

# ADVANCEMENTS IN TISSUE DISPLACEMENT- A REVIEW

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## Abstract

Numerous advancements have occurred in impression making for fixed prosthesis in the present century. Use of improvised materials and sophisticated techniques are propagated only with the aim to record the margins and the gingival tissues properly. The gingival retraction is done to displace the tissues laterally to achieve the desired aim of recording the sub-gingival margins. The purpose of this article is to review the latest advancements in the field of tissue retraction and analyse their merits and demerits. Advancements are a never ending process and will continue to advance day by day. It is our responsibility as a dentist to keep an eye on latest developments, choose the appropriate treatment plan and execute it as precisely as possible.

**Key Words:** - Gingiva, Margin, Retraction, Sub-Gingival

## Introduction

Tissue displacement is defined as deflection of marginal gingiva away from tooth.<sup>1</sup> The existence of harmony between the restoration rendered and the periodontal tissues is must for providing marginal fit of the restoration avoiding the chances of recurrent caries and gingival inflammation. The goal of tissue displacement is to reversibly displace the gingival tissues in a lateral direction so that a bulk of low viscosity impression material can be introduced into the widened sulcus avoiding the chances of tear of impression material upon removal and capturing the marginal details.<sup>2</sup> Various surgical and non-surgical methods are described in the literature having their own advantages. With time, new techniques and materials have been developed which have made gingival retraction a simple and elective procedure.

## Lasers<sup>3-5</sup>

Use of lasers is adjunctive in fixed prosthodontics. One of the important elements of success in fixed prosthodontics is the care and accuracy of the component treatment stages and the laser can, often, confer minimal damage of collateral tissue through proper consideration of the use of minimal laser energy of the correct wavelength.

## Types

### Neodymium: Yttrium – Aluminum - Garnet (Nd-YAG) Lasers

The use of this type is contraindicated near tooth surface as they tend to absorb energy and heat. This heat can be transmitted to bone and may result in bone loss.

### Erbium: Yttrium – Aluminum - Garnet (Er:YAG) Lasers

These minimally penetrate the soft tissues, so they are fairly safe to use.

### CO<sub>2</sub> lasers

The prime chromophore for CO<sub>2</sub> laser is water, hence it reflects off surfaces. CO<sub>2</sub> lasers absorb little energy near tissue surfaces, with only small temperature increases (<

3°C) and minimal collateral damage. Also, these lasers do not alter the structure of the tissues.

## Advantages

- Excellent haemostasis is provided by CO<sub>2</sub> laser.
- There is reduced tissue shrinkage.
- It is relatively painless procedure and sterilizes the sulcus.

## Disadvantages

- Er:YAG laser is not good in haemostasis as CO<sub>2</sub> laser.
- CO<sub>2</sub> laser provides no tactile feedback, leading to risk of damage to junctional epithelium.

## Expa-syl temporary gingival retraction system<sup>6-10</sup>

Kerr Corporation has introduced this product having definite advantages. The introduction of Expasyl brings dentists a product providing a way to overcome some of the shortcomings of previous materials and techniques.



Figure 1: - Expasyl Kit.

## Action

The system includes an injectable material and includes a haemostatic agent supplied in a cartridge and delivered with a specially designed gun. The Expasyl material is Kaolin incorporated into an organic binder with aluminum chloride added for haemostatic action. Two types of applicators are available, a redesigned manual gun and a new power applicator. These applicators have improved the ease of the material.

Expasyl aids in soft tissue control in two ways. First, the consistency of the “putty-like material” when injected into the sulcus aids to mechanically displace the gingival tissues horizontally and vertically to open the sulcular space, effectively providing the space that mechanical cords provide. The Expasyl paste is injected in the sulcus, exerting a stable, non-damaging pressure of only 0.1N/mm. When the Expasyl is left in place for 1 minute, the pressure is sufficient to obtain sulcus opening of 0.5mm for 2 minutes. Since, passive technique is used in placing the material, expasyl is less traumatic to the tissues leading to reduced chances of bleeding. Secondly, aluminum chloride incorporated in the product is an effective haemostatic agent.

#### Advantages

- Effectively achieves hemostasis
- Little pressure – atraumatic
- Less time consuming
- Easy removal
- Easy to dispense with the gun

#### Disadvantages

- Expensive
- Thickness of the paste makes it difficult to express into the sulcus.
- Metal tips too big for interproximal areas.

#### Gingitrac<sup>11,12</sup>

Gingitrac is a gingival retraction paste system that uses a preloaded syringe to apply the paste around the margins. The paste contains aluminium sulphate as astringent, and if necessary, a hemostatic agent can be applied prior to its use. For single tooth use, a cap is used to apply pressure for up to 5 minutes after application of paste. The cap is first filled with the paste, and then placed over the tooth and paste is syringed around the margins. For multiple tooth preparations, a plastic tray is first used with a firm paste matrix over which the Gingitrac paste is syringed before the tray is placed over the arch and held in position for 3-5 minutes. For both single and multiple tooth preparations, gingival retraction is achieved through the application of pressure. The paste is removed prior to impression taking.



