SHORT COMMUNICATION

The accessory to ace Face bow records in clinical practice - Laser Levels assisted Face bow Records

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ABSTRACT

An accurate determination, recording and transfer of jaw relation records from patients to the articulator is essential for appropriate dental restoration function, facial appearance and maintenance of patient's oral health.[1] An unsatisfactory and inaccurate record of maxilla-mandibular relationship will eventually lead to failure of the restoration or prosthesis. Facebow plays an integral part of this maxilla-mandibular relationship transfer from the patient mouth to that of the articulator. The use of facebows is emphasized in prosthodontic textbooks and is widely taught in dental schools, but is still perceived as a complex procedure by most students.[2] This article attempts to discuss the utilization of a cross beam laser level as a simple accessory to simplify face bow use and to obtain a repeatable and reliable patient head position while recording jaw relations using face bows. The laser cross beam also serves the purpose of improving the accuracy and speed of making face bow records.

Keywords: Bite Registration; Facebow; Jaw Relation Records.

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INTRODUCTION

The thought of the construction of a structure like a house or a complex, a renovation or re-modelling project without accurate measurements or plans would seem unimaginable. Similarly, dental restorations and prosthesis cannot be precisely fabricated without accurate records. The arrangement of teeth in an appropriate 3D position is an important step in prosthodontic rehabilitation and specifically in the reconstruction of the anterior and posterior occlusal plane.[1,2] The maxillary arch has a definite 3D relationship to all condyle movements and should be positioned in space by reference points that meet optimal functional and esthetic goals.[3,4]

The facebow, as defined by the Glossary of Prosthodontic Terms, is an instrument used to record the spatial relationship of the maxillary arch to some anatomic reference point or points and then transfer this same relationship to the opening axis of the articulator.[5] An ideal facebow record transfers both functional and aesthetic components from the patient to the articulator. The 3D orientation of the maxillary arch in relation to the cranial base and the transverse horizontal axis of the mandible is transferred onto the articulator via the facebow record.

Most facebows were designed to transfer the maxillary arch relationship primarily to a repeatable mandibular axis. Thus, the hinge axis forms a major component of every masticatory movement of the mandible. It should be accurately captured and transferred to the articulator, so that it becomes a accurate representative of the patient and a biologically acceptable restoration is possible. The facebow enables an articulator to move or simulate according to movements of the mandible of the patient in eccentric motions which thereby allows the technician to develop the occlusal morphology or cuspal inclinations in eccentric motions so that there will be minimal range of adjustments required during prosthesis issue appointment. This is important especially in fixed (tooth- or implant-supported) restorations, as excessive trimming (chairside) during occlusal adjustments may expose the underlying metal or zirconia coping/substructure. The need for additional steps to polish or glaze the surface-porcelain of the fixed restorations also arises in such situations which may compromise the quality of the restoration due to exposure of the coping or perforation of the crown. The complete denture occlusion may not be so critical, rightly pointed out in existing literature.[10,11] Obtaining a standardized orientation of the head, referred to as NHP (natural head position), is

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achieved by focusing on a distant point.[6] This position has been used as early as the 1860's, when craniologists realized that skulls had to be oriented in a manner approximating the NHP of the living for craniometric studies.[8] The Frankfurt horizontal plane is the most commonly used cephalometric horizontal plane that is used to obtain the 3D orientation of the maxilla along with other anterior reference points. Thus, the natural head position has been used while recording jaw relations.

Factors affecting NHP:

Cranial posture is controlled by the neuromuscular systems that are influenced by normal functions such as mastication and respiration. A recent trend for research has been to focus on the possible role of extrinsic factors that are able to affect cranial posture in a manner that could be associated with aspects of specific malocclusions. In this regard, extension and flexion of the head away from the natural head position (NHP) have been observed to be associated with morphologic patterns.[7] Cleall demonstrated that cranial extension results when the tongue is deflected by the insertion of an intraoral appliance.[7] Cranial extension beyond the normal cranial position also occurs when full dentures are inserted in patients who are edentulous and when a trans-palatal bar is inserted as part of orthodontic treatment.[8] The appliances displace the tongue by intruding into the space of the oral cavity. In addition, the placement of full dentures tends to rotate the mandible in a clockwise direction along the horizontal plane. Thus, there could be changes in the NHP once the occlusal rims or bite fork are inserted into the patient's mouth resulting in errors of the perception of the horizontal plane, thereby producing inaccuracies in face bow records.
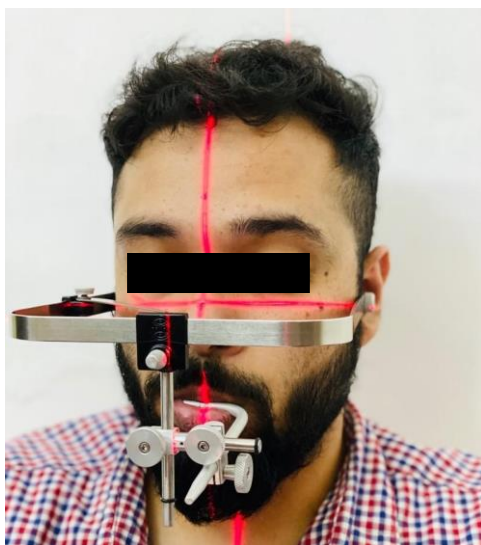
MATERIALS AND METHOD

Figure 1: The cross-beam laser projected over the patient's face while making a face bow record.

