TECHNIQUES

GINGIVAL RETRACTION TECHNIQUES - A PRE REQUISITE IN FIXED PROSTHODONTICS: A REVIEW

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Abstract

Gingival retraction or dilation is an important procedure in the fabrication of fixed prostheses. Quite often, the margins of these restorations are placed very close to the gingival margin, or even subgingivally, for aesthetic and functional reasons. Therefore, the operating surgeon must correctly record the prepared cervical finish line to enable adequate marginal integrity for the restoration. This is accomplished by retracting the gingiva laterally and making the area clean and dry. Gingival retraction is usually performed using a retraction cord impregnated in a suitable medicament.

Both nonsurgical and surgical techniques have been established for gingival retraction. This article highlights the various techniques used in gingival retraction. No single technique has been scientifically proved superior to others. The choice of gingival retraction depends on the clinical situation and the operating surgeon’s preference.

Introduction

A healthy coexistence of restoration and the surrounding periodontium should be the ultimate aim of any fixed prosthodontic treatment. The key to achieve such a relationship or harmony is an accurate impression procedure.\(^1\) Displacement of the gingival tissue is essential for obtaining an accurate impression for the fabrication of fixed restoration, particularly when the finish line is at or just inside the gingival sulcus.

Gingival displacement is defined as the deflection of marginal gingiva away from the tooth. This is performed to create sufficient lateral and vertical space between the margins of the tooth preparation and the gingival tissue in order to allow the injection of adequate bulk of impression material into the expanded crevice. Impression along the margin is critical for the marginal fit and emergence profile of the prosthesis.\(^2\) A sufficient bulk for the impression material should be ensured so that it can be removed from the mouth intact, without any tear. The critical sulcus width required for this is
approximately 0.2 mm at the level of the finish line.

The techniques of gingival tissue displacement can be broadly classified as nonsurgical and surgical. Surgical retraction techniques require more skills, and hence, they are used only by a minority of clinicians. Nonsurgical techniques are very commonly used. This article describes the different nonsurgical gingival displacements.

**Requirements of gingival retractions**

- It should provide maximum exposure of the operating site.
- It should expose the finish line margins of the preparation completely such that it allows the recording of the impression and provides marginal integrity for the restoration.
- It should provide space for sufficient bulk of the impression material so that the impression does not tear on its removal.
- It should permit completion of the preparation and cementation of the restoration.

**Techniques of nonsurgical gingival retraction**

The common techniques used are as follows:

1. **Modified impression techniques**
   - Copper band impression
   - Temporary acrylic coping impression
   - Matrix impression system
   - Modified custom tray technique

2. **Mechanical**
   - Gingival protectors
   - Matrix and wedges
   - Rubber dam
   - Retraction cord (plain or impregnated)
   - Single cord technique
   - Double cord technique
   - Infusion technique
   - Retraction strip

3. **Retraction paste or cordless technique**
   - Retraction paste with hemostatic agent
Retraction paste although without hemostatic agent

**Modified impression techniques for gingival retraction**

**Copper band impression technique**

A properly fitting copper band for a particular tooth is selected. The tube is festooned or trimmed to follow the contours of the free gingival margin. The tube with the impression material is carried up to the finish line of the preparation to displace the gingiva and produce an adequate impression. This technique is used with an impression compound and elastomeric material, i.e., first an impression is obtained with the compound, and then, it is lined with elastomeric material. This technique can also be used by reinforcing the copper band with self-cure acrylic instead of an impression compound and then lining with elastomeric material. Without the acrylic reinforcement, the band may get distorted during removal. This technique is used when multiple teeth preparations are to be recorded in an elastomeric impression.

Temporary acrylic coping: A temporary acrylic coping is fabricated, and the inside is relieved for creating space for the impression material. The coping is then filled with the impression material and reseated. The tissue is displaced mechanically when the material is forced into the sulcus. A complete arch impression is then obtained to pick the coping impressions.

**Matrix impression system**

This technique was described by Livaditis. The technique involves 3 steps: In step 1, a suitable elastomeric semi-rigid material is used to form the matrix. In step 2, a elastomeric material is used, which bonds to the matrix forming material and is required to make an impression of the preparation. The material displaces the gingival tissues and flushes the debris out of the sulcus. In step 3, a complete arch impression is subsequently made in the stock tray by using medium viscosity elastomeric impression material. This impression picks up the matrix impression.

**Modified custom tray technique**

A custom tray is modified by intraoral relining with autopolymerizing resin and then polymerized outside at 100°C for 5 minutes. The areas to be refined are relieved by trimming the resin with a bur to create a 2-mm clearance for the elastomeric
impression material. For areas with subgingival finish line, only 0.5 mm of resin is removed to direct the elastomers into the gingival sulcus. It has the advantage of time saving because it eliminates the need for a retraction cord.\(^5\)

**Mechanical retraction**

Gingival protector: This is used to displace the soft gingival tissue away from the tooth when rotary instruments are used for tooth preparation.

