The use of retraction paste to simplify impression and cementation of ceramic veneers and crowns: 3-year follow-up report

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Proper gingival displacement is an important prerequisite to obtain good quality impressions. Retraction pastes could eliminate the need for retraction cords, as they have advantages such as comfort reported by patients, faster technique, ease of use, no need for anesthesia, and reduced tissue trauma. The objective of this paper was to present a clinical case of ceramic veneers and crowns in which a retraction paste was used for gingival displacement during both the impression and cementation stages, with 3 years of follow-up. Treatment planning consisted of the replacement of preexisting crowns and ceramic veneers on the anterior teeth. After finishing the preparations, gingival displacement with Astringent Retraction Paste was performed without anesthesia or the use of cords and the impression was taken. Before cementation of the crowns and veneers, the Astringent Retraction Paste was applied. Avoiding the use of cords during cementation prevented trauma. The soft tissue margins remained stable and healthy after a period of 3 years. It can be concluded that retraction pastes could be indicated for displacement of soft tissue when preparation margins are at the gingival level or slightly intrasulcular prior to impressions, restoration cementations, direct restorations, and before relining provisional restorations.

Clinical significance: The impression appointment can be traumatic to some patients. The use of cords for gingival displacement usually requires local anesthesia and is time consuming. Retraction astringent pastes instead of cords seems to be a good option for some cases in gingival tissue displacement.

Key words: dental ceramics, dental impression materials, dental impression technique, prosthetic procedure, prosthodontics, restorative dentistry

Ceramic restorations are highly esthetic restorations with predictable results when executed within correct planning. Veneers and crowns can be used to correct tooth shape and position, close diastemas, replace old composite restorations, restore teeth, and mask or reduce tooth discoloration.

Marginal adaptation is crucial to the longevity of ceramic restorations. Marginal overhangs may trigger gingival inflammation, and increase the risk of secondary caries, especially in the region of root cement. Although supragingival preparations are associated with more consistent indexes of periodontal health, it is a consensus in the literature that most situations require margins positioned at the gingival level, or intrasulcularly. These situations include: the need for greater retention, esthetic reason to hide the restoration interface, refinement of preexisting margins, root caries, non-caries cervical lesions. In this context, it is necessary to promote lateral and vertical displacement of the gingival tissue, along with moisture control and hemostasis to ensure acceptable impressions. In other words, soft tissue management for indirect restorations requires gingival displacement and hemostasis.

Despite the advances in flow, hydrophilicity, and ability of impression materials to reproduce details, a good impression
continues to be a challenge for the dental practitioner, especially when preparation finish lines are subgingivally placed.

The purpose of gingival displacement is to expose the finishing line of the preparation to allow penetration of the impression material beyond it. Further, it is important that this spacing persists until the time of removal of the tray from the mouth, thereby preventing tearing of the material. It has been shown that a minimum space of 0.2 mm is required to obtain adequate thickness of light body material within the sulcus without distortion and tearing.9-11 Another goal of gingival displacement is to ensure that it is reversible, avoiding permanent trauma.9-11

The techniques currently used for gingival displacement can be classified into mechanical, chemical, surgical, or a combination of these. The most widely used method is mechanical, with retraction cords impregnated or not with hemostatic agents.12

Several types of cords and astringent agents have been evaluated in the dental literature, as well as their clinical and histologic impact.13 Techniques that do not require the use of cords, such as gingival retraction pastes, have been introduced in the market in order provide comfort, make the technique faster and easier, eliminate the need for anesthesia, and reduce tissue trauma. Products like Expasyl (Acteon), Magic FoamCord (Coltene), Traxodent Hemodent Paste Retraction System (Premier Dental Product), and Astringent Retraction Paste (3M Espe) are some of the products found worldwide.14

A clinical case is presented with a 3-year follow-up of ceramic veneers and crowns, in which a retraction astringent paste was used to handle soft tissues during the impression and cementation stages.

Case presentation

A 53-year-old woman sought dental treatment at a private practice in Niteroi, Rio de Janeiro, Brazil, to enhance her smile and more specifically the shape, size, and color of her anterior teeth. A health questionnaire, clinical examination, and photographic documentation were performed at the first appointment (Fig 1). After clinical and radiographic evaluation, treatment planning consisted of the replacement of the preexisting full crowns on the maxillary lateral incisors and left canine and ceramic veneers on the maxillary premolars, central incisors, and right canine.