- Hanau™ Springbow - Whip Mix facebow
- Bosch GLL 2X Professional Self Levelling Crossline Laser.
- A tripod or a flat surface on which the laser device may be kept.
- Temporary marker (any colour different from the colour of the laser beam)

Before we begin the jaw relation procedure, the patient is asked to be comfortably seated in the chair. They are then provided with a mirror and asked to position their head and look straight at a point on the opposite wall or surface such that their interpupillary line is parallel to the ground level. The patient may then be provided with protective eye wear. The cross-beam laser level from the self-leveling laser device is then projected onto the patients face such that the vertical cross beam is in line with the patient's face (midline) and is perpendicular to the floor (this also helps in determining a deviation in the facial and dental midline, or facial asymmetry)

Figure 2.1: A temporary marker being used to draw dots in line with the laser beam.

and the horizontal beam of the laser cross beam is parallel to the floor or the horizontal axis (like interpupillary line).(*Fig.1*) The self levelling property of this device aids in obtaining parallelism. Once the beam is positioned, distinct dots are marked over the patient's face that coincide with the laser beams.(*Fig 2.1, Fig 2.2*) This helps us to bring the patient back to the original correct Head position every time throughout the jaw relation procedure.

The laser cross beam also acts as an excellent guide while positioning the parts of the face bow on the patient. The laser crossbeam can be turned off when not required or during the facebow assembly. The bite fork is placed in line with the midline. The remaining components of the facebow are then assembled. The horizontal laser beam allows us to visually perceive a cant in the occlusal plane or in the U-frame (*Fig 3*).
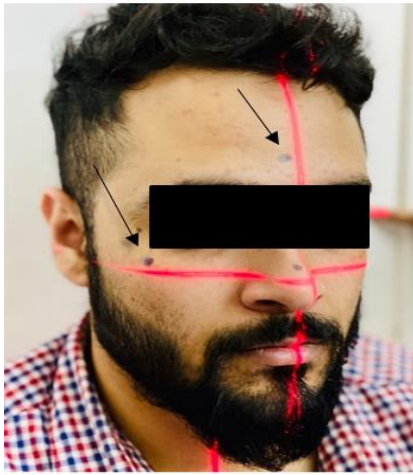
Figure 2.2: Arrows indicate the deviation of the points from the laser beam when there is a change in the patient's head position or posture.
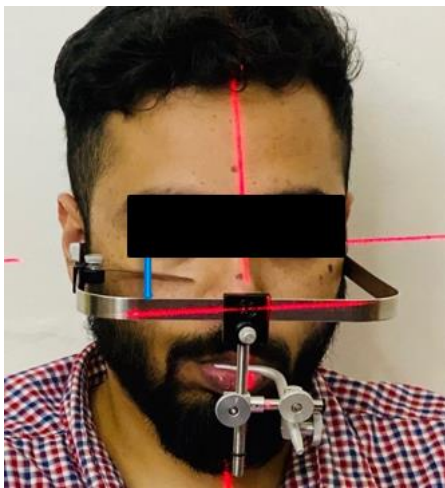

Figure 3: Arrow indicates that the U-frame isn't parallel with the horizontal laser beam. This provides a visual representation of the degree of cant..

Figure 4: U-frame and the transverse rod parallel with the horizontal laser beam, and the transfer rod parallel to the vertical laser beam.

This visual representation is crucial as it usually provides a room for error as the degree of cant perceived by different individuals can vary. This laser beam accessory eliminates the room for this error and makes the process less time consuming and accurate.

Also, the crossbeam can act as a visual guide to accurately tighten the thumbscrews of the transfer assembly in the right clamp position (*Fig 4*)

DISCUSSION & CONCLUSION

The use of laser crossbeam level along with the facebow is a simple technique that could be used while recording orientation jaw relation records in day to day practice. It allows easy visualization of the extraoral anatomical landmarks in relation to the facebow parts. It also allows the operator to be able to guide the patient to a desirable and repeatable natural head position. This technique is cost effective, easy to learn and incorporate in routine clinical practice and eliminates room for error. This method also does not add to the weight of the existing parts of the facebow and does not require customization of the facebow parts. The laser crossbeam level can also find other applications like dental photography – patient positioning for extraoral or portrait images or for positioning of casts while mounting on articulators.

CONFLICT OF INTEREST

There is no conflict of interest

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