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Review Article

A controversy with respect to occlusion

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Summary There are very little controversies on occlusion in healthy individuals, where centric relation is regarded as the criterion for assessing the present occlusion and also for establishing a new occlusal relationship between the upper and the lower jaws. On the other hand, the occlusal position in patients with deformed condyles still remains to be clarified. In this review, the effectiveness and limits of centric relation in these patients are discussed. In addition, the muscle induced occlusal positions, such as the muscular position and the terminal positions of habitual closing movements, are suggested as a substitution for centric relation. Finally, the importance of a stable intercuspal position, where the habitual closing movements terminate without any premature tooth contact, is emphasized.

Contents

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1. Introduction

The first step of restorative treatments, is to clinically estimate the existing intercuspal position (ICP), and then determine whether to keep or correct the ICP [1]. For quite some time, the centric relation (CR) has been used as the criterion and was applied to clinical cases in which prosthetic occlusal treatments were needed. Now, as the evidence suggests, dentists are in a situation where they need to be careful in applying the CR. The CR should be applied to patients with a normal physiological occlusion, and not to patients with deformed condyles. In the least, the definition of CR in the latest edition of the Glossary of Prosthodontic Terms (GPT) [2] has excluded such applications in these patients.

Recently, there has been great progress made in the diagnostic imaging of the temporomandibular joint (TMJ), which clearly shows that there are large number of patients with deformed condyles. These deformities may have resulted from such factors as aging, occlusal support, parafunction, and so on [3,4].

For patients with condylar deformity, it is inappropriate to apply the same CR definition with normal subjects. Dawson [5—7] indicated that the CR definition is still effective in patients with deformed condyles, when their condyles are comfortably seated at the highest point against the articular eminences and braced by bone at the medial pole of each condyle. This relationship of the mandible to the maxilla, is called ''adapted centric posture (ACP)''.

On the other hand, the patients with deformed condyles, that are not braced by bone and therefore are unstable on the slope of the articular eminences, have been ignored. This issue will be discussed in this present review.

2. Limits of centric relation

The definition of CR in the GPT changed dramatically in 1987, from the most posterior condylar position, to the antero-superior condylar position in the glenoid fossa [8]. However, several previous definitions were allowed to remain. Still now, some of these definitions continue in the latest GPT [2]. These multiple definitions often cause confusion in various fields of dentistry [9].

In 1987, the CR definition change was willingly accepted by clinicians, because oral functions are chiefly performed around the ICP. The occlusal position in the revised CR appears to be closer to the ICP.

Even if the condyle becomes deformed, as Dawson described, it may be located in the stable position in the fossa. On the other hand, there should be another situation in which the deformed condyle occupies an unstable position on the slope of articular eminence without any bony support in the glenoid fossa. Furthermore, the two types of occlusal situations need to be considered, with and without a stable ICP. As shown in the example cited in this review, when there is a stable ICP, nothing will generally happen, even though the condyle is unstable. On the other hand, when both the ICP and the condylar position are unstable, various disorders in the stomatognathic system may occur.

We often encounter patients with deformed and/or unstable condyles in cases of TMJ osteoarthritis [10,11], malocclusion in Angle' s class II [12—14], and after orthognathic surgery [15]. In orthodontic cases, the mandible may protrude through orthodontic treatment [13], resulting in an anterior condylar position, and then a new stable ICP can be established. Furthermore, in the orthognathic surgical cases, the separated condyle from the body of the mandible can be manipulated and repositioned again to the preoperative condylar position, sometimes with the help of a positioning device [16,17].

In these patients, when we fail to secure a stable position to the dentitions, various disorders follow, such as an open bite in the dentitions [18,19] and progressive condylar resorption (PCR) in TMJ [20—24].

Therefore, we are convinced that there are some patients who have the occlusal treatment process, in which the condylar position in the glenoid fossa should not be initially determined.

3. Bone change and unstable position of the condyle

Clinically, there is little importance to whether the condyle is deformed or not. However, it is extremely important in determining whether or not the condyle occupies a stable position in the glenoid fossa. When the condyle is unstable, it is quite possible that the ICP will be lost, even though there is a stable ICP.

Stability of the condyle can be examined by guiding the mandible to the most posterior position in the glenoid fossa. When the mandible moves backwards from the ICP to that location, over approximately 1.5 mm [1] or 2.0 mm [7], the condylar position can be assessed as unstable, because the distance is long enough for a wide space behind the condyle at the ICP [25—28]. The unstable condyle may exist unilaterally or bilaterally.

When posterior movements from the ICP are difficult for patients to perform, lateral excursions can alternatively be used. The condyle of the working-side moves backwards significantly during lateral movements, when there is a wide space behind the condyle at the ICP.

The bone change of the condyle indicates the possibility of an unstable condylar position. Therefore, it is important to assess whether or not there is a condylar bone change. A number of techniques, such as TMJ imaging through TMJ radiography using panoramic equipment, tomography, computed tomography (CT), and magnetic resonance imaging (MRI) are all useful in this regard, as well as assessing bone changes, although the accuracy is different among the respective means [29—33].

It is interesting that the patients with deformed condyles do not always indicate clinical symptoms [34,35]. Even without TMD symptoms, this does not indicate whether or not the condyle is deformed or stable.

4. Effectiveness of habitual closing movements

When the deformed condyles are located in the ACP, some patients cannot occlude properly, because the relationship between the upper and lower dentitions is so incompatible.