

# FACE BOW TRANSFER, IS IT NECESSARY IN PROSTHODONTICS – A CRITICAL REVIEW

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## Abstract:

*It has been accepted for the past many decades that an anatomically related anterior reference point is required during a face-bow transfer. Many anterior reference points have been advocated by different researchers. This paper explores several articles including systematic reviews and clinical trials regarding different concepts of face bow and came to the conclusion that the literature search failed to draw up evidence from controlled trials that there is any benefit from locating an anatomically related anterior reference point during face bow transfer in complete denture. And face bow transfer itself is the waste of time and manpower in complete denture construction.*

**Key words:** Facebow, Anterior reference point, plane of reference

## Introduction

In prosthodontics, while we attempt to restore or replace missing teeth, it becomes imperative to mount patients maxillomandibular relation on an articulator with maxillary and mandibular casts, oriented to the hinge axis, for laboratory procedures. Facebow is a caliper-like instrument

used to record the spatial relationship of the maxillary arch to some anatomic reference point or points and then transfer this relationship to an articulator.<sup>1</sup> This requires the use of two posterior points and an anterior point of reference for orienting a maxillary cast to an articulator.<sup>2</sup>

Maxilla is a part of the cranium and is a fixed entity. When the teeth of both jaws come in contact, maxilla becomes related to the mandible so that entire craniomaxillary complex is articulated with a moving bone, which is the mandible. The opening movement to bring the jaw from occlusal to rest position is almost a pure hinge movement. Here the mandible moves in an arc of a circle with a definite radius from the temporomandibular joint. This path of the condyle is determined by the curvature of the condylar head and the curvature of glenoid fossa.<sup>3</sup> Since the radius is not constant for all the patients, it has to be determined for every individual patient. Similarly the relationship of upper jaw to the lower jaw and the anatomy of maxilla and the temporomandibular joint varies from one individual to the other. Thus, recording of the orientation jaw relationship is considered to be very important, which is done with the help of facebow record.<sup>4</sup>

An anterior reference point is a physical requirement

for orienting casts in the three dimensional space in an articulator.<sup>5</sup> Many researchers advocated that improper positioning of the casts in an articulator may result in an inadequate restoration with an undesirable appearance and cause damage to the supporting structures.<sup>6</sup> It is commonly seen in general practice, that we avoid using a facebow transfer with third point of reference and mount the cast in average values especially in complete denture fabrication.<sup>7</sup>

Zarb Bolender stated that "The success of dental treatment involves many factors and the use of facebow is not an essential one."<sup>8</sup> So we conducted a literature review to find the significance of facebow transfer in complete denture fabrication.

## Aim

- To find out what is the need of an anterior reference point
- To understand whether there is any significance in this anterior reference point and face bow transfer

Logan considered the use of face bow indispensable. He said that facebow is very important in obtaining maxillary orientation.<sup>9</sup> But Craddock and Symmons considered it as futile exercise. They utilized both maxillomandibular relation and found that face bow transfer was just waste of time and money and discomfort for the patient. They said it was very time consuming and tiring for the dentist also.<sup>10</sup> Later Stansbery said that it is only a technique to position the records and told that use of face bow was useless.<sup>11</sup>

## Results from clinical researches

In 1969 a 20 year follow up study was conducted by Hickey et al in Kentucky College of Dentistry in which they utilized 64 patients. They divided the patients into two groups of 32 each. One group which received complete denture with facebow transfer and the other without facebow

transfer. They compared the difference between both the groups in all aspects including patient satisfaction and acceptance. They found no difference in retention, stability, ridge resorption or even centric occlusion.<sup>12</sup> Weinberg in another study concluded that as the plane of occlusion is elevated the condylar angle decreases, and the vice versa. In this manner we can change the orientation of maxillary and mandibular cast and hence facebow is not essential. Only small degree of error at the balancing cusp incline was seen which was negligible.<sup>13</sup> Ercoli et al supported Weinberg stating that any change in the inclination of maxillary cast on the sagittal plane will have no effect as far as inclination of the condylar path is also modified for the same angle and that reference planes were not needed for correct mounting of stone casts.<sup>14</sup> Bailey and Nowlin studied on two different 3rd reference points, the middle groove on Incisal guide pin and Orbitale. They concluded that both gave comparable results in positioning the maxilla and obtaining proper occlusion.<sup>15</sup>

A change of height in the mounting of the casts when a facebow transfer is used will not alter the relation of the casts to the condylar inclination.<sup>16</sup> In 1968, Gonzalez and Kingery used cephalometric radiographs of denture patients to evaluate the planes of reference used by dentists when transferring the maxillary cast to the articulator. They found that the relationships of the planes of reference on the patient were not maintained once transferred to the articulator and that the average perpendicular distance from the axis to Frankfort Horizontal plane was 7.1mm.<sup>17</sup> In 1985, Zuckerman discussed the downfalls of using a facebow to articulate maxillary casts when the patient has an asymmetrical orientation in the horizontal and vertical plane of orientation relative to their vertical cranial posture. This can lead to misinterpretations by the lab technician leading to skewed midlines and cants in the occlusal plane. He goes on to say that, "Until an instrument that can adjust to all the anatomic

