



Review Article

Periodontal dressings: A review

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ABSTRACT

Periodontal surgery involves the manipulation of the tissues. To overcome the post-surgical swelling, inflammation and bleeding a form of protection is to be provided. Aforesaid protection is provided by the periodontal dressings that cover the traumatized post-surgical tissue from post-operative irritation, trauma, and salivary contamination, alleviates pain, reduces haemorrhage and facilitate better recovery. Periodontal dressings are broadly classified into three categories based on the constituents. The compositions of the dressings have taken many modifications to enhance the effects of materials. Disagreements adjoining the validation of the application and shortcomings of the frequently engaged periodontal dressings and their up-to-date status in clinical run-through are labelled in this widespread review.

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1. Introduction

Periodontal surgery encompasses the surgical manoeuvring of the oral mucosa and the tooth supporting structures to assuage an array of problems. The sequelae of periodontal surgery are generally bleeding, inflammation, pain and swelling.¹

Wound healing is a compound and active process of re-establishing normal cellular biology. This process can be divided into 3 phases – i.e., inflammatory, proliferative and remodelling. In these three stages, a multifaceted and synchronized string of actions occur. The zenith of wound healing marks a well-established reinstatement of regular structure and development of the wounded tissue.²

A surgical dressing allows for unremitting healing to occur and also aids in fortification of the surgical area and inhibition of wound damage and infection.³

Numerous periodontists commend that a shielding is to be provided over surgically treated tissue to form a safeguarding from further insult. Such safeguarding is rendered by periodontal dressings or packs to overcome any sort of post-operative complications.¹

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Periodontal dressings were first introduced by Zentler in 1918 in the form of iodoform gauze.⁴ The use of dressings preceding periodontal surgery was first put forth by Dr. A. W. Ward in 1923, which laid path for widespread use of dressings preceding an assortment of procedures by periodontists, inspite of the differences in the application following periodontal surgery.⁵

2. Types of Periodontal Dressings

Periodontal dressings are generally grouped into 3 categories:

1. Zinc oxide and eugenol containing,
2. Zinc oxide without eugenol containing and,
3. Neither zinc oxide nor eugenol containing.

2.1. Those containing zinc oxide and eugenol

2.1.1. Eugenol dressings

First dressings introduced that contained eugenol was wondrpak⁵. It is constituted of liquid containing clove & peanut oils, isopropyl alcohol 10%, pine oil & resin, camphor & colouring materials and powder containing zinc oxide, talc, powdered pine resin and asbestos.

Kirkland introduced a modification consisting of zinc acetate, olive oil, zinc oxide, eugenol, tannic acid, and resin.²

Zinc oxide and eugenol dressings are provided in liquid and powder or aqueous mixture. Both are mixed on a waxed paper pad using a spatula. The powder or paste is steadily integrated into the liquid until it reaches a dough-like uniformity. The dressing may be used instantly or enveloped in aluminium foil and refrigerated for use up to 1 week.⁶ Eugenol plays an essential role in obtunding surgical sites.

Antiseptic properties of zinc oxide eugenol dressings have been elaborated by Waerhaug and Løe in 1957. Where they have also mentioned that eugenol was found to be an irritant to oral tissues, and cause tissue necrosis, predominantly of bone, which impairs healing.⁷

2.2. