

## Newer Methods of Gingival Retraction: A Review

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### Abstract

Gingival retraction can be done by mechanical, mechanico-chemical and surgical methods or by a combination of these. Gingival retraction plays a pivotal role in tissue protection and for proper impression. In this article different modern methods of gingival retraction have been discussed.

**Keywords:** Gingival retraction, hemostasis, tissue protection, gingival attachment.

Date of Submission: 08-09-2020

Date of Acceptance: 23-09-2020

### I. Introduction

During various procedures like impression or luting of the restorations, multiple challenges can surface. Moisture control plays a pivotal role for any dental procedure- direct or indirect. This is achievable only in case of effective isolation techniques.<sup>1</sup>

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

The retraction of the gingival tissue is a long established technique. It can be defined as the process of deflection of the marginal gingiva away from a tooth.<sup>3</sup> Gingival retraction is aimed at accessibility of the impression material beyond the abutment margins and also to provide enough space for the impression material to be thick enough. This is because thickness of material has been found to affect its tear resistance.<sup>4</sup> The present clinical condition will dictate the gingival retraction technique being used. Hemorrhage and its magnitude may incline towards a specific retraction technique.<sup>5</sup>

### II. Newer Methods Of Gingival Retraction

According to Benson et al, gingival retraction measures can be divided into four major categories:

(a) simple mechanical methods, (b) chemo-mechanical methods, (c) rotary gingival curettage, and (d) electrosurgical methods.<sup>6</sup>

The procedure of using mechanical method involves placement of a string into the gingival sulcus to displace the tissues physically. On the other side, hemorrhage and fluid seepage which often accompanies sub gingival margin preparation can be tackled using chemical method which involves treatment of the string with one or more type of compounds that cause induction of temporary shrinkage of the tissues.<sup>7</sup> Various methods are available for gingival retraction now (Table 1).<sup>8</sup>

RETRACTION METHODS	MECHANICAL	MECHANICO-CHEMICAL METHODS	SURGICAL
EXAMPLES	<ul style="list-style-type: none"> <li>◆ Rubber Dam</li> <li>◆ Plain retraction cords</li> <li>◆ Retraction crown/sleeve</li> <li>◆ Modified Impression techniques</li> <li style="padding-left: 20px;">Eg. Modified Custom tray technique</li> <li>◆ Plain retraction paste</li> </ul>	<ul style="list-style-type: none"> <li>◆ Retraction cord with hemostatic</li> <li>◆ Retraction paste with hemostatic</li> </ul> <p>There are three types of chemical agents used for retraction:</p> <p>a-Vasoconstrictive agents, b-Hemostatic agents, c-Astringent agents</p>	<ul style="list-style-type: none"> <li>◆ Rotary Gingival curettage/gingittage</li> <li>◆ Conventional surgery</li> <li>◆ Electrosurgery</li> <li>◆ Laser</li> </ul>

**Table 1: Methods of Gingival Retraction**

Method which is used most commonly for retraction of gingiva is retraction cord (can be combined with different chemical solutions and gels with astringent or hemostatic action). Other commonly used methods include electrosurgical units, soft tissue diode lasers and retraction pastes. A combination of these techniques can also be used. Although gingival cord is more readily used, but it can damage the delicate epithelial lining of the sulcus and underlying connective tissues.<sup>9,10</sup>

Hence, focus is being shifted to newer methods for gingival retraction. Some of them include:

### **III. Magic Foam**

Magic foam (Figure 1)<sup>11</sup> has been garnishing attention after being introduced as a method of mechanical retraction of gingiva. Magic foam cord (Colte'ne Whaledent AG, Altstatten, Switzerland) is an expanding polyvinyl siloxane material. Its gel form is injected into the sulcus; on setting expands as foam and hydrogen gas is released. Hence, gingival free margin is deflected away from the tooth and this achieves gingival displacement. Magic foam cord is a medication-free means of gingival retraction. Comprecap is provided by the manufacturer and is used to hold magic foam cord in place while retraction is underway. Magic foam cord has been found to induce less trauma to the gingival. It also has the advantage of easy usage and less time consumption.<sup>12</sup>



*Figure 1: Coltene magic foam cord*

It consists of two cartridges that consist of base (white) and catalyst (blue) pastes of expanding type of polyvinyl siloxane retraction material, mixing tips, intraoral tips, automixing gun, and Anatomic Comprecap. There are three different sizes of comprecap available for incisors, premolars and for molars.<sup>13</sup> According to the manufacturer, using magic foam cord for retraction of sulcus is easy, non-traumatic, and saves time. It is biologically compatible, with no adverse side effects or interactions. Polyvinyl siloxane has a high tear resistance. As compared to retraction cords or scalpel/rotary instruments, technique of using magic foam is faster and easier.<sup>14,15</sup>

