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The Use of Facebow in Complete Denture Construction: A Review

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Authors' contributions

This work was carried out in collaboration among all authors. Authors PLB and GSO conceived the study and guided the research. The authors JPD, PLB, PTPM, MSA and AESS wrote the manuscript, interpreted and tabulated the results. Authors DCAF and GFP translated the article. Author FDMA placed the study within the magazine's standards. All authors read and approved the final manuscript.

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Review Article

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ABSTRACT

Introduction: The use of face bow (FB) has become an essential tool for professionals seeking to transfer patient information to the semi-adjustable articulator (SAA). However, its use for the fabrication of conventional complete dentures (CD) has come to be questioned.
Objective: This literature review aims to evaluate the need for FB in CD manufacturing, in relation to the precision and quality of the prosthesis.
Methodology: The survey for this study was carried out in the websites electronic databases: Medline, Scielo, Cochrane and Scopus. Articles published in the last 15 years, from january 2009 to january 2024 were included; Articles written in Portuguese and/or English; Controlled and/or randomized clinical trials; Articles that carried out comparisons of conventional complete dentures manufactured with or without the use of FB; Articles that evaluate the efficiency of the FB in different prosthetic procedures; Studies that did not evaluate the need for using FB in the manufacture of CD were excluded; Duplicate studies. 6 articles were selected to form this study.
Results and Discussion: No significant differences were found with the use of the FB, even in simplified methods for creating CD. Studies reported that the use of FB is indifferent to the quality of the prosthesis manufactured. Furthermore, not using the FB reduces treatment time and minimizes errors due to the reduction in the number of clinical steps.
Conclusions: It is concluded that there are no significant differences between CD fabricated with or without the use of FB, and that both techniques reported equally satisfactory results, however, more in-depth clinical and laboratory studies on the subject are needed to ensure greater scientific evidence on this topic.

Keywords: Face bow; dentures complete; full mouth rehabilitation.

1. INTRODUCTION

Complete edentulism is one of the main health problems in the world [1,2,3]. Edentulous individuals are often associated with reduced masticatory efficiency, poor speech and compromised aesthetics not only affecting the intraoral but also extraoral presentation. These problems can affect the individual psychologically leading to apparent social disorders and functional disability. Although the literature reports a decline in the prevalence of this condition in developed countries, there are still patients who require oral rehabilitation treatment [1,4,5]. CD have their historical importance for edentulous patients, enabling an aesthetic, functional and socially acceptable restoration [6,7,8,9]. Some patients treated with CD also report improvements in their general health [6,10].

Many patients cannot undergo surgical procedures associated with prostheses (implant-retained) due to the cost and duration of treatment, as well as increased morbidity [1,11]. Therefore, CD remains one of the most viable and recommended rehabilitation modalities for most cases of complete edentulism [1,11,12]. Conventional methods for manufacturing CD include SAA assembly using a FB [12,13,14]. However, some professionals question whether for the construction of CD, certain procedures such as the use of FB can be omitted without affecting patient satisfaction or the quality of the prosthesis [6].

The FB is an important tool used to record the relationship of the maxillary arch with some specific anatomical reference points, helping to transfer this relationship to an articulator. Therefore, this procedure ensures that the upper dental arch model is oriented at an analogous or comparable distance to the articulator hinges [15].

Nonetheless, the variation in clinical opinions about the best technique for manufacturing CD, combined with the low number of comparative studies on the effectiveness of different approaches, raises doubts among professionals in the field [16,17,18]. Specifically, there is little scientific evidence that a more complex technique, including FB transfer, results in a better clinical outcome than a simpler technique [6,19]. In this sense, some authors question standardized procedures in the manufacture of CD, such as the use of FB, as a fundamental step for successful rehabilitation [20,21,22].

Therefore, this literature review aims to evaluate the need for FB in CD manufacturing, in relation to the precision and quality of the prosthesis [23].

2. METHODOLOGY

2.1 Study Selection

The present study is a literature review whose bibliographical survey was carried out in the websites electronic databases: Medline, Scielo, Cochrane, Scopus and Lilacs. In these, to select the articles, the English descriptors “Face Bow” AND “Denture, Complete”, “Face Bow” AND “Mouth Rehabilitation” and “Denture, Complete” AND “Mouth Rehabilitation” were crossed. The articles found were selected based on the analysis of the titles and abstracts, complying with the following inclusion and exclusion criteria:

2.2 Inclusion Criteria

(i) Articles published in the last 15 years, from january 2009 to january 2024;
(ii) Articles written in Portuguese and/or English;
(iii) Controlled and/or randomized clinical trials;
(iv) Articles that carried out comparisons of conventional complete dentures manufactured with or without the use of FB;
(v) Articles that evaluate the efficiency of the FB in different prosthetic procedures;

2.3 Exclusion Criteria

(i) Studies that do not evaluate the need to use FB in the fabrication of CD;
(ii) Duplicate studies;

3. RESULTS AND DISCUSSION

This literature review was carried out from 6 studies. Fig. 1 shows the number of studies found, based on the use of the previously mentioned descriptors and selection criteria, where stages (A) represent the stage in which the analysis of the titles was carried out, (B) the application of the inclusion and exclusion criteria and (C) the final selection, after reading the articles selected in the previous stage. Regarding the selected studies, their main results are described in Table 1.

