

Occlusal schemes for complete dentures

Abstracted from

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Bilateral balanced occlusion compared to other occlusal schemes in complete dentures:

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Question: Is bilateral balanced occlusion a more effective design for conventional dentures?

Data sources Medline, Scopus and Cochrane Library databases supplemented by searches in the journals; *American Journal of Dentistry*, *Clinical Oral Investigation*, *International Journal of Prosthodontics*, *Journal of Dental Research*, *Journal of Oral Rehabilitation*, *Journal of Prosthodontics*, *Journal of Prosthodontic Research*, *Journal of Advanced Prosthodontics* and *Journal of Prosthetic Dentistry*.

Study selection Randomised controlled trials (RCTs) or prospective studies comparing bilateral balanced occlusion (BBO) with other schemes, eg lingual occlusion (LO) canine guidance (CG) and neutral-centric or zero-degree (ZD).

Data extraction and synthesis One reviewer extracted the data and two reviewers assessed risk of bias using the Newcastle-Ottawa scale for non-randomised studies and the Cochrane risk of bias tool for RCTs. A narrative summary of the findings was presented.

Results Seventeen studies, 11 RCTs and six prospective studies involving a total of 492 were included. Average follow-up period was 2.96 months (range 1-6 months). Six RCTs were considered to be at low risk of bias, two at unclear risk and three at high risk. Studies compared BBO with LO, CG and ZD. Twelve out of 16 studies reported on quality of life and patients' satisfaction.

Conclusions The present systematic review indicated that BBO does not confer better quality of life/satisfaction or masticatory performance and muscle activity. Thus, lingualised occlusion can be considered a predictable occlusal scheme for complete dentures in terms of quality of life/satisfaction and masticatory performance, while canine guidance can be used to reduce muscular activity.

Commentary

Complete dentures, or prostheses, are commonly used in the rehabilitation of edentulous patients. Apart from maintaining oral health and function, they can also maintain aesthetics and also the patients' psychological well-being. In the construction of complete dentures, there are different designs and patient factors to consider in order to achieve a comfortable fit for the patient, one of which is the occlusal scheme of the complete removable dentures.

This systematic review drew out a largely clear PICO question. It aimed to compare bilateral balanced occlusion (BBO) with other occlusal schemes, namely lingualised occlusion (LO), canine guidance (CG) and zero-degree occlusion (ZD). The occlusal schemes are compared based on their conferred quality of life or satisfaction as the primary outcome, while mastication performance and muscle activity were assessed as secondary outcomes. It was wise for the authors to separate these outcomes as there might not be a correlation between the clinical features of the dentures and patients' satisfaction with them.¹ However, quality of life might not be synonymous with satisfaction despite both being listed as the primary outcome.

The review's search strategy involved articles published on or before October 2017 from multiple commonly used databases as well as several widely recognised prosthodontic journals. The authors' reported search strategy was brief and might not be comprehensive as articles referring to dentures as 'prostheses' may not have been identified. There was also no grey literature search reported in the review which is perhaps a limitation of this review.

Seventeen articles were eventually chosen for this systematic review, which consisted of 11 randomised controlled trials (RCTs) and six prospective studies. Prospective studies are not frequently used in systematic reviews due to their possible selection bias. However, in this review, the authors justify this due to the lack of randomised control trials published on this topic, and is in line with guidance in the Cochrane handbook.² In the absence of RCTs, inclusion of observational studies has been reported to increase precision and validity of results.³ Most of the selected studies were assessed to be of low risk of bias. However, there was a high degree of heterogeneity among the included studies which justifies the authors' decision to undertake a narrative synthesis of the results rather than meta-analysis.

The results were briefly summarised in two short paragraphs and were further expanded upon in the discussion section. The results indicated that BBO produced no difference in quality of life and satisfaction but in some cases showed a negative effect on masticatory

performance and muscle activity compared to LO and CG. The results for each of the included studies were further presented in two tables, summarising the general results and conclusions from each study. However, the studies each have significant differences how the outcome data were presented, making it challenging for the reader to draw comparisons from the data themselves.

The outcomes were evaluated with a wide variety of methods across the included studies. Interestingly, the analysis of masticatory performance included numerous methods of questionable relevance to the denture's function or patient acceptance. For example, maximum occlusal force (MOF) arguably has little relevance to masticatory performance based on our clinical understanding of mastication. Furthermore, occlusal schemes primarily differ in how they contribute to denture stability in eccentric contacts while MOF is likely to occur in an intercuspal position. One report used a sieving method involving the weight of peanuts after chewing. These types of data are of questionable relevance to patients and are difficult, if not impossible, to directly compare with other means of measuring masticatory performance in a systematic review.

While discussing the studies' limitations, the authors recommended a three-month period for patients to adapt to new dentures to more accurately assess for masticatory efficiency and satisfaction. The three-month period is reported to result in a reduction in mandibular pain and better fit of the mandibular full denture.⁴ This period also allows for the neuromuscular system to adapt to new dentures, hence allowing for more accurate assessment of quality of life or masticatory function when completed after this time has elapsed.⁵ By that recommendation, at least four out of the eight included studies did not meet the minimum threshold, and their inclusion in this review may have had an impact on the findings of this review.

Quoting the authors, 'these results should be interpreted with care, because many factors can influence the final (clinical) results.'

We generally agree with the conclusion drawn that BBO does not offer a significant clinical advantage over other occlusal schemes in terms of quality of life or satisfaction and mastication performance and muscle activity. However, further research is required to improve on the quality of primary research used in this field including the standardisation of intervention and comparators, the inclusion of a suitable number of participants and the appropriate selection and measurement of relevant outcomes.

The results from this review were insufficient for us to draw meaningful conclusions to change clinical practice. Furthermore, from clinical experience, occlusion schemes can be considered one of many aspects that contribute to making an acceptable prosthesis. Investigating different occlusal schemes and their resulting changes to quality of life and satisfaction is difficult due to the numerous factors at play such as anatomy and patient expectations.^{6,7}

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