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hinge axis asymmetries becomes available, it is more appropriate to use a method other than the facebow to record the orientation of the maxillary cast,"<sup>18</sup>. Nascimento et al said that balanced occlusion can be achieved even without facebow transfer. They observed better patient satisfaction and greater number of occlusal contacts in centric relation and left lateral movements without using facebow.<sup>19</sup> Study by Kawai et al got similar results when they conducted a randomized control trial with 122 patients. They randomly divided the patients into two groups, one group which received complete denture with facebow transfer and another without facebow transfer. They found no significant difference in patient satisfaction or quality of the denture produced by both the methods.<sup>20</sup> They also concluded that the method without facebow transfer reduced the laboratory cost and clinician's time.<sup>21</sup>

Hartmann R et al and Pitchford found an alternative method to avoid the use of facebow. Pitchford found that in the esthetic reference plane (ERP), the orbitale was 18.5 mm higher than the axis and 11.4 mm higher than the porion. Soto duplicate the vertical position of the maxillary cast in esthetic reference plane, the incisal edges of maxillary incisor teeth should be 36 mm below the condylar plane of the articulator.<sup>22</sup> Hartmann R et al compared both face bow and jig method They concluded that the universal 15 degree mounting jig showed statistically equal results to that of face-bow in complete denture patients.<sup>23</sup>

## Does recent studies support use of face bow?

Recently Kumar and D'souza did a clinical trial using 20 patients who had normal ridge and class I relation. All of them received two sets of denture, one set made with face bow transfer and the other without face bow transfer. They found that there was no significant change between both the dentures and patient were more comfortable

with the denture which was made without face bow transfer.<sup>24</sup> In a pilot study done by Turp CJ et al to evaluate whether an arbitrary face bow registration and transfer provides significant advantages in fabrication of complete denture and occlusal appliance, they could find no clinically relevant benefits with the use of face bow in the fabrication of complete denture.<sup>25</sup> Keith Yohn got similar results showing no evidence to suggest that using a face bow transfer improved the results in terms of patient's speech, the fit and comfort of the prostheses, ridge morphology, facial contours, the color of the teeth and denture bases, and the psychological aspects the arrangement of the artificial teeth, chewing efficiency, and stability, of complete denture patients.<sup>26</sup>

## What Does Systematic Reviews Say?

One of the systematic review which studied randomized control trials alone, found that there is no clinically significant difference, by using and without using face bow for complete denture fabrication.<sup>27</sup> Four other systematic reviews also got similar results. They evaluated the influence of face bow transfer and occlusal concept on general satisfaction, comfort, ability to speak, stability, esthetics, ease of cleaning, and ability to chew and came to a conclusion that chewing ability was rated more favourable for complete denture without face bow transfer.<sup>28, 29, 30, 31</sup> Recent systematic review by Khan et al found that the face bow fails to demonstrate its utility in the fabrication of complete dentures and occlusal splints. They also said that thus, there is no evidence to continue its use in the dental practice and teaching in terms of complete denture fabrication.<sup>32</sup>

"But its use in fixed prosthesis was supported in systematic reviews and need to be studied further before making a conclusion regarding the application in fixed prosthodontics."

## Conclusion

It is the duty of the prosthodontist to give good quality dentures for the patients within the available constraints of time and manpower. There is no evidence from controlled trials, of any benefit from locating an anatomically related anterior reference point during face-bow transfer. And also there is no evidence showing that face bow transfer will help us to provide such a denture for the patient. Hanau has stated that "By Realeff at various stages of complete denture construction we can achieve better stable dentures." The authors suggest to study the possible influence of Realeff in making facebow transfer insignificant in complete denture.<sup>33</sup> So it is high time to think whether facebow transfer is necessary in complete denture prosthodontics

