

# Advancements in Gingival Retraction Techniques in Restorative Dentistry

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**Abstract:** Day to day practice at a dental office is a challenging one where a dentist has to ideally confront a situation with his command and expertise. One such frequent situation arising is that concerned with isolation techniques associated with a restorative procedure. Various isolation techniques are put forth in practice which includes use of a saliva ejector, a rubber dam and gingival retraction methods. Though one presumes a common saliva ejector and dental dam would suffice to maintain an ideal working environment, a gingival retraction is essential to perform better when it comes down to placing a restoration at finish lines below the gingival margin. Gingival retraction methods not only provide ample vision and ideal working environment, but also maintain hemostasis to certain extent. Numerous gingival retractions have been employed previously like mechanical, chemical, surgical and chemomechanical procedures. Each type is loaded with its own pros and cons. The choice of a retraction method depends on clinical situation and accessibility. This review revolves around recent advances in cordless retraction techniques.

**Keywords:** gingival retraction, cordless retraction, isolation, chemomechanical retraction, recent advancement

## 1. Introduction

Various challenges surfaces for a dentist while confronting problems associated with deep cavity and during impression procedures or luting of restorations. Obtaining superior bonding and minimal contamination due to numerous factors in the oral cavity necessitates a thorough knowledge of gingival retraction agents and techniques existing and to be able to apply the suitable one for specific purposes.<sup>1</sup>

Numerous problems are faced in operative dentistry from the limiting influence of all the associated muscles to other hindrances caused due to limited vision and isolation, resulting from gingival crevicular fluid, saliva and gingival bleeding during tooth preparation to receive a restoration.<sup>2</sup>

Be it a direct or an indirect restorative procedure “moisture control” plays a vital role in dental procedures. This can be achieved only with effective isolation techniques. One such effective isolation is provided by dental rubber dam. Though it plays an imminent role by providing ample control and access to the prepared tooth area, its use is precluded at various occasions.<sup>3</sup>

Hence a substitute for contemporary isolation techniques should be deliberated to control blood and saliva at the preferred site. The choice of gingival retraction technique commonly is governed by the clinical condition. The magnitude of hemorrhage impacts the inclination towards a specific retraction technique.

## 2. Types of Retraction Methods

Traditionally, procedures for soft-tissue management and isolation are classified into three main approaches: Mechanical, chemical or surgical.<sup>4</sup>

Mechanical methods comprise of gingival retraction cords. Gingival retraction techniques using cords are frequently strenuous, agonizing in the absence of anesthesia, and characterize a menace of injury to the epithelial attachment.<sup>5,6</sup> Additional risks might contain risk

detachment of the epithelial membrane, irreversible gingival retraction and undue hemorrhage or seeping.

Chemical methods comprise an assortment of chemical solutions and gels performing as astringents or hemostatic agents.<sup>7</sup> They are further classified as Class I (vasoconstrictors, adrenergics) or Class II (hemostatic agents, astringents).<sup>8</sup> The current agents which are used for hemostasis have shown to be unstable, hinder bonding, and repeatedly leave debris in the sulcus area.<sup>9,10</sup>

Surgical methods can be divided into electrosurgery and laser.<sup>11,12</sup> Conventional gingival excision practices by laser and primary rotary curettage, can occasionally be painful and lead to injury of the periodontium.

More recent and widely employed approach is chemomechanical methods which combine effectiveness of chemical and mechanical methods and delivers non-invasive tissue management. The application of conservative retraction cords as a mechanical or chemo-mechanical system is well recognized in practice because of its comparative predictability, efficacy, and security associated with rotary gingival curettage and electrosurgery.<sup>13</sup> But it has definite restrictions which comprises higher working time, pain, prerequisite of local anesthesia, damage to epithelium and gingival recession. To overcome these limitations, various newer retraction systems are introduced. There have been improvements in mechanical retraction with the introduction of cordless retraction techniques with added hemostasis. The following review presents the currently available cordless retraction systems in market with its advantages and disadvantages.

### 2.1 Expasyl (SDS/KERR)

Expasyl is considered a viable alternative to a conventional retraction cord. It is a viscous paste used for all techniques which necessitates gingival retraction comprising: impressions, luting of restorations, securing a rubber dam, and restoration of class II, III, and V cavities. Expasyl is a biocompatible material which presents with advantages of having excellent retraction with longer shelf life. It is known

to physically displace the tissue for better marginal access. Minimal pressure required to displace the tissues. It does not pose hazard of rupturing epithelial attachment. It is time and performance efficient when compared to conventional cord with retraction achieved as quickly as -2 minutes. It also produces hemostasis and controls crevicular seepage.<sup>14</sup>

Expasyl (Kerr) is an aluminum chloride (AlCl<sub>3</sub>) based paste-like material syringed into the sulcus with autoclavable stainless steel dispenser, acting both as a chemical hemostatic agent and mechanical retraction material (chemomechanical method). While it delivers exceptional hemostasis, the retraction is known to be minimal.<sup>15</sup>

The composition has basic three ingredients: kaolin, water, and aluminum chloride. Expasyl contains white clay (kaolin) to guarantee the consistency of the paste along with its mechanical action while aluminum chloride provides hemostasis.<sup>16</sup>

The Expasyl paste is syringed into the crevicular space using a stable non deliberate pressure of 0.1N/nm.<sup>17</sup> The ideal biologic width is around 3mm. When Expasyl is injected and held in place for a minute, it will generate sufficient pressure to acquire a sulcus opening of 0.5mm, for two minutes.<sup>10</sup>

Minimal pressure required to apply Expasyl. It is extruded directly into the sulcus where it turns rigid and creates gap between the tooth and the tissue, more like a retraction cord. Hemostasis and gingival crevicular fluids are arrested by aluminum chloride, which also shrinks the epithelium providing extra gap between the sulcus. Rinse and dry after 2 minutes. Tooth is hence ready for the succeeding procedure.