Based on these results, the current reduced number of studies that worked on the perspective of comparing the fabrication of CD with or without the use of FB is notable, in which only 6 were found. The results will be discussed below, evaluating points of consensus and discrepancies in the academic community.

When comparing the different methods for making complete dentures in terms of performance and chewing ability over 3 months, and with one of the differences being the use or not of FB, both groups presented similar masticatory performance and only the “eating well” item had a significant preference for the simplified method group. Both methods are similar at a physiological level and in terms of the patient's perception [1].

Furthermore, no considerable discrepancy was found regarding the reliability of the FB when compared to an average configuration given by the Bonwill triangle and the Balkwill angle when transferring from CD to SAA in normosystemic patients with adequate occlusion [19]. Moreover, another study also found similar findings, where it was found that there were no significant differences in patients’ satisfaction or quality assessments of prostheses manufactured using the standard protocol compared to three simplified variations, in which one of them omitted the assembly of the FB [6]. However, even from the patients' perspective, discrepancies can be seen based on the results of a study that investigated comfort and behavior during speaking and chewing after rehabilitation with and without the use of FB. A scale was applied to each patient, after using the two techniques, which contained the following alternatives: “Poor”, “Satisfactory” and “Very good”, the authors respectively obtained the following results: 0, 30 and 70% for the technique without FB, while that with the use of this device presented results of 25, 30 and 40% for the same scale [24].

With regard to the impact on the quality of CD, it was found that even if bilateral balanced occlusion is obtained with both methods, avoiding the use of FB can directly and positively influence their quality. The results demonstrated that, when comparing the numbers of occlusal contacts of the 2 techniques, the simplified alternative using a medium value articulator (Stratos 100, Ivoclar, Liechteinstein) was superior for all and with significant values for 50% of the tests (in relation to centric movement, right and left laterality and protrusion movements). Therefore, these average recordings performed without FB can contribute to obtaining a more balanced occlusion and, consequently, assist in the manufacture of CD with better fit, stability, comfort and aesthetics [24].

Besides, when considering the clinical and economic aspects, there is a concern about the effectiveness and costs associated with the use of FB. Although some studies emphasize the clinical benefits provided by FB, it was observed that a simplified method for the complete construction of the dental prosthesis can restore masticatory function at least as well as the conventional protocol clinically and for the patient [1]. Another research, which addressed the analysis and quantification of cost-benefit in the manufacture of CD, obtained values of up to 34.9% financially lower for the simplified method in relation to the conventional method, which proved to be more costly for completely edentulous patients. In addition to evidence the significant disparity in the clinical times required to perform conventional (more clinical time) and simplified (less clinical time) techniques for both the dentist and the assistant, with the average difference between the two techniques being 111.3 minutes for the dentist and 15.1 minutes for the assistant [13].