## References

- Glossary of Prosthodontic terms. J Prosthet Dent 2003; 94:10 - 92.
- Bailey JO Jr, Nowlin TP. Evaluation of third point of reference for mounting maxillary casts on Hanau articulator. J Prosthet Dent 1984; 51:199-200.
- Pichford JH. A re-evaluation of the axis orbital plane and the use of orbital in face-bow transfer record. J Prosthet Dent 1991;66:349-55.
- Weinberg LA. An evaluation of the face bow mounting. J Prosthet Dent 1961;11:32-42.
- Christensen RL. Rationale of the facebow in maxillary cast mounting. J Prosthet Dent 1959;9:388-93.
- Krueger GE, Schneider RL. A plane of orientation with an extracranial anterior point of reference. J Prosthet Dent 1986; 56:56-60.
- Pitchford JH. A reevaluation of the axis-orbital plane and the use of orbitale in a facebow transfer record. J Prosthet Dent. 1991 Sep; 66(3):349-55.
- Prosthodontic treatment for edentulous patients. Zarb Bolender, 12th edition
- Logan J. G.: Indispensability of the Face-Bow. D. Digest 32:537-542 1926
- Evaluation of the face-bow, F. W. Craddock, B. Journal of Prosthetic dentistry 1953.
- Stansbery, C. J.: Futility of the Face-Bow. J.A.D.A. 15:1467-1471. 1928
- Hickey JC, Henderson D, Straus R. Patient response to variations in denture technique, part I: design of a study. J Prosthet Dent. 1969;22(2): 158-170.
- Weinberg LA. An evaluation of the face-bow mounting. J Prosthet Dent 1961;11:32-42.
- Ercoli C, Graser GN, Tallents RH, Galindo D. Facebow record without a third point of reference: Theoretical considerations and an alternative technique. J Prosthet Dent 1999;82:237-41.
- Bailey JO Jr, Nowlin TP. Evaluation of the third point of reference for mounting maxillary casts on the Hanau articulator. J Prosthet Dent 1984;51:199-201.
- Trapozzano, V. (1965). Complete dentures - laws of articulation. J Prosthet Dent, 13(1), 34-44
- Gonzalez, H., & Kingery, R. (1968). Evaluation of planes of reference for orienting maxillary casts on articulators. JADA, 76(Feb), 329-337.
- Zuckerman, G (1985). Practical considerations for using the face-bow for complete denture prosthodontics. J Prosthet Dent, 53, 2, 219-221
- Nascimento DF, Patto RB, Marchini L, da Cunha VP. Double-blind study for evaluation of complete dentures made by two techniques with and without facebow. Braz J Oral Sci 2004;3:439-45.
- Kawai Y, Murakami H, Shariati B, Klemetti E, Blomfield JV, Billette L, et al. Do traditional techniques produce better conventional complete dentures than simplified techniques? J Dent 2005;33:659-68
- Kawai Y, Murakami H, Takanashi Y, Lund JP, Feine JS. Efficient resource use in simplified complete denture fabrication. J Prosthet Dent 2010;19:512-6.
- Pitchford JH. A reevaluation of the axis – orbital plane and the use of orbitale in a face-bow transfer record. J Prosthet Dent 1991;66:349-55.
- Evaluation of Alternative Dispositives to the Face-Bow For Mounting Casts in Semi-Adjustable Articulator. Roberto HARTMANN. Rev Odontol Bras Central 2013;21(60)
- Kumar M, D'Souza DS. Comparative evaluation of two techniques in achieving balance occlusion in complete dentures. MJAFI. 2010;66(4):362-366
- Evaluation of alternative dispositives to the face bow for mounting cast in semiadjustable articulators SS Rocha, HL de Souza, RSL Junior - Revista Odontológica do 2013
- The face bow is irrelevant for making prostheses and planning orthognathic surgery. Keith Yohn, DDS, MS. JADA 2016
- The face bow is irrelevant for making prostheses and planning orthognathic surgery. Keith Yohn, DDS, MS. JADA 2016
- Heydecke G, Akkad AS, Wolkewitz M, Vogeler M, a randomised crossover trial: Lingualised vs. First premolar/ canine-guided occlusion for complete dentures. Gerodontology 2007;24:77-86.

29. Heydecke G, Vogeler M, Wolkewitz M, Türp JC, Strub JR. Simplified versus comprehensive fabrication of complete dentures: Patient ratings of denture satisfaction from a randomized crossover trial. *Quintessence Int* 2008;39:107-16.
30. Cunha TR, Della Vecchia MP, Regis RR, Ribeiro AB, Muglia VA, Mestriner W Jr., et al. A randomised trial on simplified and conventional methods for complete denture fabrication: Masticatory performance and ability. *J Dent* 2013;41:133-42.
31. Omar R, Al-Tarakemah Y, Akbar J, Al-Awadhi S, Behbehani Y, Lamontagne P, et al. Influence of procedural variations during the laboratory phase of complete denture fabrication on patient satisfaction and denture quality. *J Dent* 2013;41:852-60.
32. Utility of Facebow in the Fabrication of Complete Dentures, Occlusal Splints and Full Arch Fixed Dental Prostheses: A Systematic Review. Farhan Raza Khan, 2018 *Indian Journal of Dental Research*
33. Jain R et al. Realeff- Relevance in complete denture. *ISSN*, vol 1 issue 4 Dec 2012