**Matrix and wedges**

Wooden wedges can be placed interproximally to mechanically depress the gingiva. Matrix with gingival extension can be used to displace the gingival tissue.

**Rubber dam**

Heavy, extra-heavy, and special heavy gauges of rubber dam with proper interseptal dimensions can be used. The rubber dam aids in gingival retraction.

Since the rubber contains sulphide compounds, it may inhibit polymerization of polyvinyl siloxane. Hence, the use of rubber dam should be avoided when polyvinyl siloxane is used.

**Retraction Cord**

Retraction cord can be used plain or impregnated with medicaments. Plain cords can be gently forced into the sulcus to displace the gingiva laterally from the tooth. The use of pressure alone often will not control sulcular hemorrhage. On removal, there is generally gingival bleeding.\(^6\) Preimpregnated or soaking a cord with hemostatics can control the sulcular hemorrhage and improve its tissue retraction qualities. The chemicals used along with the cord can be vasoconstrictors and astringents.

**Single-cord technique**

This technique is indicated when retracting the gingiva for obtaining the impression of one or three prepared teeth with healthy gingival tissue, especially when the prepared margins are at or below the gingival tissue.

A single cord is placed in the sulcus and removed before taking the impression. This provides displacement, which is about the width of the cord. In a deep sulcus, the tissue can collapse even over the top of the cord, thereby restricting the access of the impression material into the retracted sulcus. This causes the impression material to tear on removal or since the impression material
is very thin in these regions, and it can easily deform.

**Double cord technique**

This can be used when single or multiple teeth are prepared. It involves 2 cards, one placed above the other. A thin 00 retraction cord is first packed to control the gingival seepage and hemorrhage. The second large cord is impregnated with a hemostatic agent and placed above the first cord for a minimum of 4 minutes and removed before the impression is made. The advantage of this technique is that the first cord remains in place within the sulcus and thus reduces the tendency of the gingival cuff to recoil and displace the impression material. This approach not only helps control gingival hemorrhage and exudates but also prevents the tearing of the sulcus impression because of inadequate bulk. Another advantage is that the first cord protects the tearing of the gingival epithelium.

**The infusion Technique**

After the preparation of the gingival margins, subgingival hemorrhage is controlled using a specially designed Dento-Infuser device, with a 20% ferric sulphate medicament. The infuser is moved around the tooth in a burnishing motion. The hemostasis is checked for, and a knitted retraction cord soaked in ferric sulphate solution is packed into the sulcus. After placing the cord in the sulcus for 1–3 minutes, it is removed. The sulcus is rinsed with water, and the impression is obtained. The main disadvantage of this technique is that it may not provide enough displacement of the gingiva for adequate bulk of impression material in the sulcus. The gingival tissue may take up the blue-black stain, which will disappear in few days.

**Retraction Strips**

Synthetic retraction materials are chemically extracted from a biocompatible polymer (hydroxylate poly vinyl acetate) that creates net-like strips. The material, which can be easily shaped and adapted into the sulcus without local anesthesia, is slightly effective for the absorption of intraoral fluids, such as saliva, blood, and crevicular fluids. Once inserted around the tooth, the sponge-like strips expand with the absorption of fluids and exerts pressure on the gingival tissue to cause displacement.

**Cordless retraction**
These materials are available in paste-like form and supplied with a specialized dispenser to displace the gingiva when injected into the sulcus. They are less traumatic than the conventional retraction cord and are preferred for gingival displacement in implant prosthesis. They are also used to obtain digital impressions for the CAD/CAM prosthesis.

Retraction paste with hemostatic agent
A number of retraction pastes with hemostatic agents are available. One such material has Kaolin matrix and 15% aluminum chloride. Kaolin expands hygroscopically when it is in contact with the crevicular fluid, and it produces displacement. Aluminum chloride can inhibit the setting of polyether and polyvinyl siloxane impression material, and so it should be rinsed away properly before making the impression.

Retraction paste without hemostatic agent
A variety of polyvinyl siloxanes, which generate hydrogen gas during setting, induce expansion. The material is syringed around the preparation, and a cotton cap placed over it held under biting pressure for 5 minutes. As the patient bites over the cap, the silicon material is pushed into the sulcus. The silicone material foams due to the liberation of hydrogen as the silicon sets and expands in the sulcus producing displacement. The material is removed after 5 minutes.

Precautions to be taken during gingival retraction
- Proper retraction techniques should be selected
- The concentration of chemicals, their period of contact with tissue, and the applied pressure should be controlled properly by the operating surgeon.

Summary and Conclusion
The periodontium around the restoration should be healthy because the margins of the tooth preparations are placed very close to the gingival tissue. Transient displacement of the gingiva is an important step in the impression procedure for the fabrication of crowns and fixed partial denture. Several techniques have been established for the retraction of the gingiva. Each technique has its own advantages and disadvantages. Recently, techniques have also been...
developed for the retraction of gingiva without the use of cords. Clinicians should choose the material and technique most suitable for the patient.

1. References


