whether to take the superior border, the tip, or the inferior border of the tragus of the ear as posterior reference points to define ATL.¹⁰ Ismail and Bowman compared the use of an ala-tragus line oriented to the middle of the tragus with the occlusal plane of natural teeth, and concluded that dentures constructed accordingly would have an occlusal plane set far too low posteriorly. This is contradicted with current study.^{9,16,21,22} Nissan et al.²³ on the other hand, recorded the angle formed between occlusal plane and Camper's line as 7.08°. Abrahams and Carey¹⁶ reported the angle formed between the natural occlusal plane and Camper's plane to be 9.66°. Augsburger²⁴ found the angle of the occlusal plane deviated from Camper's plane by 3.2°-7.85° in dentate patients of different facial types. (Van Niekerk²⁶ recorded a 2.45° angle between the occlusal plane of the complete denture and the ala-tragus line). Karkazis and Polyzois²⁵ did not find a correlation between Camper's plane and the occlusal plane of natural teeth (average 2.84°) or artificial teeth (average 3.25°); however, the inclination of the occlusal plane on complete dentures was similar to the natural occlusal plane. The difference between the average angle (2.0°) made by the occlusal plane and Camper's plane as found in the present study and that of other studies can be explained by the use of different points of measurement. Van Niekerk et al.²⁶ used the inferior border of the tragus as the posterior border of the ala-tragus line, whereas Karkazis and Polyzois used the center of the tragus as the posterior border of Camper's plane.²⁵ Results reported by another study⁵ showed that Angle between occlusal plane in the dentate group and Camper's I was 2.063°±2.11, between OP and Camper's II, was 3.15°±1.63 and angle between OP and Camper's III was 6.12°±1.65 respectively. They demonstrated that the superior border of the tragus is the most acceptable point to orient the occlusal plane, which complies with Boucher, the Glossary of Prosthodontic Terms. On the other hand, these results do not agree with the findings of other study.²⁵ who had suggested the use of the inferior part of the tragus rather than middle or superior, while Ismail and Bowman⁹ suggested the use of the middle part of the tragus. From the results of this study, it can be inferred that use of the Camper's plane I may be clinically a useful reference line for the initial orientation of the OP, but it should be taken only as an approximation. Final determination of it is governed by other criteria like intra-oral land marks. If used, it would seem preferable to define it as running from the inferior border of the ala of the nose to the tip or to the superior border of the tragus of the ear.

CONCLUSION:

According to the results obtained, angle between Camper's I (superior border of the tragus to the lowest point of ala) was most precise in orienting the occlusal plane in prosthodontic rehabilitation.

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