

Research Letter

Simplified method for Occlusal Plane orientation in fabrication of the complete dental prosthesis

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ABSTRACT

The objective of this letter is to present the fabrication and use of a device in combination with a commercially manufactured occlusal plane guide as an aid in determining occlusal plane orientation in complete dental prosthesis treatment.



Sir

Despite advances in prosthodontic materials and techniques, successful treatment of the completely edentulous patient remains a significant challenge. The dentist must not only replace lost physical structures, but also relate the prosthetic components for proper esthetics, phonetics, and mechanical function, while preserving the remaining tissues. Since much or all information on the orientation of the natural teeth is lost with their removal, guidelines relating the teeth and various anatomical features in dentate patients have been suggested as reference points for alignment of denture teeth.

One apparently controversial factor, determination of proper anterior-posterior (A-P) inclination of the occlusal plane, has been the subject of at least 10 proposed guidelines in the prosthodontic literature. These guidelines utilize a number of different anatomic landmarks as reference points in the completely edentulous patient. The following are the most commonly used A-P landmarks:

1. Corner of the mouth to the lower margin of the ear lobe.
2. Buccinator groove and labial commissures.
3. Parallel to and midway between the ridges.
4. Parallel to the mandibular residual ridge, posteriorly at the junction of

the superior and middle thirds of the retromolar pad, and anteriorly at or just below the labial commissures.

5. Lateral border of the tongue.
6. Parallel to the floor with the head in the upright position.
7. At the level of Stensen's duct.
8. For the immediate removable complete dental prosthesis, follow the occlusal plane formed by the natural teeth.
9. The ala-tragus line, known as Camper's plane.

Although most of these guidelines establish flat planes, the occlusal plane selected initially in clinic serves as a guide, and may have to be modified because the teeth are to be arranged in a compensating curve, or depart from the flat plane for functional or esthetic reasons.^[1]

Use of Camper's plane to orient the occlusal plane is well-documented and mentioned in complete denture texts since the early 1920's.^[2, 3, 4] One method uses a commercial occlusal plane guide (Trubyte Fox Occlusal Plane Plate, Dentsply International Inc., York, PA) after appropriate facial contouring of the maxillary occlusion rim, with the occlusal surface of the rim made parallel to Camper's plane.^[5]

Rough visualization of the ala-tragus line is one method of establishing parallelism of the wax occlusion rim with Camper's plane, but this may be difficult to determine without assistance. (Fig. 1)

The operator working on his own frequently finds it awkward to hold a straightedge steady with one hand while marking the patient's face with the other.

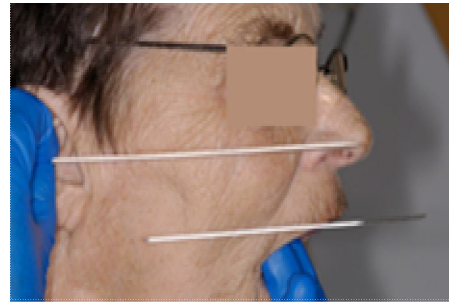


Fig. 1 Visualization of ala-tragus line commonly used to establish parallelism of wax occlusion rim and Camper's plane. Note significant displacement of tongue depressor from anterior landmark point due to unsteady positioning of operator's hand

The purpose of this article is to present a method of fabricating and using a device with a commercial occlusal plane guide to establish the occlusal plane in complete denture treatment.

Although many anatomical landmarks have been suggested to determine the appropriate anterior-posterior angulation of the plane, the use of Camper's plane, the ala-tragus line, is well documented. The technique presented provides a more stable and reproducible alignment of the occlusal plane to the ala-tragus line than rough visualization, which is often hampered by operator and patient movement and different viewing angles.

A segment of wire paper clip (#1 Paper Clip, ACCO Brands, Lincolnshire, IL), secured in a cube made of autopolymerizing acrylic resin (Dentsply Pink Repair Material, Dentsply International Inc., York, PA), and a commercial occlusal plane indicator (Trubyte Fox Occlusal Plane Plate, Dentsply International Inc., York, PA) will be used.

By applying the parallel postulate, in which every point on line

“A” (the ala-tragus line) is located exactly the same distance from line “B” (the occlusal plane), equidistant lines are formed. In other words, parallel lines must be located in the same plane, and parallel planes must be located within the same three-dimensional space. A parallel combination of a line and a plane may be located in the same three-dimensional space.

Procedure

1. Straighten the paper clip and cut to 5-7cm length.
2. Form one end of the wire into a zig-zag shape to be secured in the resin, and shape the other end to form a blunt loop to serve as a pointer, approximately 3mm in diameter (Fig. 2).