Advantages: tearing of the sulcus is prevented, blood and debris is cleaned from the sulcus, impression material is delivered slowly into the gingival sulcus and also more accurately. It also holds the sulcus open for an extended amount of time. Disadvantages: increased chairside time and no hemostasis.<sup>16</sup> Color of the foam will aid in visualization. The material gets easily separated from the sulcus and has adequate working time. But it has a disadvantage of limited clinical indications, no provision of hemostasis, comparatively expensive to retraction cord. When compared with conventional cord, no improvement is recorded in working time or quality of retraction. It is considered to be less effective on subgingival margins. Intraoral tips provided are a bit bulky and can hinder adequately injecting material into gingival sulcus.<sup>17</sup>

### **IV. Expasyl:**

Expasyl (Kerr Corp., Orange, CA, USA) is a gingival retraction material with paste like consistency. It consists of aluminium chloride which imparts the hemostatic properties and the kaolin present in it cause hygroscopic expansion on contacting the crevicular fluid, providing gingival retraction in approximately 2 minutes.<sup>6</sup>

Expasyl uses 15 percent aluminum chloride within kaolin matrix. It widens the sulcus which provides needed retraction.<sup>18</sup> Homeostasis is controlled due to presence of aluminium chloride. Furthermore, it effectively reduces the flow of sulcular exudate like epinephrine-soaked cords.<sup>19</sup> As compared to packing a cord into the sulcus, an injection is less painful to the patients and is also easier and quicker to administer, leading to greater patient compliance. Its time consumption is also least.<sup>20</sup>

The material is available in capsules (cartridges), accompanied with a preformed gun-type device. The capsule is first placed in the gun after which the material is expressed. The retraction paste should be slowly injected into the sulcus (2 mm/s) keeping the tip parallel to long axis of tooth. The point of the cannula should

be kept such that it creates a closed space between the tooth and the edge of marginal gingiva. Clinically, if the sulcus is completely filled, gingival marginal area will appear slightly blanched.<sup>21,22</sup>

Advantages: effectively controls bleeding, less traumatic, saves time, dispensing is easy, especially when procedure includes multiple teeth and is also easy to remove.

Disadvantages: more expensive when compared to cords; inhibits set of polyvinyl siloxane and polyether impressions and in case of deep subgingival margins, is less effective.<sup>23</sup>

#### **V. Merocel:**

Merocel (Merocel Co, Mystic, CT, USA) is a synthetic polymer with a sponge-like texture, and cut into 2-mm strips (Figure 2)<sup>24</sup>. The strips can be shaped easily and adapted to the sulcus. Merocel displacement material is very efficient in absorption of saliva, fluids and blood.<sup>25</sup> The material swells after being placed into the sulcus and effectively expands pushing the gingival tissue and the finish line away. The soft tissue fully recovers within 24 hours of impression making.<sup>26</sup> Advantages comprise of easy shaping and placement, its non-traumatic affect on gingival tissues, faster recovery of the tissue displacement and effective absorption of sulcus exudates.



*Figure 2: Merocel strips*

Merocel is a synthetic retractile material which is porous and chemically extracted from a biocompatible polymer (hydroxylated polyvinyl acetate) which creates a net-like structure. The material has pliability leading to easy shaping and placement into the sulcus.<sup>27</sup>

Merocel retraction material is (1) chemically pure, (2) easily shaped, (3) tremendously effective for intraoral fluid absorption such as of saliva, blood, and crevicular fluid, (4) softness and adaptability to surrounding tissues, (5) free of fragments or debris, and (6) non abrasive nature.<sup>28</sup>

#### **G-Cuff:**

It is a disposable plastic collar launched by Canadian company, named Stomatotech, for the purpose of retraction of gingival (Figure 3)<sup>29</sup>. It is first inserted on the apical end of the abutment after which the abutment should be engaged to the implant. The plastic collar is found between the apical part of the abutment and the gingival soft tissue. The plastic collar should be drawn out and then removed permanently after retrieving the impression from the mouth.



