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ORIGINAL ARTICLE

"Occlusal Plane Orientor": An Innovative and Efficient Device for Occlusal Plane Orientation

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Abstract Correct occlusal plane orientation is a pre-requisite in Prosthodontic reconstructive treatment therapy as it helps in achieving esthetics and phonetics anteriorly and forms a milling surface posteriorly where tongue and buccinator muscle position the food bolus during mastication. Activity of Muscles during clenching will be least, when the occlusal plane is made parallel to plane of lost natural teeth. Conventionally the ala-tragus line (Camper's plane) is used as a guide for assessment of the occlusal plane and fox plane is used to check the parallelism between the two. Occlusal plane orientor is a new device developed to mark occlusal plane parallel to ala-tragus line on maxillary occlusion rim, thereby saving clinician's time and increasing efficiency. Additionally, it is a useful tool for occlusal plane orientation in patients with facial deformity, absence of an eye or an ear.

Keywords Occlusal plane orientor · Occlusal plane · Occlusion rim

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Introduction

Determination of occlusal plane [1] is one of the most important clinical procedures in prosthodontic rehabilitation of edentulous patients. The position of occlusal plane forms the basis for ideal teeth arrangement. Anteriorly occlusal plane helps in achieving esthetics and phonetics while posteriorly it forms a milling surface where tongue and buccinator muscle position the food bolus and hold it during mastication [2].

Biting force during maximum clenching is greatest when the occlusal plane is made parallel to the ala-tragus line. It decreases when the occlusal plane is inclined about 5 degrees anteriorly or about 5 degrees posteriorly. Muscle activity at various forces is least when the occlusal plane is made parallel to the ala-tragus line [3].

Thus incorrect record of occlusal plane would hamper esthetics, phonetics and mastication. It may affect the stability of a complete denture and ultimately result in alveolar bone resorption.

Traditionally occlusal plane is made parallel to inter-pupillary line anteriorly and camper's line posteriorly by repeated checking of occlusal rim plane in patients mouth with fox plane or numerous other devices and readjustments until the desired occlusal plane orientation is achieved [4]. This procedure is time consuming and error prone. Assistance may also be required to avoid parallax error.

Thus this new device, the occlusal plane orientor was made to overcome the shortcomings of traditional method of occlusal plane orientation. Occlusal plane orientor marks grooves on occlusion rim parallel to inter-pupillary line anteriorly and camper's line posteriorly. Occlusal rim can then be reduced to the level of these grooves, thus achieving occlusal plane orientation at the desired relation in one attempt.

Additionally, it is a useful tool for occlusal plane orientation on patients with facial deformity, absence of an eye or an ear.

Designing of the Device

Occlusal plane orientor has following components (1) forehead rest with head strap (stabilizes and supports the instrument) (2) Vertical rod (positioned at midline of face) (3) inter-pupillary line indicator with nasal rest (positioned parallel to inter pupillary line with nasal rest stabilizing it over nasal bridge) (4) plane indicator (extra-orally adjusted parallel to camper's line.) (5) Plane marker (intra-orally marks groove on occlusal rim, parallel to inter-pupillary line anteriorly and camper's line posteriorly, 0.5 mm thick) (6) thumb screws 1 and 2 lock vertical rod at the desired vertical and antero-posterior position, 3 and 4 lock inter-pupillary line indicator parallel to the inter-pupillary line, 5 locks plane indicator parallel to Ala-tragus line and 6 adjusts plane marker vertically at the desired level of visibility of anterior teeth (Fig. 1).

Instrument is designed such that the Inter-pupillary line indicator, plane indicator and plane marker are three plates which are parallel to each other and perpendicular to vertical rod. Plane indicator and plane marker are a unit attached to vertical rod by a hinge (Fig. 2), which allows the adjustment of the unit as a whole in a plane parallel to Ala-tragus line. Plane marker though can separately be moved vertically up and down using thumb screw no. 6 to mark the anterior occlusal plane at the desired level of the visibility of anterior teeth. Plane marker has three small projections, one at one of its ends for marking grooves parallel to interpuillary line and the other two on its inner surface for marking grooves parallel to camper's line on the occlusion rim on both sides (Fig. 2).

