Crown Lengthening

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Underlying biology

The soft tissue attachment to the tooth, coronal to the periodontal ligament, is called the dentogingival complex (DGC, sometimes referred to as the 'biologic width'). It consists of the dentogingival fibres (approx. 1mm in height) and the junctional epithelium (approx. 1mm, but can be as much as 9mm in height). The term 'biologic width' was established as a synonym for the DGC. The height of the DGC is, on average, 2.04 mm1. In health, the supraosseous gingiva (SOG), consisting of the DGC and the free gingiva (gingival sulcus), is approximately 3 mm in height.

Actual clinical and histological evaluations of human specimens have shown that the biologic width can have widely varying dimensions. For example, the connective tissue attachment was found to range between 0.77 mm and 1.9 mm 5-7. Even greater variations have been found regarding the junctional epithelium and sulcus depth 3, 4, 8-10. In view of the variability of the dimensions of the SOG, the surgeon must employ a customized approach during crown lengthening surgery, when trying to relocate the DGC, in preparation for the placement of more apical restorations whose margins might otherwise 'invade' the biologic attachment complex.

Clinical observation has determined that when restoration margins are placed either too deeply within the gingival sulcus (more than .5mm from the gingival margin) or too close to the DGC, a state of chronic inflammation occurs 12,13. In order to preserve the integrity of the DGC and prevent subsequent inflammatory disease (that can advance into more serious periodontal lesions or even cause chronic pain), it is recommended that a distance of 2 to 3 mm be maintained between any restoration margins and the alveolar bone 2-4.

In cases where restorations are placed too close to the supra-ossoeous connective tissue and alveolar bone, the DGC migrates apically, resulting in loss of attachment, either due to gingival recession or through the formation of deeper pockets 13, 14. Alternatively, if the DGC is repositioned apically in a controlled manner, prior to the restorative treatment, the resulting sulcus is of minimal depth15.

Treatment planning

Before proceeding with surgical crown lengthening, the tooth to be treated as well as the adjacent teeth must be examined thoroughly, paying particular attention to various periodontal parameters. The examination should include dental radiographs, periodontal status, and an occlusal analysis. Esthetic considerations should also be involved in the assessment. Phase I therapy, including restorative, endodontic and initial periodontal therapy, should be completed first. Ideally, if the final restoration will be a crown, the crown margins should be prepared and a temporary restoration should be fabricated prior to the surgical appointment. Often retention of the temporary restoration can be challenging at this stage. This treatment sequence has the distinct advantage in that the surgeon does not have to estimate the extent of the osteoplasty and, therefore, avoids additional violation of the biologic width, which might occur subsequently, while finalizing the position of the restoration margins once the surgical site has healed. At the same time, interdental accessibility increases significantly, when the existing temporary restoration can be removed during the surgical procedure.

Indications for crown lengthening

- Complete caries removal: Teeth with extensive, inaccessible subgingival caries, which is difficult to excavate, restore or treat endodontically.
- Any type of restoration margins which would violate the biologic width: Margins either submerged deep within pockets or too close to the alveolar bone.
- Retention: Teeth with inadequate coronal tooth structure, which cannot be built-up sufficiently due to occlusal or other limitations.
- Teeth with inadequate ferrule: Endodontically treated or severely damaged teeth must have an adequate ferrule, in order to be restored with crowns16, 17. The ferrule corresponds to a 2mm vertical natural tooth structure, at least 1mm thick, which can retain the amalgam, composite or cast metal core of the future crown restoration.
- Aesthetic crown lengthening: Apical relocation of the gingival margin around teeth in the aesthetic zone may be required due to other reasons such as lack of altered passive eruption, orthodontic treatment, prosthetics. Clinical crown-lengthening in most of these cases cannot be done simply by removal of gingival tissues, since the dimensions of the DGC could be such that the final margins will invade the DGC, resulting in chronic inflammation, etc.

Contraindications to Crown lengthening

- Unrestorable teeth
- Teeth with short roots
- Teeth with inadequate bone support (mobile teeth)
- If furcations would have to be exposed as a result of crown lengthening
- If adjacent teeth would be destabilized as a result of crown lengthening
- Teeth with inadequate attached keratinized gingiva (corrective grafting can be done in most of these cases, sometimes concurrently).

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