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LETTER TO THE EDITOR

# Criticism upon the systematic review (SR) 'Centric relation-intercuspal position discrepancy and its relationship with temporomandibular disorders'

To the editor

## Introduction

After thorough reading the publication 'Centric relation–intercuspal position discrepancy and its relationship with temporomandibular disorders. A systematic review (SR)', by Jimenez Silva et al. [1] in your journal, I thought a critical reaction would be appropriate and necessary. As a peer-reviewer myself for a journal with a Journal Impact Factor (JIF) over 2, I do understand how important quality research is for a journal and its readership. In this systematic review, I found quite some flaws.

The authors start the article suggesting that malocclusion and occlusal interferences are equivalent terms. Malocclusion is primarily an orthodontic term to indicate the variability in normal occlusion. In the past occlusal interferences, resulting in centric slide, were thought to be the main etiologic factors for the development of temporomandibular disorders (TMDs).

Next, the authors discussed the centric relation (CR) in a few paragraphs. They cite the definition of CR, as published in the Glossary of Prosthodontic Terms from 2005 [2]. The authors conclude that the concept of CR is controversial and its definition has changed over the years.

I presume that the authors could not have known the results of the Goldstein publication on the survey [3] among the Fellows of the Academy of Prosthodontics (AP) to come to a single, unambiguous definition of CR. Out of nine different definitions of CR, instead of the seven definitions from the Glossary of 2005, the most chosen version in the AP-survey became the new definition of centric relation [4], published online early 2017. Nevertheless, until today there is no validated centric relation point/area/position. Okeson [5] pointed to, as in any other joint, positional stability of the condyles, determined by the direction of force of the elevator muscles that pull the condyles into the most superoanterior position in their respective fossae. This position can only be determined by bilateral guidance or muscle-determined with a jig or a leaf gauge [5]. Consequently, the musculoskeletally stable or stable orthopaedic (SO) position is currently equivalent to CR [5,6]. In his recent publication 'The ball on the hill', Greene [7] supported for three groups of special patients the need to consider their maxillomandibular relationship, and, actually for every patient, the standard of the stable orthopaedic position, as advocated by Okeson [5,7].

The intercuspal position (ICP) is the complete intercuspation of the opposing teeth independent of the condylar position, a vastly undisputed consensus position. Centric slide is the movement, while the mandible is in CR, between the initial occlusal contact into maximum intercuspation.

## The systematic review

An electronic search was conducted to determine the relationship between centric slide (CR-ICP discrepancy) and the presence of TMDs. After application of the inclusion and exclusion criteria, the study includes and appraises 20 case-control, observational studies about the relationship between centric slide and TMD.

A quality assessment with the Newcastle Ottawa Scale was applied. No article reached the highest score of 9, the range of scores was between 2 and 6.

Only two studies were based upon the (R)DC/TMD, the other studies used different means to diagnose. One study was a comparison between 50 healthy individuals and 50 patients with minimally one sign or symptom of TMD. This last criterium is not the same as an arthrogenous diagnosis as mentioned in this SR. The other 14 studies are neither mentioned, nor discussed in the text. Nevertheless, a positive relationship was reported in 10 studies between centric slide and myo-/arthrogenous disorders. The remainder of four studies are not mentioned at all in the quality assessment. The authors completely missed the content of the Zonnenberg article [8] with a Newcastle Ottawa Score of 4. The article reported, among other outcome, the findings of centric slide, (1) obtained with the clinical method of moderate pressure on the chin and measured with a flexible ruler, compared to a method with a leaf gauge, and (2) with models, mounted to an articulator. The comparison between a manual, clinical determination of centric slide and mounted models, located in the stable orthopaedic position, leads to a statistically significant difference. The clinical method to determine centric slide with a ruler, calliper or comparable instrument, leads to a smaller one-dimensional measurement with roughly estimated increments of 0.5 millimetre. Mounting models into an articulator in the stable orthopaedic position produces a larger, significantly different, 3-dimensional measured centric slide with precise increments of 0.1 millimetre in SAM Articulator Equipment. These findings make all the studies about the CR-ICP discrepancy, based upon the clinical method to locate centric slide, worthless for this SR.

A data-collection without limitation of the methods to measure centric slide as inclusion criterion suggests that they all produce similar results. What is the main objective of this study? To demonstrate the existence of a slide or, more specific, the precise magnitude of the slide? In that case, the

method to measure centric slide must be able to differentiate between <2 mm, considered the normal variation of centric slide [5] and =2 mm or >2 mm.

To show your readership one example of a failing report in the underlying SR, earning the highest Newcastle Ottawa Score of 6, I must point to the Manfredini article [9]. They report in a woman-dominated sample of TMJ-clicking, determined with the RDC/TMD, that the RCP-MI slide length was calculated in the three spatial axes after manual mandibular distraction. Not explained is what this manual mandibular distraction comprehends, nor how the magnitude along the 3 spatial axes, leading to the actual RCP-MI slide, was calculated. Not more information available than the above, neither in the SR nor in the underlying article [9]. This makes the Newcastle Ottawa Score of 6 questionable. Any scientific article must be so clear that any interested researcher must be able to repeat the procedures and methods to come to the same conclusion.

The only study that fits all criteria for a reliable outcome of centric slide is the Zonnenberg and Mulder [8] article: diagnosis based upon the RDC/TMD, a correct measuring method of centric slide: the movement from the first contact while mounted in the stable orthopaedic position compared to the maximum occlusion in an articulator. Up and above, this study provides a convincing argument against a clinical method with a ruler [8].

## Conclusions

- The conclusion must be that the only acceptable outcome of this study, namely the evidence is low, may be true, not because of the facts extracted from the articles, but because of the comparison of the existing inconsistencies of CR, the lack of a comparable RDC/TMD diagnosis and various measuring methods of centric slide that cannot be compared. Conducting this systematic review is not even like comparing apples and oranges; it is comparing various fruits in a well-assorted fruit bowl, depending on which definition of centric relation (if at all) or measuring method was used.
- The term CR remains controversial, is confusing and needs to be abandoned and must be replaced by the stable orthopaedic (SO) position.
- If you have no in-depth knowledge of occlusion, centric relation and centric slide, the authors should have known better and avoided a systematic review on this particular topic.
- Using the service of a translator with no knowledge of the matter leads to erroneous wording and terminology, with its consequent interpretation.
- Obviously, a well-informed Review Board of a peer-reviewed journal would not accept publication of this study. Acta Odontol Scand needs an expert.

## Disclosure statement

No potential conflict of interest was reported by the author.

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