One-Stage Surgical Crown Lengthening and Provisional Prosthetic Placement
An Interdisciplinary Approach

Clinical crown lengthening is usually a very useful surgical resource for achieving surprising aesthetic and functional solutions in dental practice. The typical procedure comprises exposure of the teeth or root remnants, followed in a second step by prosthetic replacement. In some cases, the surgical intervention is preceded by orthodontic extrusion to favor the availability of abundant bone and gingival tissue. Thanks to this versatile surgical technique, endodontic treatments can be applied to fractured teeth or root remnants overlying a healthy dental structure, and preceding actual aesthetic prosthetic restoration. From the functional perspective, clinical crown lengthening procedures offer highly predictable and stable results, since they are based upon manipulation of the bone and gingival margin, ensuring an adequate spatial relationship based on a functional constant, the biological width. In some cases, such as the case presented in this article, performance of the surgical and prosthetic steps in 2 different sessions may prove inadequate in terms of patient satisfaction and appearance. Both coronal and radicular portions may be exposed cervical to the prosthetic margin of the individual crowns (short in this case) or pre-existing bridge, yielding an unattractive appearance in patients with ample dental display or gummy smile. Under such circumstances it is preferable to plan a single intervention comprising both the surgical step and placement of a provisional prosthetic restoration.

This approach clearly requires planning, organization, and discipline, with the establishment of a coordinated and efficient team comprising the periodontist, rehabiliting dentist, prosthetic laboratory technician, and the patient.

CLINICAL CASE
A 57-year-old woman presented with dental aesthetic problems. The clinical and radiological examinations of the upper anterior sector revealed the presence of short crowns that exacerbated the appearance of a gummy smile (Figure 1a). The central incisors presented with a diastema, together with short, rather square crowns. Figure 1b shows the final outcome of individual crown placement (Procera [Nobel Biocare]) from canine to canine, however treatment extended from the right first premolar to the left second premolar. The rest of the evaluation revealed the absence of the upper right second premolar and upper molars—thus depriving the patient of posterior dental support. The clinical condition was accompanied by right lower first molar furcation impairment, while the upper jaw showed marked bone atrophy, resulting in proximity of the maxillary sinuses (exhibiting enhanced pneumatization; Figure 2a). The panoramic radiograph in Figure 2b shows final patient rehabilitation. In addition to the crowns of the upper teeth, she received 4 endoestial implants (Replace Select, 4.3 mm [Nobel Biocare]) with bilateral sinus lifts in the upper arch—since at least 4 mm of bone from sinus floor to alveolar margin was available. The lower arch was likewise rehabilitated with individual Procera crowns, including premolarization of the right first molar, which was hemisected to control the type III furcation affecting it. The rest of periodontal treatment included control and treatment of
chronic periodontitis and clinical lengthening of the lower anterior teeth. The patient was instructed on the wearing of a night guard following treatment.

Figure 3a shows a surgical stent with the desired dento-gingival aesthetic modifications reflecting the changes required in this particular clinical case. Construction of the stent always requires prior assembly and waxing in a semistable articulator (Panadent PCH [Panadent]), followed by an imprint and the preparation of a plaster model on which the surgical guide is then constructed. The dental di- mensions are required, firstly the incisal margin, occlusal plane, and possible gingival margin both at rest and at maximum smile, considering the linear measures in width and height as well as the pro- portionality between the latter to ensure a natural ef- fect.5,6 In this context, the ideal height from incisal margin to gingival margin was accepted to be between 10.5 and 11.0 mm. With the pur- pose of transferring the infor- mation to the articulator, a facial arch was taken parallel to the horizon, in order to transfer the incisal plane and inclination.

Waxing can be made ac- cording to the aesthetic and functional needs of the pa- tient. Undercutting the acrylic surgical stent was prepared, which allowed us to conduct objective and subjec- tive clinical evaluations pre- operatively, thereby affording reliable prediction of the final outcome, and even consider the subjective assessment of the patient and relatives.

Figure 3b shows initiation of the surgical procedure. Of note is the inclination of the scalpel blade, since a rather thin flap is required for both dental adaptation at the end of the procedure and for ac- hieving an intimate apposition to the bone. The inci- sions show the new central limit of the incisal margin. After marking the gingival contour and locating the root details such as the dental zenith, the split was re- moved and instrumentation was continued manually. In cases such as this, with the presence of cistostasis, it is ad- visable to define sectioning, placing the margin 1 to 1.5 mm apical to the desired point. Eliminating the bone prominence on the flap is projected toward a more incisal position, and this must be com- pensated for in advance.

