

REVIEW ANALYSIS & EVALUATION

CANINE-GUIDE OCCLUSION AND GROUP FUNCTION OCCLUSION ARE EQUALLY ACCEPTABLE WHEN RESTORING THE DENTITION

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What is the influence of the lateral occlusion scheme on patient comfort, masticatory system physiology, and prosthesis longevity?

ARTICLE TITLE AND BIBLIOGRAPHIC INFORMATION

Impact of lateral occlusion schemes: A systematic review. Abduo J, Tennant M. J Prosthet Dent 2015;114(2):193-204

SUMMARY

A literature search through PubMed (MEDLINE), Google Scholar, and Cochrane Central Registrar of Controlled Trials, up to January 2014 was done to retrieve comparative studies and clinical outcome studies. The inclusion criteria were peer-reviewed human clinical studies published in English. The search was further supplemented by manual searching through the reference lists of the selected studies. The initial search revealed a total of 680 studies; however, after applying the inclusion criteria, 26 studies were found suitable for the analysis (13 comparative studies [group 1] and 13 clinical outcome studies [group 2]). The most commonly evaluated lateral occlusion schemes were canine-guided occlusion (CGO) and group function occlusion (GFO). Group 1 studies evaluated the impact of lateral occlusion schemes on muscular electromyographic (EMG) activity, condylar displacement, mastication, and mandibular movement. Group 2 studies evaluated the impact of restored occlusion on longevity, patient comfort, and pathologic consequences.

Key Study Factor

The impact of lateral occlusal scheme with canine-guided occlusion or group function occlusion on EMG activity, patient comfort, and prosthesis longevity were the key factors sought.

Main Outcome Measure

Group 1 studies evaluated the immediate response to alteration of the lateral occlusion scheme by the following methods:

EMG. The electrical activities of masticatory muscles were recorded and used to evaluate the effect of the lateral occlusion scheme on muscle response to different mandibular movements.

Mandibular movement. The impact of lateral occlusion on mandibular movement or condylar position was evaluated when the teeth are masticating.

The participants were requested to undertake the following movements:

SORT SCORE			
A	B	C	NA

SORT, Strength of Recommendation Taxonomy

LEVEL OF EVIDENCE		
1	2	3

See page 11A for complete details regarding SORT and LEVEL OF EVIDENCE grading system

SOURCE OF FUNDING

Not reported

TYPE OF STUDY/DESIGN

Systematic review

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Physiologic: Mastication, sliding from intercuspal position to edge-to-edge position (eccentric grinding), and sliding from edge-to-edge position to intercuspal position (concentric grinding).

Nonphysiologic: Maximal clenching in the intercuspal position, maximal clenching in the edge-to-edge position, and submaximal edge-to-edge clenching. The aim of these movements was to simulate the muscle reaction to parafunctional activities.

Group 2 studies are long-term studies that reported the applied occlusion scheme in the prosthesis/restoration design. Although not specifically evaluating the impact of the lateral occlusion scheme, the studies investigated patient response, restoration longevity, and complications in situations resembling routine clinical practice. The lateral occlusion scheme was achieved by composite resin restorations and fixed dental and implant prostheses. In several studies, the lateral occlusion scheme was altered in conjunction with increasing the occlusal vertical dimension (OVD).

Main Results

Five comparative studies evaluated the effect of altering the lateral occlusion scheme on mastication and mandibular movement. Belser and Hannam¹ found that altering GFO to CGO narrowed the envelope of mandibular movements, while the muscle coordination during mastication was not altered. Likewise, Jemt et al,² found CGO was associated with a slightly steeper movement path than GFO during mastication. Furthermore, their participants reported GFO to be more comfortable than CGO. Salsench et al,³ demonstrated that participants with CGO had the steepest lateral guidance angle, while participants with GFO had less vertical overlap.

In terms of mastication speed, Jemt et al,² found GFO to be associated with greater mandibular velocity than CGO. Salsench et al,³ found that the duration of mastication is influenced by the occlusion scheme, and a longer mastication cycle was attributed to CGO than GFO. Because mastication height of GFO and CGO was similar, velocity of mastication speed was greater in GFO than CGO.

In relation to the condylar displacement, maximal edge-to-edge clenching caused the condyles to displace regardless of the lateral occlusion scheme.⁴ However, the lateral occlusion scheme altered the magnitude and direction of the condyle displacement. On the working side, there was an insignificant total displacement between the different occlusion schemes, while on the nonworking side, GFO caused the greatest displacement. The most prominent displacement was vertical on the nonworking side.

Seven studies evaluated the effect of natural lateral occlusal scheme on EMG activity. The evaluated muscles were the masseter, anterior temporalis, posterior temporalis, suprahyoid, infrahyoid, and sternocleidomastoid. The following EMG patterns have been observed: lower anterior temporal activity with CGO than with GFO^{1,4-7}; similar masseter muscle activity with CGO and GFO^{4-6,8}; lower sternocleidomastoid activity with CGO than with GFO⁹; similar suprahyoid muscular activity with CGO and GFO.^{10,11}

The long-term studies indicated that there is no difference between the 2 schemes in patient comfort and restoration longevity. Instead, mechanical complications are associated with other risk factors such as bruxism, restorative material properties, and implant prosthesis occluding against implant prosthesis.

Conclusions

1. There are some differences between the different lateral occlusion schemes in relation to parafunctional muscle activities and the magnitude of mandibular movement. However, physiologic function and patient acceptance appear to be minimally influenced by the lateral occlusion scheme.
2. CGO and GFO are equally acceptable when restoring the dentition. The evidence supports a flexible principle of occlusion rather than a preconceived occlusion theory.
3. Similar lateral occlusion principles can be considered for implant prosthesis.

COMMENTARY AND ANALYSIS

From the included studies, there are indications that CGO exhibits some protective roles for posterior teeth, masticatory muscles, and the TMJ complex. However, it was observed that GFO is more efficient for chewing and is more comfortable.

Interestingly, the significant effect of different occlusion schemes on muscle activities was not always observed from all the studies. Some muscles (anterior temporalis and sternocleidomastoid) appear to be more affected than others (masseter, suprahyoid and infrahyoid). I regret that by the inclusion criteria, the work of Schulte & Manns¹² and Manns et al,¹³ who were pioneers in the EMG studies of laterotrusive occlusal schemes, were not considered in this review.

In terms of function, there are some signs that GFO facilitates quicker mastication, but there is no evidence that the lateral occlusion scheme influences patient satisfaction. On the other hand, the outcome of this review supports the finding that there is no causative relationship between the lateral occlusion scheme and TMD development.

From a clinical point of view, this review did not find a clear relationship between the lateral occlusion scheme and mechanical complications of the restorative treatment for tooth-supported restoration or prosthesis. CGO and GFO appear to have a satisfactory outcome for composite resin restorations and for fixed prostheses for up to 5 years, when it becomes relevant information for clinical practice.

In this review it is recommended to implement flexibility and broader principles in occlusion design. Therefore, as a clinical guide, instead of adhering to a preconceived occlusion scheme when complex restorative treatment is indicated, the clinician should consider an occlusion scheme that is practical, simple, conservative, and allows esthetic treatment.

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