

Tissue Displacement techniques for Optimum Final Impression of Fixed Restorations

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Abstract:
Statement of problem: One of the critical steps during restorative dental procedures is complete control of the environment of the operative site, this also extends to the gingiva surrounding the teeth being restored. For the patient’s comfort and safety and for the dentist's access and clear visibility, the gingiva must be displaced to make a proper final impression, permit completion of the preparation, and cementation of the restoration. Therefore, the choice of an appropriate displacement method and timing is a critical step.
Purpose: The aim of this comparative review was to assess the chemo-mechanical gingival displacement methods in terms of the role of the chemical agents used in achieving hemostasis control and also the proper timing in regard leaving the cord in the sulcus.
Methods: An electronic database search was conducted using two major data bases, PubMed and ResearchGate, to search any studies involving gingival retraction techniques.
Results: 8 potential studies were analysed.
Conclusion: The chemo-mechanical method of using a retraction cord impregnated or soaked in various chemicals is the most frequently used method for an optimum time of 4 min before impression taking. The retraction cord mechanically displaces the gingival tissue and absorbs moisture contamination in the gingival sulcus, while the chemical agents control hemorrhage and shrink the gingival tissues.

INTRODUCTION

Prosthodontists have their dexterity and artistry constantly challenged not only by the complexities of patients’ conditions, but also by the nuances of techniques employed in treatments. Perhaps this is most evident in fixed restorations and the multitude of variables and trials they present. Fixed, full-coverage prosthodontic restorations are most dependant procedure on the health and stability of periodontal structures. Caries, current restorations, esthetics or additional retentions are just some of the variables that cause these full coverage preparations to require sub-gingival margins. The variables are further complicated by difficulties in attaining good impressions of cervical finish lines that fail to displace soft tissues, fluids, or debris. The goal is to obtain a sulcular width greater than 0.2 mm, making it possible for the impression material, or scanner, to copy the tooth structure and provide adequate thickness of the impression material to resist distortion or tearing. Therefore, the choice of an appropriate displacement method is a critical step. Several clinical methods are available for adequate gingival displacement, including mechanical displacement, chemo-mechanical displacement, electro-surgery, and rotary gingival curettage.

DISCUSSION

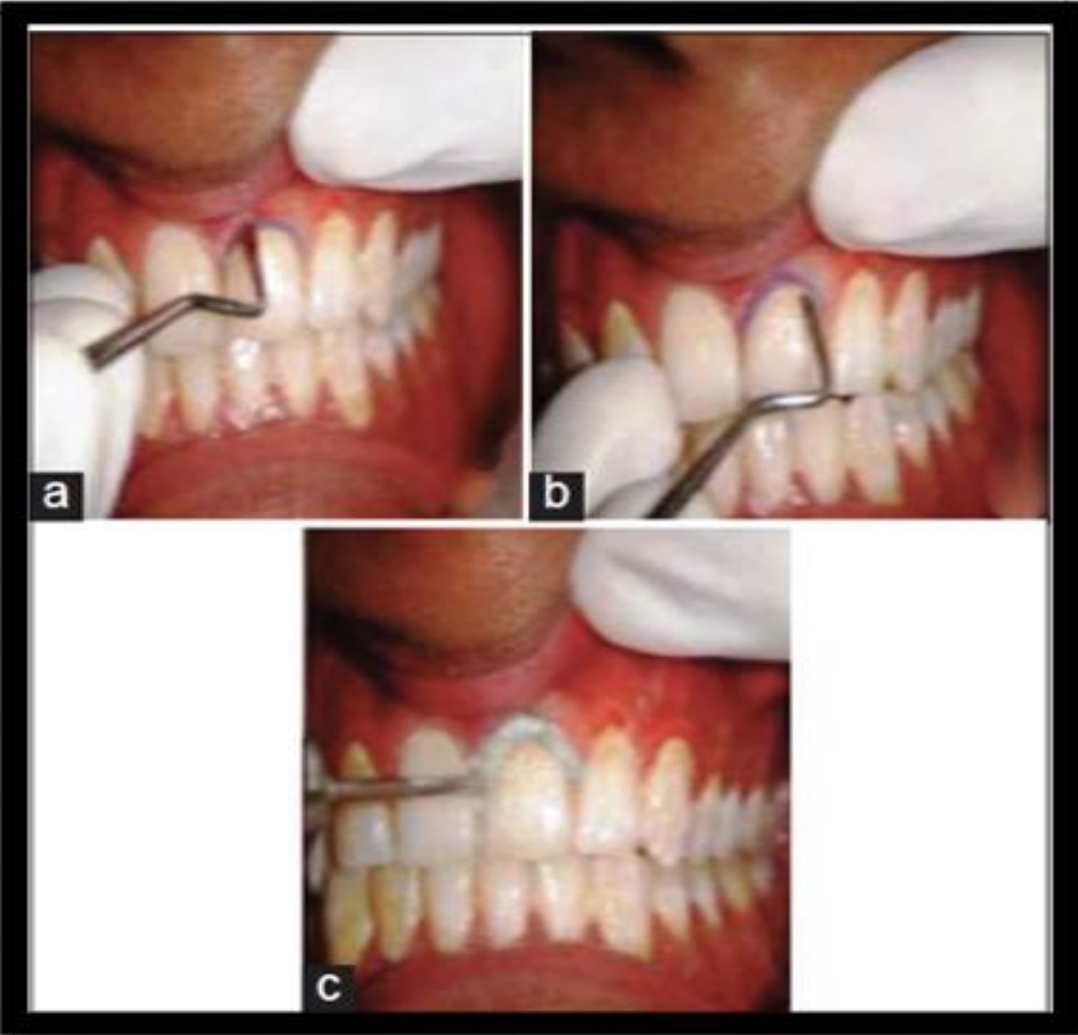
Several hemostatic medicaments are available to be used in conjunction with displacement cords and many have been substantially studied. They can be vasoconstrictors that cause contraction of the blood vessels, Astringents that contract the gingival tissue or chemicals that cease bleeding by haemostasis and coagulation.