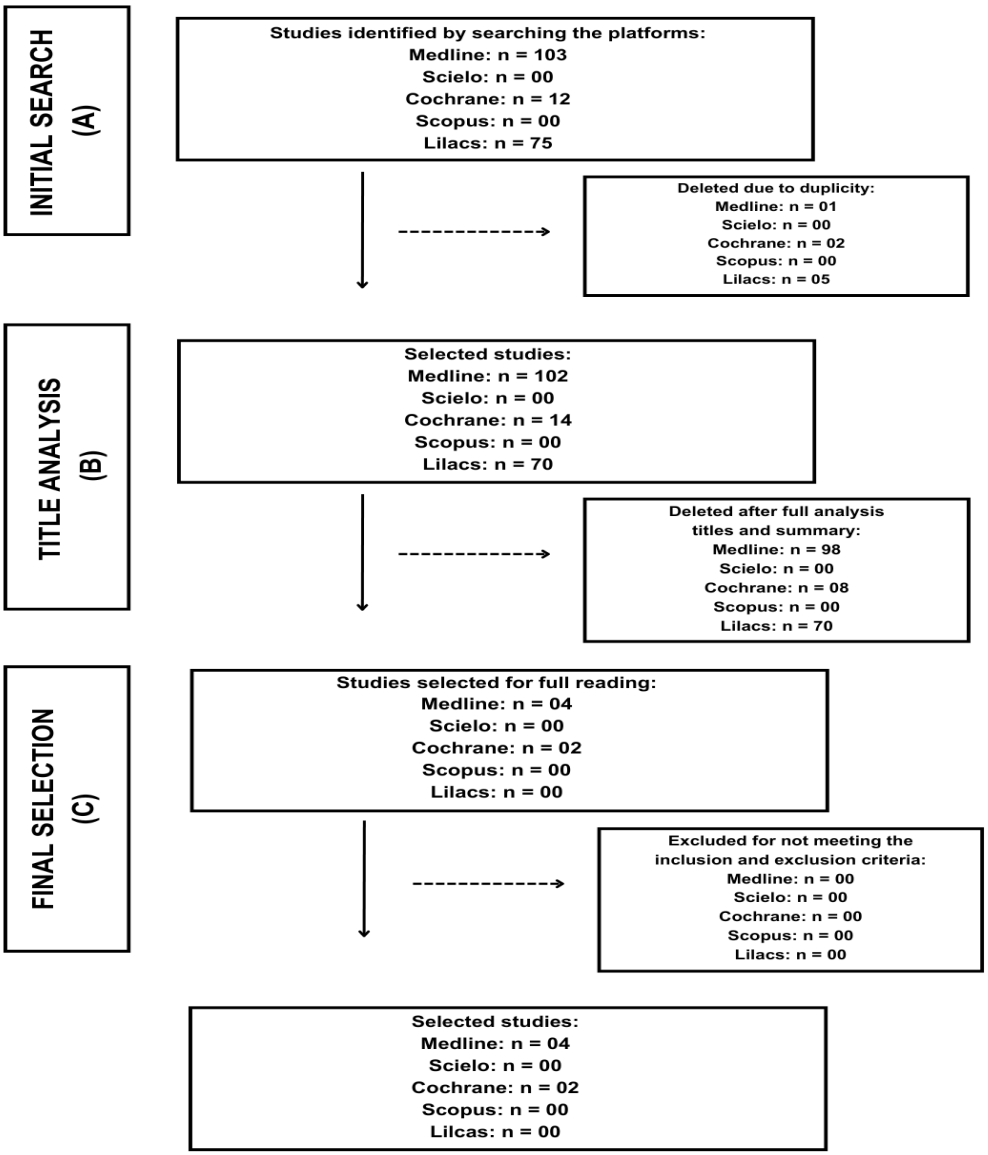

Fig. 1. Search for studies, selection and inclusion of articles

Table 1. Description of selected studies (title, author, objective and conclusions)

Title	Author/year	Objective	Results
Does a face-bow lead to better occlusion in complete dentures? A randomized controlled trial: part I.	Von stein-Lausnitz et al. (2017)	To evaluate the impact of face-bow registration on the reassembly of conventional complete dentures.	No substantial difference in the use of the face-bow compared to an average configuration, in a total denture refitting procedure.
Comparative Evaluation of Two Techniques in Achieving Balanced Occlusion in Complete Dentures.	Kumar et al. 2010	To compare complete dentures made using two techniques: with the use of a face-bow and without the use of a face-bow, in dentures with balanced bilateral occlusion.	The technique without the face-bow showed better results in terms of length of stay, esthetics, comfort and stability. Balanced occlusion was achieved for both techniques.
Comparative Evaluation of Two Techniques in Achieving Balanced Occlusion in Complete Dentures.	Cunha et al. 2013	To compare a simplified method with a conventional protocol for making complete dentures, in terms of performance and masticatory capacity.	The simplified method is able to restore masticatory function to a level comparable to a conventional protocol, both physiologically and according to the patient's perception.
Influence of procedural variations during the laboratory phase of complete denture fabrication on patient satisfaction and denture quality.	Omar et al. 2013	To compare the subjective and objective results of complete dentures made using standard and simplified clinical protocols.	There were no significant differences in patient satisfaction or prosthesis quality between the two methods.
A randomized trial on simplified and conventional methods for complete denture fabrication: cost analysis.	Vecchia et al. 2013	To quantify the costs of making complete dentures using a simplified method compared to a conventional protocol.	The cost of the prosthesis was 34.9% lower for the simplified method.
Influence of a face-bow on oral health-related quality of life after changing the vertical dimension in the articulator: a randomized controlled trial. Part II.	Von stein-Lausnitz et al. (2017)	To assess the impact on quality of life following the use of full dentures reassembled using the face-bow.	The use of average values in CD reassembly is valuable. The face-bow was not perceived as superior.

Based on what was discussed, it is important to consider that studies may vary in relation to their methodology used to evaluate the effectiveness of the FB. These methodological variations can lead to different interpretations of the results and make comparisons between studies difficult. Some studies emphasized specific aspects of oral rehabilitation, such as achieving a balanced and functional occlusion [13], while others addressed a broader range of clinical outcomes and patient satisfaction [1,6,13,24]. These differences in emphasis may result in different conclusions about the effectiveness of FB in oral rehabilitation. Beyond that, due the few articles found, the continued need for research and debate in the area it's remarkable, aiming to improve clinical practices for dentists and to improve results for patients.

4. CONCLUSION

Therefore, the data presented in this review allow us to conclude that the use of the FB does not result in major differences in the construction of CD and that simplified methods can be as effective as traditional ones. Furthermore, studies highlighted a reduction in costs and clinical working time, by applying simplified methods, enabling treatment that is more accessible to the patient and advantageous to

the dentist, producing prostheses with the same clinical effectiveness. More randomized clinical studies are needed to evaluate the use of FB in the creation of CD.

DISCLAIMER (ARTIFICIAL INTELLIGENCE)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of manuscripts.

CONSENT AND ETHICAL APPROVAL

It is not applicable.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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