*Figure 3: G-Cuff tissue retraction system*

A valve is created by plastic which further prevents contamination of the area of finish line from the. The major intention of G-Cuff is maintaining soft tissue surrounding the implant abutment permits the impression to have easy accessibility to the surface of the abutment needed for the optimal restoration.<sup>30</sup>

**Gelcord:**

Gelcord comprises of- 25% Aluminum Sulfate Gel (Figure 4)<sup>31</sup>. It stays put in place as compared to liquid astringents, providing maximum hemostasis. Tissue necrosis has not been reported with its use till now. Its indications include Class V Restorations along with procedures where tissue alteration is needed during composite placement. Mildly rub the gel into the hemorrhaging area. Gelcord is also well flavored for better patient acceptance and better visualization is provided due to its bright color. The initial cord can easily slide into the sulcus due to sufficient lubrication provided by it.<sup>32,33</sup>



**Figure 4: Gel cord**

**Retraction Capsule (3M ESPE):**

3M™ ESPE™ Retraction Capsule has been recently introduced and is a retraction paste that consists of 15% aluminum chloride (Figure 5)<sup>34</sup>. It is packaged in unit-dose capsules and the tip is extra fine so that it can fit directly into the sulcus. The retraction procedure is 50% faster with this material as compared to retraction capsules. It is also milder in gingival tissue leading to decreased risk of bleeding and hemorrhage. As the tip of the capsule is sufficiently fine, it provides better sulcular and interproximal access. The tip is also plastic with round and soft edges, allowing practitioners to use it with least apprehension about the detrimental effects that can occur on the tissue or discomfort felt by patient.<sup>35</sup>



**Figure 5: 3M™ ESPE™ Retraction Capsule**

**Gingitrac (Centrix):**

Gingitrac is a paste system wherein the syringe provided applies the paste around the margins. It couples the features of pressure, astringency as well as time unlike using retraction cords, which are traumatic; or the paste alternatives that are messy. To control hemostasis, GingiTrac uses an auto mixing gun that delivers the exact needed combination of mild built-in astringent. As an added benefit over retraction cord, bleeding does not occur while removing it, as the coagulum does not adhere to the silicone GingiTrac. It provides more accurate impressions owing to its gentle nature on gingival. It is more cost effective and also easier to handle than bulky automix guns due to convenient single-dose.<sup>36</sup>

The paste is preloaded into the syringe. The astringent present in paste is aluminum sulfate. Application of a hemostatic agent can be done, if needed, before its use. First fill the cap with paste and then, for five minutes, place it over the tooth. Apply paste on the sulcus with syringe. When impression of more than one

tooth is needed, carry the paste matrix over a plastic tray and then syringe the Gingitrac paste over it. Position the tray after this and remove after 3–5 min. Retraction of gingival, for single as well as multiple tooth preparations, is due to pressure application. Remove the paste before impression making.<sup>28</sup>

This product is available in combination with foamic cylinders that encircle the tooth. These cylinders are manufactured in large as well as regular sizes. The polyvinyl siloxane paste is inserted into the gingival sulcus. Following this, the foamic cylinder that are filled with more of the retraction paste are placed on the tooth. Direct the patient to bite it to exert pressure for 3–5 minutes, until setting of material occurs. Then assembly is removed and the degree of retraction is observed. The final impression is made if it is found satisfactory, otherwise repeating procedure is needed. This method is a relatively easy and less traumatic to the gingival tissue. Latex gloves must not be used when employing this product.<sup>37</sup>

Advantages include its easy express from automix gun, fast setting time, longer shelf life, control of oozing of blood, fast and easy removal, and that it is easy to slip the material cleanly out of sulcus without inducing trauma. Disadvantages are its high price and faster sulcular collapse as compared to cords.<sup>24</sup>

### **Stayput:**

Stay put impregnated amalgamates the advantages of an impregnated cord and braided cord along with the ability to adapt of ultrafine copper filament (Figure 6)<sup>38</sup>. It is impregnated with aluminum chloride. Stay put cord is also available in a non impregnated form which upon need can be impregnated later with hemostatic agent. Advantages include faster haemostasis, ability to be preshaped, pliability and safety for cardiac patients.<sup>28</sup>



**Figure 6: Stay-put retraction cord**

It is available in four sizes, depending on width (0–3). Compression caps which are provided in regular and anatomic shapes can also be used in conjunction. The facial as well as lingual surfaces have a semi-circular shape on the anatomic compression caps. This allows their placement on adjacent teeth allowing retraction. Place the compression cap on tooth after cord placement and then ask the patient to bite. This will cause further retraction of gingival sulcus.<sup>39</sup>

## **VI. Conclusion**

Respect to gingival tissue needs to be given during procedure being carried out to provide treatment which is as atraumatic and as comfortable to patient as possible. Several techniques of gingival retraction are available which are predictable, safe, and efficacious in the management of the gingival tissue in restorative dentistry. Choice of material will depend on individual clinical case, health of patient, availability, cost along with comfort of dentist and patient. A combination of methods may be used, if needed.

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