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Reviw article

THE PLACE OF RETRACTION CORDS AMONG THE TISSUE DISPLACEMENT METHODS

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ABSTRACT:

Gingival displacement is performed to create sufficient space between the finishing line and the gingival tissue, to allow the injection of the adequate bulk of the impression material into the expanded crevice. Control of moisture in the sulcus is also necessary. The variety of methods for tissue management can be broadly classified into surgical and non-surgical. Objective: To analyse the properties of tissue displacement methods, described in the literature for the last 4 years and display the prefered choices of the practitioners.

Material and method: A time range from the last 4 years was set. Using the keywords "retraction cord" and "survey," we found 64 from 115 articles in total, relevant to our topic. Patents, citations and books weren't included in this review.

Results from the overview of the properties of the different tissue management methods indicate that retraction cords take a significant place among them and can be recognised as a classical and well known method.

Conclusions: The studies from the articles show adequate sulcal width right after retraction with most methods, sufficient haemostasis can also be obtained. Every each method, however, is accompanied by several drawbacks. Concidering all the quallities of the different tissue dispalcent methods, there is no specific evidence to promote the use of a single technique over any other. The selection of the method for gingival retraction primarily depends on each clinical case. However, the retraction cord technique remains to be the prefered method for gingival management due to its many advantages.

Keywords: retraction cord, survey, gingival displacement.

INTRODUCTION:

Gingival displacement is defined as the deflection of marginal gingiva away from the tooth. [1] This is performed to create sufficient space between the preparation finish line and the gingival tissue to allow the injection of the adequate bulk of the impression material into the expanded crevice. Moisture control in the sulcus, especially when a hydrophobic impression material is used, is also necessary because it can cause flaws in the area of the finish line. The critical sulcular width in this regard seems to be approximately 0.2 mm. [2, 3] This is of utmost importance for obtaining accurate impressions for adequate marginal fit and emergence profile; whether the impression is made with a conventional impression material or a digital impression technique. The goal of tissue displacement is to reversibly displace the gingival tissues in a lateral and apical direction,whilst stopping the bleeding so that low viscosity impression material can be pressed into the widened sulcus, avoiding any deformation or tearing of the impression material upon removal.

A great number of methods are described in the literature, and with time new techniques and materials have been developed. The variety of methods for tissue management can be broadly classified into surgical and non-surgical. [4, 5]

OBJECTIVE:

To analyse the properties of tissue displacement methods, described in the literature for the last 4 years and display the prefered choices of the practitioners.

MATERIAL AND METHOD:

A time range from the last 4 years was set and using the keywords: "retraction cord" and "survey" we found 64 from 115 articles in total, relevant to our topic. Patents, citations and books were not included in this review. From all the existing methods we are focusing only on the contemporary and commonly used.

RESULTS:

One of the most well known methods is the retraction with cords. Cords come with different weaving (braided, knitted or twisted), colour and size. So far there is no standard to unify their sizes. Cords can be found plain or pre-impregnated with different solutions and gels, which can be broadly divided into vasoconstrictors and astringents. Chemically impregnated cords offer a better retraction. Diameter, astringent/hemostatic agent and cord type have a direct effect on the physical properties of the

cord. Common astringent/hemostatic agents include ferric sulfate, aluminum potassium sulfate, aluminum chloride, zinc phenolsulfonate and racemic epinephrine. Current gingival retraction agents are not without undesirable side-effects, but still, the chemo-mechanical method of gingival retraction is the most widely used. [6]

Fig. 1. Ultradent retraction cord

Epinephrine - advantages: vasoconstrictive, hemostatic; disadvantages: systemic effects – epinephrine syndrome, risk of inflammation of gingival cuff, rebound hyperemia, risk of tissue necrosis. Aluminum sulfate and aluminum potassium sulfate - advantages hemostasis, least inflammation of all agents used with cords, little sulcus collapse after cord removal; disadvantages: offensive taste, risk of necrosis if in high concentration. Ferric sulfate – advantages: hemostasis; disadvantages – tissue discoloration, acidic taste, risk of sulcus contamination, inhibits set of polyvinyl siloxane and polyether impressions. Aluminum chloride - advantages – no systemic effects, least irritating of all chemicals, hemostasis, little sulcus collapse after cord removal; disadvantages – less vasoconstriction than epinephrine, risk of sulcus contamination, modifies surface detail reproduction, inhibits set of polyvinyl siloxane and polyether impressions.

The use of retraction cord has certain disadvantages, such as: time consuming, traumatic, gingival recession after healing, bleeding after removal. As an alternative to the retraction cords, different cordless systems are developed. They usually contain pastes and gels in a form suitable for injection in the sulcus. They are considered to be less traumatic and with less histological damage than cord systems.

Racegel is a new hemostatic agent containing 25% aluminum chloride, oxyguinol, and excipients. It becomes more viscous on tissue contact due to its thermodynamics. Racegel is easily rinsed, leaving no irritation of the surrounding tissues and its thermal effect is reversible when rinsed with water. The gel can be used with or without gingival retraction cords.

Fig. 2. Racegel

Gingitrac is a gingival retraction paste system that uses a preloaded syringe to apply the paste around the margin; it also incorporates the use of a compression cap to enhance the retraction effects of the material. The paste contains aluminium sulphate as astringent. Advantages: easier to express from automix gun, longer shelf life, faster setting time, controls oozing of blood, removal is fast and easy, and materials slip cleanly out of sulcus without trauma. Disadvantages: high price and faster sulcular collapse than cords.

