The importance of occlusion

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The correct physiological restoration of occlusion poses a major challenge for every dentist and technician. Even the smallest high spot, measuring just a few microns, can cause dysfunction in a patient's masticatory system. In restorative dentistry, occlusal proportions are constantly changing. It is therefore essential, for the benefit of the patient, to understand and monitor the function of teeth in static and dynamic occlusion. Functional occlusion is important for the overall health of the patient. The interdisciplinary verification of symptoms and treatment is an integral part of daily practice. Therefore, checking the occlusion during treatment is strongly encouraged.

Occlusion and the potential effects of occlusal interference on patients

Every restoration, extraction, prosthetic device and orthodontic treatment changes the static and dynamic occlusion. The smallest occlusal interference of just a few microns is disruptive to the proprioceptors of the stomatological system. This can cause bruxism (clenching or grinding), which can result in functional disorder of the cranio-mandibular system. Overstraining teeth, periodontium, muscles and joints are the effects.

It is important not only to detect, but also to avoid further functional disorder in the cranio-mandibular system. The smallest interference to habitual occlusion can cause serious disturbances for the patient. An acute functional disorder such as clenching or grinding can become chronic in the long term.

Patients with new fillings, crowns and bridges, or who have undergone orthodontic treatment, who complain of typical symptoms (cranio-mandibular dysfunction syndrome) should undergo
examination of their occlusion specifically. Premature contacts are often uncomfortable, as the proprioceptors are sensitive to pressure. The patient will try to compensate for the occlusal interference by adopting a new habitual position, with consequences for the attached tissue structures.

**Position for occlusal restoration**

Essential to any kind of occlusal restoration is the position of the mandible. Most patients are treated in their habitual position of the mandible, which is the correct position for most patients. For patients with more complex restorations or patients suffering from temporomandibular joint disorders, a new physiological positioning of the mandible is essential. In most cases, centric occlusion is the new therapeutic position.

Centric relation is the position of the mandible relative to the maxilla, with the intra-articular disc in place, when the heads of the mandibular condyles are against the most superior part of the distal-facing incline of the glenoid fossa (i.e. the mandibular condyles are in their most superior and anterior position).

For balanced occlusion in a static position, the patient should have enough ABC contacts on each quadrant in the intercuspal position. In this position, the teeth of the opposing jaws achieve complete intercuspation and are in maximum contact with each other.

**Figs. 5 & 6** The best physiological position: the condyles are in centric position with enough occlusal contacts.

**Figs. 7 & 8** The condyles are still in centric position. An interfering initial contact is evident on tooth #36.

**Figs. 9 & 10** Compensatory reaction caused by the interfering contact on tooth #36. The mandible has shifted to a new position, which is out of centric occlusion, to compensate for the occlusal interference.
The physiological influence of interfering initial contacts

For most of the patients, their habitual position of the mandible in maximum occlusion is the preferred position for occlusal restoration. However, even a tiny interfering prematurity contact of only 20 µ can trigger a compensatory reaction, placing the mandible into a new physiological position. This is a natural reaction of our biological system to avoid higher forces focused only on one area.

For example, if you are eating something and you chew on a little grain of sand, you automatically shift your mandible to a different position to protect your teeth. A permanent “grain of sand” (occlusal interference) can trigger an overload of the biological system, in which case the patient will have reached his or her maximum capacity for compensation. Pain symptoms can then become chronic.

Occlusal restoration

In order to reconstruct physiological occlusion, correct visual identification of contact points is essential. Occlusion checking materials (articulating papers) with the effect of progressive colour transfer are helpful in identifying occlusal forces in intercuspal habitual position. Areas with higher force loads can be identified as darker-shaded markings with higher contrast. These markings likely indicate the initial contacts. Areas with less intense colour markings indicate contacts with lower occlusal forces or areas with no contact. Upon close examination, these markings look like a donut. The centre of the contact point has a lighter shade. The more intense-coloured edge of the contact point is not part of the contact. Just the lighter-coloured centre is the real contact area. For occlusal equilibration, only these areas should be adjusted. For a balanced occlusion, the patient should have enough ABC contacts on each quadrant.

Occlusal corrections can be additive or subtractive. If modification of the occlusal relationship in patients who have been grinding their teeth over a long period is needed, this may be challenging, as they would already have lost a significant part of their hard tooth tissue. A splint is indicated for treating such patients (additive occlusion).

Conclusion

The reconstruction of physiological occlusion is essential for the complex functioning of the entire stomatognathic system. There are various concepts of occlusion. For recording and analysing the complex movement of the mandible, a wide range of electronic devices are available.

Beside all these tools, a basic understanding of the biomechanical design of an occlusal surface is essential. Today, we have a wide selection of different occlusion indicators to visualise these biomechanical structures. Soft colour-impregnated occlusion checking papers, in combination with thin occlusion checking films, are optimised for visual checking of the occlusal relationship between the maxilla and mandible.

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