Anterior Esthetic Crown-Lengthening Surgery: A Case Report

(Allongement de couronne clinique par chirurgie sur dents antérieures à des fins esthétiques : étude de cas)

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Sommaire

Examen des concepts théoriques sous-jacents à l'allongement de couronne clinique par chirurgie et description d'un patient à qui on a fait une telle intervention à des fins esthétiques.Une vue d'ensemble des différentes indications et contre-indications vous est présentée.

Mots clés MeSH : *case report; crown lengthening; periodontium/surgery*

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The appearance of the gingival tissues surrounding the teeth plays an important role in the esthetics of the anterior maxillary region of the mouth. Abnormalities in symmetry and contour can significantly affect the harmonious appearance of the natural or prosthetic dentition. As well nowadays, patients have a greater desire for more esthetic results which may influence treatment choice.

An ideal anterior appearance necessitates healthy and inflammation-free periodontal tissues. Garguilo[1] described various components of the periodontium, giving mean dimensions of 1.07 mm for the connective tissue, 0.97 mm for the epithelial attachment and 0.69 mm for the sulcus depth. These measurements are known today as the biologic width. Ingber and others[2] observed that the presence of caries or restorations in close proximity to the alveolar crest may lead to inflammation and bone loss due to violation of the biologic width. Hence, they recommended that the restorative margin be a minimum of 3 mm coronal to the alveolar crest, suggesting that this margin could be achieved through a surgical intervention known as crown-lengthening surgery. Some authors have questioned the necessity of this procedure, suggesting that if the biologic width is invaded, the body can re-establish the necessary dimensions on its own over time.[3] However, it is generally accepted that crown-lengthening surgery helps to relocate the alveolar crest at a sufficient apical distance to allow room for adequate crown preparation and reattachment of the epithelium and connective tissue.[4] Furthermore, by altering the incisogingival length and mesiodistal width of the periodontal tissues in the anterior maxillary region, the crown-lengthening procedure can build a harmonious appearance and improve the symmetry of the tissues.

Good communication between the restoring dentist and the periodontist is important to achieve optimal results with crown-lengthening surgery, particularly in esthetically demanding cases. In addition to establishing the smile line, the restoring dentist evaluates the anterior and posterior occlusal planes for harmony and balance, as well as the anterior and posterior gingival contours. This information allows the restoring dentist to determine the ideal incisogingival length and mesiodistal width of the anterior maxillary teeth. On the basis of these projections, the periodontist recontours and relocates the gingival margin and the alveolar crest to achieve both an esthetically pleasing appearance and periodontal health. The following case report illustrates these concepts.

Case Report

A 30-year-old man presented to the University of Toronto faculty of dentistry requesting "better-looking teeth." His

Figure 1: *Close-up view of the anterior maxillary teeth before the surgery.*

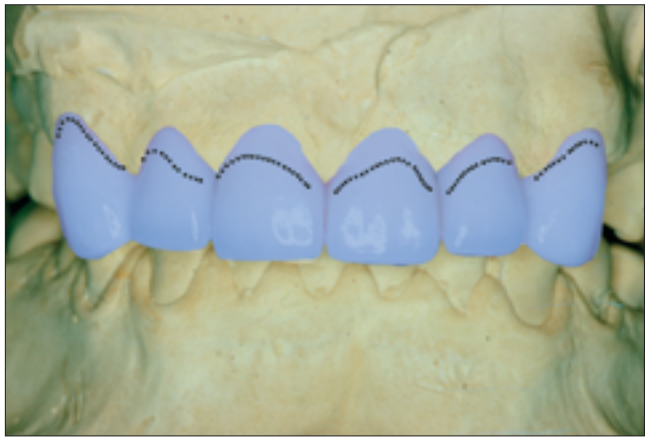

Figure 2: *Wax-up of the maxillary teeth. The dotted line represents the preoperative gingival margin.*

medical history was noncontributory, and he denied a history of smoking or alcohol consumption.

Extraoral examination revealed no significant findings. His face was symmetric and had a straight profile. His smile line extended to the second premolars, and smiling displayed approximately 4 mm of gingival tissues.

Dental examination revealed that the crown of tooth 12, which had been treated endodontically, had a fracture extending subgingivally. Although the anterior maxillary teeth looked symmetric with respect to their contralateral counterparts (e.g., tooth 11 was similar to tooth 21 in terms of length and width), they were not proportionate in size. Ideally, the central incisors and canines are approximately equal in length and are usually 20% longer than the lateral incisors. The central incisors should be 25% wider than the lateral incisors and 10% wider than the canines. Furthermore, the length-to-width ratio of individual teeth should be 1.2:1 for the canines and lateral incisors and 1.1:1 for the central incisors.[5] The prosthetic treatment plan for the patient involved porcelain-fused-to-metal (PFM), crowns for teeth 15 to 25.