Epinephrine has been used as chemical with which retraction cords were impregnated. It is used in concentrations of 0.1% and 8%. However, contraindications include a positive history of cardiovascular diseases, hyperthyroidism, and known hypersensitivity to epinephrine. Epinephrine syndrome has also been reported in patients with none of these contraindications. The syndrome includes tachycardia, increased respirations, increased blood pressure, nervousness, fright on occasion, and postoperative depression. The symptoms appear either after the cord has been in for a few minutes or shortly after removal. It has been recommended that 0.1% epinephrine should be used rather than the 8% solution.

Ferric sulfate (15.5-20%) is commonly employed as a coagulant while performing associated gingival displacement. Another agent used for haemostasis is 20-25% aluminum chloride. It has been found to be least irritating to the gingival tissues but also results in the removal of the smear layer and dentine etching. Alum and aluminum sulfate are considered to be the safest astringents because they do not have any significant systematic effect, but they are also less effective at controlling haemorrhage and crevicular exudates.

A study by Chaudhari et al. was designed to clinically evaluate efficacy of newer retraction agent tetrahydrozoline (b) with two widely used retraction systems; Expasyl retraction system (c) and medicated retraction cords with aluminium chloride (a) on basis of amount of gingival retraction. The amount of gingival retraction obtained by using aluminium chloride as gingival retraction agent was maximum compared to tetrahydrozoline and Expasyl. The results of a study by Runyan et al. Indicated that soaking displacement cords in aluminum chloride solution does not lessen the cords ability to absorb fluid. Because aluminum chloride solution does aid in hemorrhage control, soaking cords before placement may be a useful adjunctive technique.

1) VASOCONSTRICTORS
a) Epinephrine
b) Nor-epinephrine
2) BIOLOGIC FLUID COAGULANTS
a) 15.5–20% Ferric sulfate
b) 100% Alum
c) 15–25% AlCl ³
d) 10% Aluminium potassium sulfate
e) 15–25% Tannic acid
3) SURFACE LAYER TISSUE COAGULANTS
a) 8% ZnCl ²
b) Silver nitrate



In a systematic review and meta-analysis that conducted by Martins et al, the purpose was to compare gingival displacement with conventional cords and cordless techniques and determine the reliability of the measurement methodologies. In this meta-analysis, displacement cord resulted in increased gingival displacement when compared with the cordless technique. Taken together, the current evidence supports the general superiority of the cord technique for increased gingival displacement.

The time for which the cord is placed in the sulcus is also an important consideration. If the cord is placed for only two minutes, the sulcus width is reduced to 0.1 mm within 20 seconds of cord removal. On the other hand, If the retraction cord is placed for a longer time, this could result in damage to the gingival tissue and recession. This is especially relevant for pre-impregnated cords or cords used with haemostatic agents.

Baharav and colleagues tested a 2-cord technique for tissue displacement and concluded that the cords need to stay in the sulcus for 4 minutes before impression making to produce sufficient crevicular width expansion.

Laufer et al. investigated the length of the time medicated displacement cords should remain in the gingival crevice prior to impression making. They concluded to achieve a crevicular width of 0.2 mm, cord should remain in the gingival crevice for an optimum time of 4 min prior to impression making when using materials evaluated in this study. However, contemporary textbooks recommended that the cord should remain in the gingival crevice for an optimum time of 10 min.



CONCLUSION

Chemical impregnated cords are the most commonly used technique of gingival tissue displacement. Use of The cord impregnated with Aluminum chloride (5–10%) is referred to be the safest and most effective method of gingival displacement for an optimum time of 4 to 10 min. Aluminum chloride has no contraindications and minimal side effects when used in lower concentration.

The techniques presented highlight the significance of proper gingival retraction of soft tissue during impression capture. The dentist must be knowledgeable of the different techniques available for proper gingival retraction to allow for adequate exposure and successful impression capturing. The longevity of the restorations greatly depends on appropriate gingival retraction of tissues allowing for better margins and suitable aesthetics.