Fig. 3. GingiTrac

Expasyl – a temporary gingival retraction system, that includes an injectable material in a cartridge, delivered with a specially designed gun. The material is Kaolin, which incorporated into an organic binder with aluminum chloride. Advantages: effective control of bleeding, less traumatic, time saving, easy to dispense when multiple teeth are included and is easy to remove. Disadvantages: more expensive than cords; inhibits set of polyvinyl siloxane and polyether impressions and is less effective with very subgingival margins.

Fig. 4. Expasyl

Magic Foam Cord is a new non-haemostatic gingival retraction system that contains expanding vinyl

polysiloxane. The material is syringed around the crown preparation margins, and a cap (Com-precap) is placed to maintain pressure. Advantages: less traumatic to tissues than retraction cord, easy to remove material from preparation and sulcus and has adequate working time. Disadvantages: no hemostasis provided, expensive when compared to cord, no improvement in speed or quality of retraction compared to cord, less effective on subgingival margins and intraoral tips too large to inject material adequately into the sulcus.

Fig. 5. Magic FoamCord

Matrix Impression System includes three steps and three impression materials of different viscosities.

First, a matrix of occlusal registration elastomeric material is done over the prepared tooth. The retraction cord is removed, and a definitive impression is recorded in the matrix using a high viscosity elastomeric impression material. After the matrix impression is positioned, medium viscosity elastomeric material is loaded in an impression tray and is seated over the matrix and remaining teeth to create an impression of the entire arch. The design of the matrix also forces the high viscosity impression material along the preparations and into the sulcus. Advantages: eliminates chances of tearing of the sulcus, cleans blood and debris from the sulcus area, delivers impression material in the gingival sulcus slowly and with more accuracy and holds the sulcus open for an increased time. Disadvantages: increased chairside time and no hemostasis. [7]

Merocel strips are extracted chemically from a hydroxylate polyvinyl acetate polyme. They are synthetic materials in form of net-like strips, that leave no debris. Placement of Merocel retraction technique does not require the use of local anesthesia. The porous and sponge-like microstructure provides a dry field for the impression, whilst the absence of fibers decreases the risk of post-operative problems. Advantages: easily shaped, effectively absorbs oral fluids and the sulcus is clean without the presence of any debris.

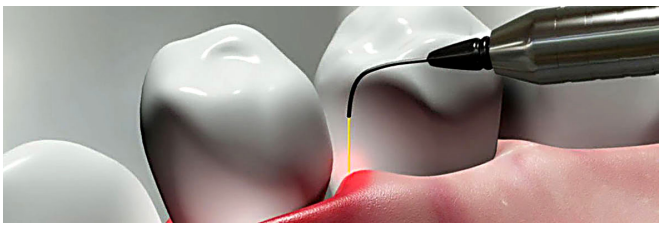
The surgical methods of gingival retraction use specialized devices to reshape and remove gingival tissue, to control bleeding and to create access to preparation margins. The surgical method for exposure of the margins of the tooth preparation has been referred to as “troughing” or “tissue dilation”. The first use of this technique was with electrosurgery. A small J-shaped electrode is used to widen the gingival sulcus. It needs to be positioned parallel to the long axis of the tooth in order to remove tissues only from the inner wall of the sulcus. Minimizing the production of lateral heat is important. Advantages: efficient and precise hemostasis of the incision. Disadvantages: cannot be used in patients with pacemakers and together with nitrous-oxide, due to nitrous oxide’s flammability, no hemorrhage control if starts and an adequate band of healthy attached tissue is necessary.

Fig. 6. J-shaped electrode

Recently laser tissue sculpting for tissue management has been introduced. The trough, soft tissue excision, extends from the height of the free margin of the gingiva to a point 0.3 – 0.4 mm apically to the finishing line. The displacement of the soft tissue is accompanied by hemostasis. The need of soft-tissue healing might be

problematic in the aesthetic zone. Advantages: excellent hemostasis with carbon dioxide laser, reduced tissue shrinkage, relatively painless and topical sterilization. Disadvantages: Er- YAG laser is not as good at hemostasis as CO_2 laser, CO_2 laser provides no tactile feedback and leads to a risk of damage to the junctional epithelium.

Fig. 7. Diode laser



Rotary curettage has been performed with a torpedo bur simultaneously forming a chamfer finishing line and removing the epithelial lining of the sulcus. Must be performed on healthy tissues to avoid shrinkage after healing. Advantages: fast, ability to reduce excessive tissue and recontour gingival outline. Disadvantages: causes considerable hemorrhage, high risk of traumatizing the epithelial attachment and the absence of keratinized gingiva at the base of the sulcus may result in a gross recession. [8]

DISCUSSION:

Comparison between the different tissue management methods remains a difficult task due to the fact that there are only a few reported criteria for clinical assessment such as blood control and crevice dilatation. There is no reported data regarding the accuracy of the measurements. Nevertheless, the clinician's choice remains clear. According to Ahmed and Donovan, 92% of reporting dentists used gingival displacement cords, of which 61% were a braided cord, 20% were a knitted cord, and 18% were reported as unknown. A significant number of practitioners (28%) reported using cordless techniques for gingival displacement. [9] Similar results can be observed from another survey conducted by McCracken and col. in which they state that most clinicians use either a single cord (35%) or dual cord (35%) technique and about 16% of respondents use an injectable retraction technique. [10]

CONCLUSION:

The studies from the articles show that an adequate sulcal width is present immediately following retraction and with most methods, sufficient haemostasis can be obtained. [11] Each method, however, is accompanied with its specific advantages and disadvantages. Considering all the qualities of the different tissue displacement methods, there is no specific evidence to promote the use of a single technique over any other. [12] The selection of the method for gingival retraction primarily depends on each clinical case. [13-18] Retraction cord technique remains to be the preferred method by practitioners for gingival management due to its many leading advantages.

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