The decision to either ex- tensive gingival tissue or apically position a flap de- pends on the remaining keratinized tissue (attached gum). In our patient sufficient tissue remained. The interden- tal papillary component was not modified in order to pre- dict the papillary filling in the restorations to be manu- factured.7 The buccal flap was raised, taking care to pre- serve the full buccal part of thickness and adjust it poste- riorly to ensure a uniform and thin thickness, using a rough, oval-shaped diamond drill. Next, and again with the help of the surgical stent, a new bone margin was defined, located at least 3 mm apical to the recently re- defined gingival margin (Figure 3c). The contour and zenith designed in the soft tissue were then accurately reproduced at the alveolar bone. In this case maxillary osteoplasty was required due to the presence of bone pro- nances and the lack of inter- radicular festooning. The papil- liary contents and interprox- imal bone were not modified, for as has already been noted, their preservation was impor- tant for predictability in papillary filling and fixation of the apical extreme of the contact area.

This is the point of inter- vention of the reconstructing dentist, who in this case re- moved the existing bridge and conducted re-preparation from the upper right first pre- molar to left second premolar. Figures 4a and 4b show the cervical adaptation process. In this case the provisional restoration was indirect, based on the data afforded by the diagnos- tic assembly prepared before surgical management. In relation to the provisional bridge, special care was taken to ensure harmony with the new established contour and marginal anatomy. An ade- quate cervical emergence profile was carefully defined with reproduction of the cer- vical convexity of the crown. This serves to support and guide tissue positioning, thereby making gingival tissue shape and position more predictably postoperatively.

It should be noted that the location of the prosthetic margin with respect to the bone margin, is a common step in re-defining a new biological thickness, under surgical control. This in turn may be expected to induce healing, regeneration, and structural stability of the periodontal tissues in their new position. The bridge was adjusted and adapted conventionally. Naked eye visualization of the prosthetic termination ensured optimum efficiency. The mar- gingles were then polished, with bridging from upper right first premolar to left second premolar, and the bridge was retained with temporary cement.

The prepared flap was then sutured in its new loca- tion (Figure 5a) using Ethilon 5-0 monolony suture (Ethi- con). The immediate postop- erative care included the ap- plication of cold facial bandages and the prescription of anti-inflammatory medication in the form of ibuprofen (Loxonin 60 [Siegfried Rhein]), together with a combination of proteolytic enzymes and streptodornase (Varidasa [Wyeth, Mexico]) to avoid the formation of edema. Pain was controlled with ketorolac (Toradol-Dolac [Syntex, Mexico]), while antimicrobial control was afforded by 500 mg of amoxicillin adminis- tered three times a day (Amoxicil [GlaxoSmithKline]). This complete protocol was started 2 days before the intervention and was continued for 5 days thereafter. Regarding bacteri- al plaque control, the patient was prescribed dental brush- ing with 0.12% chlorohexidine digluconate rinses (Bexident [Siegfried Rhein]) 3 times a day until 1 week after surgery re- moval. The healing process in turn was facilitated with ascorbic acid (2 g/day of Redoxon Forte [Roche]). Figure 5b shows the results obtained 3 weeks after the interven- tion. Tissue evolution is seen to be excellent.

Figures 5a and 5b show de- tails of the complete crowns on the model and in the mouth of the patient, cemented with universal cement (RelvyX Unicem Self-Adhesive Universal Resin Cement [3M ESPE]). Of note is the excel- lent tissue stability and adap- tation achieved after 4 months, as well as the man- nipulation of the form, color, and control of the propor- tions—including height fixa- tion of proximal contacts for papillary preservation of the fitted crowns.

**DISCUSSION**

Interdisciplinary work im- plies not only joint decision making, but in some cases...a need for simultaneous and co- ordinated work in operative aspects...

The described simultane- ous surgical intervention and prosthetic placement is appli- cable not only to specific cases such as our own, charac- terized by the existence of a prior prosthetic component, but also to all cases of upper anterior sector treatment. The placement of a provision- al immediate prosthesis ac- companying the surgical step has further implications, par- ticularly when a visible zone is implicated and excellent aesthetics and tissue stability are required. When working with a surgically exposed zone, prosthetic preparation or re- preparation may be more pre- cise, with better elaborated and supervised adaptation,
sealing, and anatomical cervical conformation of the provisional restoration. This in turn influences the long-term outcome in terms of appearance and stability, since controlled and simultaneous manipulation of bone position, gingival margin, and prosthetic form and adaptation is accomplished.

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