Initial impressions were taken with an addition silicone. From this impression, two casts were obtained. A first cast was used to create an additive diagnostic wax-up (Fig 2), and a second cast was intended for the patient to see her original condition and compare it with the intended treatment. After the patient approved the proposed treatment, silicone guides were made to control tooth reduction. The preparation margins were kept at the gingival level or slightly intrasulcular (0.5 mm) (Fig 3).
Fig 4a and 4b  Finishing cups (Flexicups, Cosmedent) and disks (Sof-Lex, 3M Espe) were used to finish and polish the preparations.

Fig 5  Gingival displacement with Astringent Retraction Paste (3M Espe) was performed without anesthesia or the use of cords.

Figs 6a to 6c  Aspects of the maxillary arch impression performed using the two-step technique with putty material and light body addition silicone (Express XT, 3M Espe).

Figs 7a to 7c  Plaster cast showing adequate soft tissue displacement and margin definition.
Finishing cups (Flexicups, Cosmedent) and disks (Sof-Lex, 3M Espe) were used to finish and polish the preparations (Fig 4). Finishing strips were used interproximally to remove retentions that could possibly tear the impression material during impression procedures.

After finishing the preparations, gingival displacement with Astringent Retraction Paste was performed without anesthesia or the use of cords (Fig 5). This clinical case specifically favored the use of the paste since the finish lines of preparations were located at the gingival level or slightly subgingivally. Diastema closures or correction of discolored teeth require more subgingivally positioned margins either to provide adequate emergence profile in the first option or for color masking in the latter.

Maxillary arch impression was performed using the two-step technique with putty material and light body addition silicone (Express XT, 3M Espe) (Fig 6). After removal from the mouth the impression was sprayed with peracetic acid (Perax Rio 0.2%, Rioquímica) for disinfection, left for 15 minutes, and washed in running water. Once disinfected, the impression was sent to the laboratory for cast fabrication. Adequate soft tissue displacement and margin definition can be seen on the cast (Fig 7). The antagonist arch impression was also taken with addition silicone by the two-step technique, and disinfected in the same manner.

The crowns and veneers were made with leucite-reinforced ceramics (IPS Empress Esthetic, Ivoclar Vivadent) in A2 shade for incisors and premolars, and A3 for canines (Fig 8). It is important to point out the importance of two working casts. The first cast was trimmed and used in the preparation of the prosthetic pieces; and a second, rigid cast, was used for proximal adjustments in the laboratory. The clinical stages that preceded cementation were dry proof, wet proof with try-in pastes, and the surface treatment of the restorations and the abutment teeth.

The try-in stage consisted of evaluating the marginal adaptation and color of the restorations. In this step, a verification of the adaptation of the ceramic, as well as the emergence profile, was performed, to ensure adequate morphology of the restorations, with macro- and micro-texture compatible with patient’s dentition, and satisfactory color of the restorations. The wet proof was performed with try-in pastes that simulated the color of the cured cement. In this case, since there was no need to mask or adjust the color of any restoration, the translucent try-in paste (RelyX Veneer Try-in, 3M Espe) was used. The patient was satisfied with the restorations and it was decided that translucent cement would be ideal for cementation.

Leucite-reinforced veneers and crowns were prepared internally using 10% hydrofluoric acid for 60 seconds. Thereafter, the pieces were washed thoroughly under running water, and dried with a light jet of air. The restorations were cleaned with 37% phosphoric acid to remove debris. The restorations were once again rinsed with water for 1 minute and dried with a light jet of air. Silane was applied for chemical bonding, and dried after 60 seconds. The adhesive system (Adper Single Bond 2, 3M Espe) was applied and the restorations set aside without photopolymerization, to prevent a possible misfit.