Figure 2: - Gingitrac Kit

#### Magic foam cord<sup>13,14</sup>

Magic Foam Cord is a new non-haemostatic gingival retraction system. It is the first expanding vinyl polysiloxane material designed for retraction of the gingival sulcus

without the potential traumatic and time consuming packing of retraction cord. The material is syringed around the crown preparation margins and a cap (Com-precap) is placed to maintain pressure. After five minutes, the cap and foam are removed and the tooth is ready for final impression. The material claims to have an expansion of 160% after 5 minutes.



Figure 3: - Magic FoamCord.

#### Matrix impression system<sup>15,16</sup>

Matrix impression system is a new system that requires a series of three impression procedures, using three viscosities of impression technique. It attempts to overcome the deficiencies of the older systems and at the same time incorporate their best features. A matrix of occlusal registration elastomeric material is made over the tooth preparations. Depending on the distribution and complexity of the preparations, the matrix may be made in one piece or in two or more sections. The retraction cord is removed and a definitive impression is made in the matrix of the preparations with a high viscosity elastomeric impression material. After the matrix impression is seated, a stock tray filled with a medium viscosity elastomeric impression material is seated over the matrix and remaining teeth to create impression of the entire arch.

This system effectively controls the four forces that are relapsing, retraction, displacement, and collapsing that impact on the gingiva during the critical phases of impression making. The design of the matrix also forces the high viscosity impression material along the preparations and into the sulcus where it cleanses the sulcus of debris and

fills it. The matrix facilitates the formation of the optimum flange. Chances of tearing are virtually eliminated as of improved configuration of the sulcular flange, decreased amount of voids or contaminant in the sulcus.

#### The Matrix impression system uses three impression materials

- A suitable elastomeric semi rigid material required to form the matrix.
- A high viscosity elastomeric impression material, which will preferably bond to the matrix-forming material, required to make an impression of the preparations in the matrix.
- A stock tray with a medium viscosity impression material to pick up the matrix impression and the remaining arch not covered by the matrix.

#### Advantages

1. Eliminate chances of tearing of the sulcular flange by developing the optimal configuration.
2. Clean blood and debris from the sulcus area at critical moments.
3. Delivers impression material in the sulcus gently but with increased accuracy and speed.
4. Holds the sulcus open for an increased time.

#### Mercocel

Mercocel<sup>17</sup> is a new retraction material to displace gingival tissues without tissue damage before impression making. Mercocel retraction strips are synthetic material that is specifically chemically extracted from a polymer hydroxylate polyvinyl acetate that creates a net like strip without debris or free fragments. Placement of Mercocel retraction technique does not require use of local anaesthesia, resulting in careful management of the delicate gingival tissues with improved management of the treatment. Also, Mercocel retraction device ensures sufficient gingival retraction to permit measurement of the subgingival finish line and gingival surfaces of unprepared teeth. The porous and sponge-like microstructure of mercocel retraction strips ensures a dry environment allowing impression material to record precise tooth preparations. Scanning electron microscopy reveals absence of fibres thus, decreasing the risk of post-operative complications.



Figure 4: - Mercocel strip reveals absence of filaments and spongy microstructure.

#### Advantages

- It is chemically pure and can be easily shaped.
- It effectively absorbs intraoral fluids such as saliva, blood and gingival fluids.
- It is free of any fragments without presence of any debris.

#### Racegel<sup>18</sup>

Racegel is a new hemostatic agent that controls bleeding and absorbs crevicular fluid prior to and during impression taking and crown placement. Due to its thermodynamic characteristics, the material's viscosity increases upon contact with the tissue providing access to the gingival margin. The gel contains 25% aluminium chloride, oxyguinol and excipients. The Aluminum Chloride is clinically proven for its astringent properties. The bright orange colour makes it easy to dispense, place and rinse. The gel helps to prepare the sulcus prior to impression taking and can be used with or without gingival retraction cords. It facilitates the opening of the gingival crevice, reduces bleeding and oozing. Due to its consistency, it rinses away quickly, leaving no residual material, discoloration or irritation of the surrounding tissue.

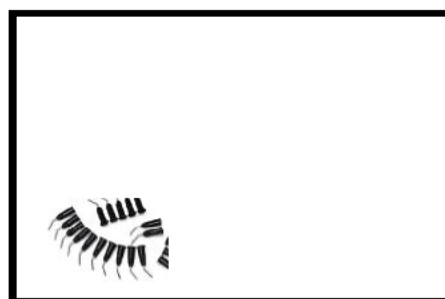


Figure 5: - Racegel kit

#### Stay Put<sup>19</sup>

Stay-put impregnated combines the advantages of an impregnated braided retraction cord with the adaptability of a fine metal filament. Aluminum chloride is used for impregnation. Non-Impregnated stay put cord is also available which can be impregnated with hemostatic agent as required.

#### Advantages

1. Quick Haemostasis.
2. Can be Pre-shaped.
3. Adaptable and Pliable.
4. Good contrast to gingiva.
5. No risk of cardiovascular Problem.

#### Conclusion

Tissue displacement has become an integral procedure for the success of fixed prosthesis as it helps in maintaining the equilibrium between the tissues and the restorations. Various techniques as described are equally effective in dilating the tissues and it is the operator's judgement to choose the technique and material according to the clinical situation and imply best of his efforts to manage these soft tissues with



minimal trauma to avoid any chances of recession and provide a healthy restoration to the patient.

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