Lingualized occlusion

Trend or clinical solution?
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In complete denture prosthetics, three concepts of occlusion are described, namely: canine-guided occlusion, monoplane occlusion, and bilaterally balanced occlusion. One of the masticatory patterns, which comply with the requirements of the bilaterally balanced occlusion, is the lingualized occlusion. This concept by Gysi has been updated by Dr. Lauciello and other colleagues. New prefabricated posterior teeth have been designed with the support of Lee Culp, the highly regarded American dental technician.

Principle of lingualized occlusion
The principle of lingualized occlusion aims at stabilizing the restoration. The forces, which are transmitted to the mucous membrane and directly or indirectly to the supporting bone, should be reduced. The implementation of the principle is ensured by the following three parameters:

1. **The position of the occlusal contacts:** In lingualized occlusion, the palatal cusps in the maxilla come into contact with the antagonist contact areas in the mandible. The buccal cusps in the mandible do not demonstrate any antagonist contact with the maxilla (Fig. 1).

2. **The position of the teeth on the alveolar ridge:** According to Sears, the contact areas in the mandible should be located on the lingual side of the alveolar ridge (Fig. 2).

3. **Reduced cusp height:** Reducing the cusp height in the mandible or eliminating the cusps altogether results in a reduction or elimination of interfering contacts (and tipping moments) caused by the cusp slopes during eccentric movements (Fig. 3).
Both in conventional and implant supported complete dentures, lingualized occlusion results in a reduction of the forces transmitted to the mucous membrane and the supporting bone. SR Ortholingual DCL® and SR Orthoplane DCL®, the new posterior tooth lines, meet these requirements.

**SR Ortholingual DCL:** The palatal cusps of the maxillary teeth are dominant. The height of the buccal cusps decreases in relation to the sagittal and frontal compensation curve. The mandibular teeth demonstrate a cusp inclination of approximately 15° (Fig. 4). The cusp slopes are separated by an intercuspal ridge. Since this ridge is very shallow and demonstrates no further structural elements, the maxillary cusps can slide into occlusion in an anterior-posterior direction without being statically fixed in the centric position.

**SR Orthoplane DCL:** Taking abraded teeth as the models, flat buccal and lingual cusps were created. The cusp slopes are defined by the main fissures, while the marginal ridges result from the design of the secondary fissures. Due to this quasi virtual intercuspal ridge, the palatal cusps of the antagonist jaw do not occlude in the occlusion relief and are not statically fixed in the centric position (Fig. 5).

**Material**

The resin used for these posterior tooth lines greatly contributes to the durability of the prosthetic restoration and reduces the transmission of occlusal forces onto the soft denture bearing areas. The mechanical values of the resin have been considerably improved by cross-linking the polymer and the matrix, as e.g. in the „DCL“-material (Double Cross-Linked). The use of materials that compensate for the masticatory loading, such as resins, is also recommended in the literature. Moreover, this view was confirmed in investigations by Shalak, Soumeire, and Gracis. The latter recognized that the masticatory loading is up to 50% lower with resin materials than with ceramic materials.

**Tooth set-up**

Setting up the **SR Ortholingual DCL** teeth: In a first step, the posteriors in the mandible are set up in the Stratos® articulator with the help of a setting-up template. The Pound line has to be observed in the horizontal. All the cusp tips of the SR Ortholingual teeth come into contact with the setting-up template. Subsequently, the maxillary teeth are set up with only the palatal cusp tips coming into contact with the mandibular teeth. If the set-up table (Fig. 6) is used, the maxillary teeth may be set up first, if desired. The mandibular teeth are then set up in relation to the maxillary teeth. This set-up method enables a more harmonious alignment of the buccal surfaces of the maxillary teeth in relation to the canines.

Setting up the **SR Orthoplane DCL** teeth: Basically, the set-up method is the same as for SR Ortholingual.
However, this type of prefabricated teeth requires a compensation curve, which can be defined arbitrarily or with the help of the setting-up template. The monoplane concept of occlusion described by Jones is contraindicated in this case, since it does not take a compensation curve into account.

**Mixed set-up:** This is a combination of the two set-up methods described above, in which the SR Orthoplane teeth are used for the mandible and the SR Ortholingual teeth for the maxilla. The palatal cusps occlude on the intercuspal ridge of the antagonists (Fig. 7).

**Grinding in the occlusion**
The following rule of thumb applies to the adjustment of the occlusion: The palatal working cusps must not be adjusted by grinding.

**Indications**
The lingualized occlusion is indicated for conventional complete dentures if the patient’s occlusion is "imprecise" [1]. This may be caused by several factors:

1. **Anatomical factors:** Shallow or even flat alveolar ridges, severe resorption, considerable alveolar ridge distance, Class II jaw relation, etc.

2. **Physiological factors:** Open masticatory cycle, low salivation rate, thin and non-adhering mucous membrane, insufficient neuromuscular coordination.

For the combination of an "implant-supported complete denture in the mandible and an implant-supported or conventional complete denture in the maxilla", author Dr. Mericske-Stern, among other things, recommends the lingualized concept of occlusion. According to her, this masticatory pattern improves the resistance of the dentures against functional forces. Moreover, it evenly distributes the occlusal forces between the implants and the denture bearing areas. Furthermore, a lingualized occlusion is also indicated for the combination of a "complete denture in the maxilla and an implant-supported restoration in the mandible". This concept of occlusion transmits the occlusal forces in the same way that the bilaterally balanced occlusion stabilizes dentures.

**Conclusion**
Linqualized occlusion is not a temporary trend, but a clinical necessity. This concept of occlusion enables

1. a reduction of the forces transmitted onto the denture-bearing areas,
2. a 50% higher masticatory efficiency, since teeth with cusps are used,
3. and different approaches to solving specific clinical problems.

Literature on this topic can be obtained from the author.

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