The treatment of tooth surfaces began with a modified isolation, placing cut rubber dam securely under clamps inserted into the first molars. Although this technique does not provide absolute isolation of the operative field, it promotes good visi-

**Fig 8** Crowns and veneers made with leucite-reinforced ceramics (IPS Empress Esthetic, Ivoclar Vivadent).

**Fig 9** Astringent Retraction Paste inserted into the sulcus of the prepared teeth.
bility, good moisture control, is easy to place, and does not cause pain or tissue trauma. Prophylaxis of the preparations was carried out and the Astringent Retraction Paste was inserted into the sulcus of the prepared teeth (Fig 9). After 2 minutes, the paste was rinsed and the field dried. The use of Astringent Retraction Paste was intended to avoid bleeding during cementation. The teeth were conditioned with 37% phosphoric acid for 30 seconds in enamel and 15 seconds in dentin. They were rinsed for twice the conditioning time and dried with a light jet of air. The adhesive system (Adper Single Bond 2) was applied, and air dried for volatilization and solvent evaporation.

A photocurable resin cement (RelyX Veneer, 3M Espe) was used in the same color as the try-in paste (Translucent) and excess was removed with a brush and dental floss before photoactivation. The cement was photoactivated for 40 seconds on the buccal and palatal surfaces of each piece with a high power polywave light curing unit (VALO, Ultradent).

The option to avoid cords during cementation avoided trauma and bleeding, as can be seen in the immediate postoperative images (Fig 10). The soft tissue margins remained stable and healthy at the 3-year follow-up (Fig 11).

**Discussion**

A close association between overcontoured restorations and periodontal disease has been known for decades. In daily practice, overhanging margins of dental restorations are a frequent problem that leads to gingival inflammation and subsequent attachment loss.8

The use of gingival retraction astringent paste in the present case proved to be effective in the control of moisture and gingival displacement. It helped to obtain a precise working cast, with visible finishing lines, and well adapted restorations. It also proved helpful in the cementation stage to control bleeding and saliva, which can compromise the procedure.

There is no consensus in the literature on the superiority of one method of gingival displacement over others.12-15 It is important to choose a technique that allows a good impression of the preparation, with minimal tissue trauma. In the past, metal-ceramic crowns with deep intrasulcular margins were commonly used to mask the metallic substructure of the restorations.13 For these preparations, tissue displacement with cords, often two, was the most advocated technique.13 Currently, with the increase in metal-free restorations, especially in bleached...
substrates, gingivally positioned margins have become more common. In these situations, retraction pastes can be an good option.9

In the materials used in the presented clinical case, the paste was composed of kaolin to promote displacement and 15% aluminum chloride to generate hemostasis.9 The effectiveness in reducing crevicular fluid and hemostasis proved to be similar to that reported by cords impregnated with epinephrine.10,17,18 A review article comparing the efficiency of cordless versus cord technique suggests improved ability of paste systems to achieve hemostasis.16 The authors point out the avoidance of trauma during cord packing as the main reason. Furthermore, the paste is hydrophilic and can be easily washed from the gingival sulcus.10 Its use is not limited to impressions. It can be used prior to cementation, and for composite restorations near the gingival margin when absolute isolation cannot be achieved.

Some advantages of retraction pastes are the comfort reported by patients, the speed of the technique, and ease of use.14 With the use of pastes there is no need for anesthesia. Retraction paste systems have been shown to produce less stress for patients,9-11,14,15 and less trauma to the tissues when compared to the retraction cords.17,18 One study demonstrated lower rates of inflammatory cells in the crevicular fluid after soft tissue displacement with pastes when compared to cords.15 A recently published systematic review and meta-analysis described biologic benefits of using retraction pastes.19

The authors showed that gingival retraction pastes were associated with less destructive effects on periodontal tissues, such as lower probing depth, less bleeding on probing, and better Gingival Bleeding Index.19

As disadvantages, the viscosity of the paste may not be ideal to promote adequate spacing in deeper subgingival areas, and aluminum chloride may inhibit polyether and addition silicone polymerization if the dental practitioner does not properly wash the area prior to impression.12

Conclusions

Ideal indications for retraction pastes are: displacement of soft tissue when preparation margins are positioned at the gingival level or slightly intrasulcular (0.5 mm); as an auxiliary tool in the control of humidity and hemostasis prior to indirect restoration cementation; prior to direct restorations near the gingival margin; and before relining provisional restorations. In cases where the finishing lines of the preparations are deeper and greater mechanical displacement of the tissues is necessary, the use of cords seems to be indicated.

Declaration

The authors deny any conflicts of interest related to this study.

References