Periodontal examination revealed good oral hygiene with minimal plaque and calculus deposits. The gingiva was pink and firm, and the papillae were intact. The anterior teeth were heavily restored (**Fig. 1**). Clinical examination revealed shallow probing depths, no mobility and adequate amounts of keratinized attached gingiva.

Review of the full mouth series revealed no significant findings. The crestal bone level was within normal limits, and the crown to root ratio was favourable. Occlusal analysis revealed, among other findings, an Angle's class I relationship, with 70% overbite and 2 mm of overjet. No signs of fremitus were observed. The patient had adequate anterior guidance upon protrusion and adequate group function upon lateral excursions.

After discussion with the restorative dentist, esthetic crown-lengthening was recommended to allow a healthy, optimal relationship between the teeth and the periodontium. The restoring dentist then took alginate impressions. A wax-up of the anterior maxillary teeth was done to determine the incisogingival length, the mesiodistal width and the contour of the teeth that would lead to a pleasing appearance (**Fig. 2**). A surgical stent was made from the wax-up. The amount of gingival recontouring and ostectomy was guided by the stent.

The initial inverse bevel incision was performed so as to achieve the ideal contour on the anterior teeth. This incision is carried out in a parabolic manner, with the most apical point or gingival zenith for the central incisors and canines located just distal to the tooth axis and the gingival zenith for the lateral incisors coinciding with the tooth axis. The marginal gingival height for the maxillary central incisors is at approximately the same level as the height for the canines, whereas the marginal gingival height for the lateral incisor is slightly lower when the teeth are in an Angle's class I relationship.[6] Care was taken to ensure that the incisions blended with the gingival contour of the posterior teeth. The papillae were raised in a split-thickness fashion, and this process was followed by creation of a full-thickness flap apically. Thus, the papillae were kept intact palatally to avoid tissue recession. Osseous resection, performed only on the buccal surface, exposed 3 mm of root surface from the gingival margin to the alveolar crest; this allowed for attachment of the junctional epithelium and connective tissue (**Fig. 3**). The flap was apically repositioned and sutured with 5-0 Dexon suture (**Fig. 4**). Chlorhexidine rinse 0.12% bid was prescribed for 2 weeks, and the patient was given appropriate postoperative instructions.

Final preparation of the teeth began a half year later, since gingival recession can occur as long as 6 months after the surgery.[7] Care was taken to ensure that the margins of the temporary crown were smooth and closely adapted to ensure gingival health. One millimetre of coronal dentin was achieved by the crown lengthening surgery on tooth 12 to allow for the ferrule effect. A ferrule is a band of cast metal encircling the external dimensions of the residual tooth. In a tooth with a crown, the walls of the crown form a ferrule, which encases the gingival 1 to 2 mm of the axial walls of the preparation above the crown margin; this is called the ferrule effect. Studies have

Figure 3: *Osseous reduction.*

Figure 4: *Apically repositioned flap and sutures.*

Figure 5: *Final insertion of the PFM crowns 10 months after surgery.*

shown that the ferrule effect significantly reduces the incidence of fracture in a nonvital tooth by reinforcing the tooth at its external surface.[8,9] Final insertion of the PFM crowns was performed 10 months after the crown-lengthening surgery (**Fig. 5**).

Discussion

In regions of the mouth where esthetics are important, wound-healing after crown-lengthening surgery must be allowed to proceed to completion if optimal results are to be achieved. Any disruption of the wound-healing process can lead to undesirable consequences. After crown-lengthening surgery, the periodontium continues to remodel and mature. Bragger and others[7] reported that gingival recession can occur between 6 weeks and 6 months after the surgery. Hence, if prosthetic reconstructions are planned, recessions must be closely observed during the healing phase. Temporary crowns should be retained until the wounds are completely healed (possibly up to 6 months), after which final crown preparation and insertion can be accomplished. If these guidelines are followed, gingival recession should not occur.

Although not an absolute contraindication for periodontal surgery, cigarette smoking can impair wound-healing and is detrimental to the success of the surgery.[10] Hence, patients who smoke may experience unpredictable surgical outcomes. Other factors such as patient compliance, oral hygiene and history of periodontal disease can also influence surgical outcome. The dentist should carefully consider these key factors in preparation for treatment in esthetically demanding areas. ✦

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