

BIOSCOPIC PLANES OF PROSTHETIC INTEREST TO ESTABLISH OCCLUSAL PLANE IN EDENTULOUS PATIENTS-A CEPHALOMETRIC STUDY

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ABSTRACT:

Aims: To determine the parallelism of the occlusal plane to the different alatragal lines and to evaluate the parallelism of maxillary and mandibular residual ridges/ basal bone to the three ala tragal lines. **Material and Methods:** Forty dentulous and forty edentulous subjects were included in the study. Four radiological markers have been placed- one each on superior, middle, inferior position of tragus and one at the ala of the nose. Lead foil is placed on the intaglio surface of the maxillary and mandibular dentures. Then the Lateral cephalograms was made and traced. **Statistical analysis:** Was subjected to ANOVA test and post hoc test of Bonferroni. **Results:** The alatragal line passing through the inferior position of the tragus to the ala of the nose is relatively parallel to the reference planes studied and helps to establish occlusal plane during complete denture fabrication.

Key words: Alatragal lines, Maxillary –Mandibular angle, Maxillary Occlusal Plane Angle, Maxillary Residual Alveolar Ridge Plane, Mandibular Residual Alveolar Plane.

INTRODUCTION

Complete denture Prosthodontics is challenging, because rehabilitation of edentulous patients with conventional complete dentures, has to be done by considering various biological and mechanical factors to restore functions and health of the Stomatognathic system.¹ Inability to precisely orient the occlusal plane would hamper esthetics, phonetics and mastication. It may even affect the stability of complete dentures, leading to the resorption of the residual alveolar ridges.

Even though alatragal line is the most commonly used extra-oral landmark to establish the posterior occlusal plane in edentulous patients, it still remains controversial. This controversy is primarily due to the disagreement on the exact point of reference on the tragus (superior, middle or inferior position on tragus to establish the alatragal line).

Material and Methods:

Forty edentulous subjects between 40 to 80 years of age with orthognathic ridge relationship, rehabilitated with completes dentures in the Department of Prosthodontics, V.S. Dental College and Hospital, Bangalore, were included in the present study. Study casts mounted on

articulator was used as criteria for determining the Orthognathic ridge relationship. Subjects with Flabby ridges, temporomandibular joint problems like clicking, subluxation; neuromuscular disorders were excluded from the study.

Forty dentulous subjects between 19 to 24 years of age with orthognathic or skeletal class I ridge relationship,(on the basis of ANB angle of 2 to 4 degrees) were included in the study. Subjects with attrition, extensive restorations, history of orthodontic treatment and temporomandibular disorders were excluded from the study.

The standardized Planmeca Proline EC Cephalostat CM machine was used to make all the cephalograms and the other materials used in the study .

Preparation of edentulous subjects for lateral cephalograms : On each participant four ball bearings, one each at superior, middle, inferior position of the tragus and one at the base of the wing of the nose was attached using double sided adhesive tape.

Preparation of dentures for lateral cephalograms : It was necessary to adapt a layer of lead foil using adhesive



Fig.1. Preparation of dentures for lateral cephalograms

tape on the intaglio surfaces of the maxillary and mandibular dentures, where they contact the residual alveolar ridges for tracing residual alveolar ridges. A ligature wire was adapted over the occlusal plane using sticky wax, so that the upper border of the ligature wire was aligned with the tips of the buccal cusps of first premolar, second premolar, buccal cusps of molars and meets the most lingually placed incisor tooth for determination occlusal plane length. (Fig.1.)

After preparing the patients and the dentures the lateral cephalometric radiographs were taken and were traced using 4H pencils on acetate tracing papers. The landmarks and planes used are shown (Fig.2 and Fig.3)

Methodology

The study is divided into three parts

Part -I Comparison of maxillary plane angle of dentulous subjects with camper's plane angles of edentulous subjects. The angles formed between the maxillary plane and the three Alatragal lines (Superior, Middle and Inferior) of the edentulous subjects are measured. Angle formed between maxillary plane and occlusal plane of dentulous subjects is measured. The camper's plane angles A,B and C are compared with dentulous maxillary occlusal plane angle to determine which of the three

camper's plane angle is close to dentulous maxillary occlusal plane angle.

Part-II Determination of parallelism of the alatragal lines to residual alveolar ridges. A perpendicular was dropped vertically from orbitale and the angle formed between the three alatragal lines with the plane dropped vertically is measured. The angle formed between the maxillary residual ridge plane to the plane dropped perpendicularly from orbitale is measured. The angle formed between the mandibular residual ridge plane to the plane dropped perpendicularly from orbitale is measured to assess the relative parallelism between the three alatragal lines to the residual alveolar ridges.

Part-III Determination of parallelism between the Maxillary and Mandibular Residual Ridges The parallelism was determined by comparing the angles formed between the Maxillary residual alveolar and Mandibular residual alveolar ridges with the plane dropped vertically from the orbitale.

Results

The data was subjected to ANOVA test and post hoc test of Bonferroni. The alatragal line passing through the inferior position of the tragus to the ala of the nose is relatively parallel to the reference planes studied and helps to establish occlusal plane during complete denture fabrication.