## 2.2 Magic

### Foamcord (Coltene/Whaledent)

Magic Foamcord presents with efficient hemostasis and minimal damage to tissues while retraction.<sup>18</sup>

Magic foam cord is a polymeric material which is introduced into the gingival sulcus and allowed to set. Circular foams are supplied along with the material which is contoured to the shape of gingival sulcus which is available in three sizes to accommodate different teeth. The patient is advised to bite on a cap (Comprecap) while maintaining the pressure on for 3 minutes. The material slightly expands during setting and produces exceptional lateral and vertical displacement. The cap and foam are removed after 5 minutes and the tooth is set for the final impression.<sup>19</sup>

Magic foam cord is less traumatic to tissues than conventional retraction cord. The Color of foam aids in visualization. The material is easy to separate from the sulcus. It has adequate working time. But it comes with a disadvantage of limited clinical indications, no hemostasis provided, comparatively expensive to expensive retraction cord. No improvement is observed in working time or quality of retraction compared with conventional cord. It is considered to less effective on subgingival margins. Intraoral tips provided may be too bulky to adequately inject material into gingival sulcus.

A study which evaluated the clinical efficacy of 3 new gingival retraction systems; Stay-put, Magic foam cord and Expasyl, on the basis of their relative ease of handling, time taken for placement, hemorrhage control and the amount of gingival retraction, Magic foam cord retraction system was considered more effective gingival retraction system among the other three.<sup>20</sup>

## 2.3 Gingitrac (Centrix)

It is an effective gingival retraction system based on vinyl polysiloxane material with aluminium sulfate astringent. It truly harnesses the power of pressure, astringency and time unlike traumatic cord techniques or messy paste alternatives. GingiTrac uses an auto mixing gun to deliver the perfect combination of mild built-in astringency to control hemostasis. Unlike with retraction cord, the coagulum will not stick to the silicone GingiTrac, so there is no bleeding when it is removed. A GingiCap is used for single preparation retraction which works in less than 5 minutes, without hands in mouth and blanches the gingiva till the vestibule. It works gently with no tissue trauma to provide more accurate impressions. The convenient single-dose tips are much easier to handle than a bulky automix gun and are cost effective.<sup>21</sup>

## 2.4 Gel-Cord

Gelcord comprises of- 25% Aluminum Sulfate Gel. Unlike liquid astringents it stays put when placed for maximum hemostasis. No reports of tissue necrosis have been reported. It is indicated for Class V Restorations or if tissue is altered during composite placement. The gel is rubbed mildly into the hemorrhaging area. Gelcord is flavored well for greater patient acceptance and brightly colored for better visualization. It provides enough lubrication for the initial cord to slide easily into the sulcus.<sup>22, 23</sup>

## 2.5 Tissue Goo

Tissue Goo is a gel that contains active ingredient is 25% aluminum sulfate stays put where it is placed and provides ample hemostasis during tissue management processes. Aluminum sulfate does not cauterize, but rather acts similar to a coagulant to arrest the bleeding. It also acts as a lubricant while placement of the cord. The retraction cord will provide ideal tissue displacement, while absorbing the goo and deliver hemostasis. Tissue Goo will not impede with the set impression material.<sup>22, 23</sup>

## 2.6 G Cuff

A Canadian company, named Stomatotech, launched a disposable plastic collar for gingival retraction which is inserted on the apical end of the abutment before the abutment is engaged to the implant. The plastic collar is found between the apical part of the abutment and the gingival soft tissue. Once the impression is retrieved from the mouth, the plastic collar is drawn out and removed permanently. The plastic creates a valve preventing the liquids from contaminating the area of the finish line of the abutment. G-Cuffs major intention is to maintain soft tissue surrounding the implant abutment permitting the impression

(conventional or digital) to have an access to the surface of the abutment required for the optimal restoration.<sup>24</sup>

## 2.7 Retraction Capsule

The recently introduced 3M™ ESPE™ Retraction Capsule is 15% aluminum chloride retraction paste. It is packaged in unit-dose capsules with an extra-fine tip that fits directly into the sulcus. When compared with retraction cords, the retraction procedure with this material can be up to 50% faster. The risk of bleeding and/or hemorrhage is less on removal, and is milder on gingival tissue. The significantly fine tip of the capsule offers improved access into the sulcus and interproximal areas. As the tip of the capsule is plastic with round, soft edges, practitioners can use it with less apprehension about detrimental effects on the tissue and patient discomfort.<sup>25</sup>

## 3. Conclusion

Choice of appropriate gingival retraction system is still a dilemma for the operator. Moreover, a particular clinical situation may indicate the specific technique. Hence the type of gingival retraction to be employed should be thoroughly thought over before using, keeping in mind the gingival tissue health and comfort of both patient and the practitioners.

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