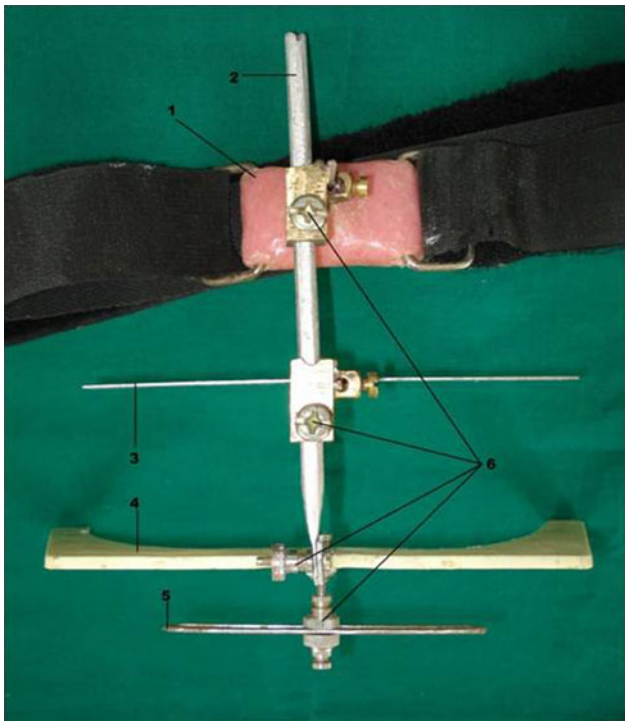

Fig. 1 Occlusal plane orientor

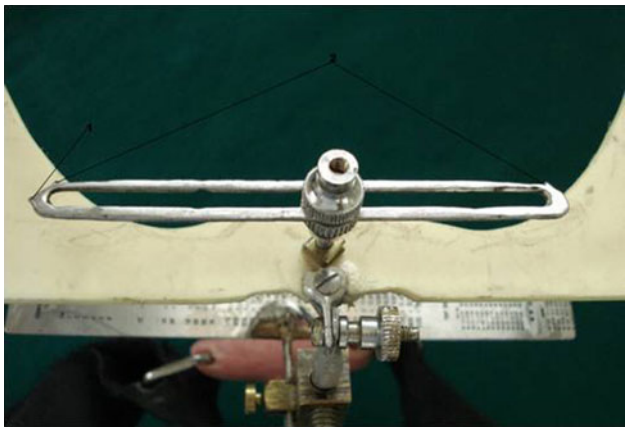

Fig. 2 Plane marker having three small projections

Guideline for Using the Device

Make the patient sit in an upright position, looking straight ahead with Ala-tragus line parallel to the floor. Place maxillary occlusion rim in patient's mouth and check for labial fullness and lip support. Position the occlusal plane

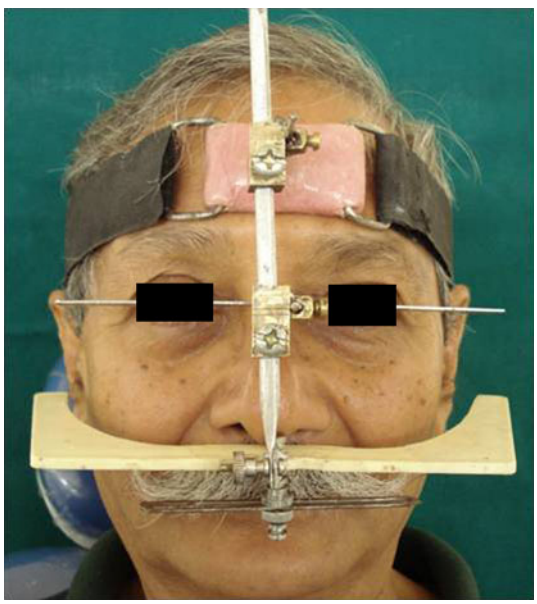

Fig. 3 Occlusal plane orientor on patient

Fig. 4 Plane marker positioned between the cheek and the occlusion rim

Fig. 5 Marking on occlusion rim

orientor, such that vertical rod passes through the mid line of face (Fig. 3). Using screws no. 1 and 2 lock vertical rod at the desired vertical and antero-posterior position respectively. Adjust and lock inter-pupillary line indicator parallel to the inter-pupillary line by using screws no. 3 and 4. Adjust plane marker vertically (up and down) at the desired level of visibility of anterior teeth using screw no. 6 and mark the anterior occlusal plane parallel to inter-pupillary line. To mark the posterior occlusal plane, adjust plane indicator parallel to Ala-tragus line using screw no. 5, which will bring plane marker automatically parallel to Ala-tragus line as both plane marker and plane indicator have common hinge joint. Now position the plane marker between the cheek and the occlusion rim and pulling it posteroanteriorly scribe a groove on maxillary occlusion rim parallel to Camper's line (Fig. 4). Remove the maxillary occlusion rim from patient's mouth and reduce it with a hot plate till the level of the marking made (Fig. 5).

In patients with a missing ear, occlusal plane is marked in the same way as previously described since the device will take opposite ear as reference for side with missing ear.

In patients with facial deformity or a missing eye, inter-pupillary line indicator is removed and vertical rod is placed on mid line of the face with plane indicator parallel to ala-tragus line. Then normal procedure is followed as described earlier.

Advantages

1. Simple to use.
2. Time saving—fox plane only checks parallelism but this instrument marks parallel line on the occlusal rim reducing number of adjustments required, thus reduces operator's manual work.
3. Less chances of human error.
4. Can be used in patients with facial deformity, absence of an eye and an ear.

Conclusion

Occlusal plane orientor is a simple device which marks occlusal plane parallel to the Camper's line on occlusion rim thereby reduces manual work for operator and decreases chances of human error. It is a simple, efficient and time saving appliance which accurately establishes the occlusal plane. Additionally, it is a useful tool for occlusal plane orientation on patients with facial deformity, absence of an eye or an ear.

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