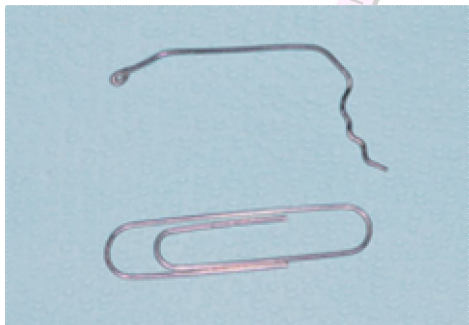


Fig. 2 Below, original papers clip. Above, final indicator form

3. Mix the autopolymerizing acrylic resin and form into a small block with rounded corners. Maintain a flat surface on the underside of the block for use against the Fox plane.
4. While still in the doughy stage of polymerization, embed the zig-zag end of the wire in the acrylic resin and hold in position until immobile. (Fig. 3)

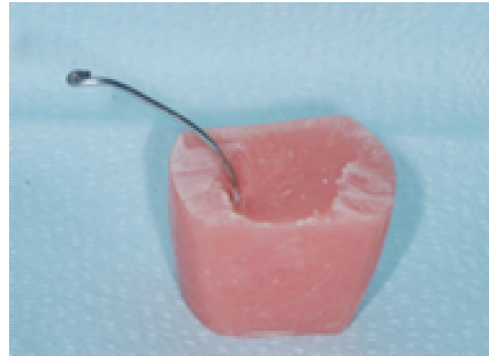


Fig. 3 Photograph of device after initial fabrication. Note flat undersurface

5. Place the device on the upper surface of the Fox plane in front of the patient's nose, with the blunt pointer end of the wire initially adjusted vertically to contact the alar reference on one side (Figs. 4 and 5).



Fig. 4 Placement of intraoral part of Fox plane against occlusal surface of maxillary occlusion rim

6. Adjust the occlusal plane angle of the maxillary occlusion rim so that the wire pointer contacts the left and right alar and tragal landmarks with the wire set at a single height. This confirms that the occlusal plane has been made parallel to Camper's plane.

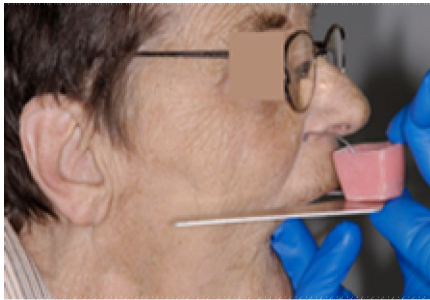


Fig. 5 Device positioned on Fox plane. Pointer end of wire is adjusted to contact inferior point of ala while Fox plane stabilized against occlusion rim

7. Continue with the facebow transfer record and maxillary cast mounting.
8. Develop appropriate contours of the mandibular occlusion rim and record base and establish correct vertical dimension and interocclusal distance.
9. Prepare the occlusion rims and record bases for the centric relation record. Make the record with the preferred technique, mount the mandibular cast, and verify the mounting with a second centric relation record.
10. Register the midline, high smile line, and left and right labial commissures at rest by scribing the labial surface of the maxillary occlusion rim with the preferred hand instrument.
11. Select appropriate denture tooth shade and molds, and submit the materials to the dental laboratory for tooth set up and waxing.

The dental literature has shown the ala-tragus line to have a close relationship to the occlusal plane, and therefore can be used for orientation of the occlusal plane on the maxillary occlusion rim. However, previous methods of evaluating parallelism of the occlusion rim and ala-tragus line have often been difficult for the operator, especially

when working alone. While attempting to stabilize the occlusal plane guide and tongue depressor, the dentist must simultaneously evaluate the angulation from a frequently awkward position dictated by the held items. Even when assistance is available, precise reorientation of the items for comparison of the right and left ala-tragus lines to the tentative occlusal plane is also difficult with the original technique.

The method presented in this article provides a more stable and reproducible alignment of the occlusal plane to the ala-tragus line than rough visualization. Although the position of the occlusal plane ultimately depends on good clinical judgment, the method presented at a minimum enables the dentist to simply and quickly establish a well-defined starting point.

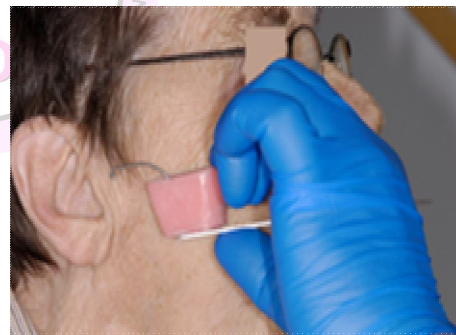


Fig. 6 Final device setting should contact all four landmark points confirming parallelism of occlusal and Camper's planes

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