Discussion

Orientation of the plane of occlusion in complete denture Prosthodontics aids in esthetics, phonetics, mastication and stability of complete dentures.¹ Thus the precise establishment and orientation of the plane of occlusion is very important during rehabilitation of the completely edentulous subjects and is one of the important factor, which determines the prognosis of the case.² various guidelines/methods or concepts have been suggested for the orientation of the occlusal plane based on morphological studies on natural, artificial dentition and by clinical experiences.³ An occlusal plane that is too high, forces the tongue into a new position . This causes the floor of the mouth to raise and create undue pressure on the border of the flange. All of this lead to disruption of the normal position of the floor of the mouth and results in partial loss of border seal. An occlusal plane that is too high /low creates unnecessary troubles.⁴ Although alatragal line is the most commonly used and only extra oral landmark used to establish the posterior occlusal plane,it still remains controversial because of the disagreement on the exact position of reference on the tragus.⁵ Studies have shown that all the three positions of the tragus i.e. Superior, middle and inferior has been considered to determine the ala-tragal lines to establish the plane of occlusion and the results also support all the three positions. However, not many studies were found to have taken on edentulous subjects to determine the relative parallelism of the alatragal line to the residual

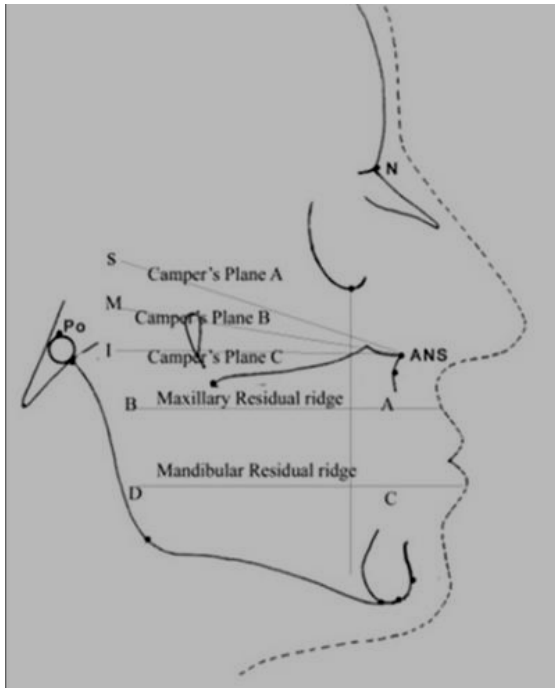


Fig.2. Lateral cephalometric radiographs Depicting the landmarks



Fig.3. Lateral cephalometric radiographs depicting the planes

alveolar ridge and it is also not evident from the currently available studies that which of the three positions that is superior, middle and inferior can be used to determine alaragral line in the edentulous subjects, so that it is similar to that of the dentulous subjects. The clinical observation and studies have shown that the orientation of plane of occlusion is influenced by the maxillomandibular space .The maxilloandibular space is intern influenced by the vertical space as measured by the maxillomandibular angle and the horizontal space as determined by the length of the occlusal plane.⁶ Though the present study was designed to determine the relative degree of parallelism of the occlusal plane to the three alaragral lines in edentulous subjects with orthognathic ridge relation, we also took into consideration the above factor that the maxillo mandibular space of the subjects may be of four groups as long -large, short -large, long -small and short – small depending on occlusal plane length and maxillomandibular angle.¹ Hence the edentulous subjects and dentulous subjects were divided into four subgroups to determine if there is any significant difference in establishing the plane of occlusion between the four subgroups. From a biomechanical point of view,^{8,9} it has been suggested that the occlusal plane in edentulous be established parallel to the residual alveolar ridges/Basal bones is more stable and hence in the present study apart from determining which of the three alaragral enables occlusal plane of edentulous subjects to have maxillomandibular space similar to dentulous subjects maxillomandibular space.¹⁰ It was also decided to study the relative parallelism of the residual ridges/Basal bones and to ascertain which of the three alaragral line is relatively parallel to maxillary and mandibular residual alveolar ridges.1mm metallic balls were used to make the landmarks visible on radiographs for uniformity as against the use of lead foil or radioopaque dyes, and also for convenience Double sided adhesive tape was used to attach the metallic balls at the superior, middle and inferior positions as it was easy to visualize the positions and it did not cause any inconvenience to the subjects while attaching / removing and lead foil was attached to tissue surface of the maxillary and mandibular denture to visualize maxillary and mandibular residual ridges.

To determine which of the three alaragral lines in edentulous subjects can be used to establish occlusal plane so that it is similar to dentulous subjects in relation to maxillomandibular space .The maxillary occlusal plane angle of the dentulous subjects was compared with different camper's plane angles. To determine which of the three alaragral lines when used to establish occlusal plane in edentulous subjects will be parallel to maxillary and mandibular residual ridges, a perpendicular plane dropped from orbitale was used as reference plane and the angles formed between three camper's plane-orbitale with maxillary residual ridge-orbitale, and three camper's plane-orbitale with mandibular residual ridge-orbitale were compared.

Limitations

Subjects were selected randomly without considering sex. Inability to get equal number of subjects in all subgroups. Duration of edentulism and amount of ridge resorption has not been considered.

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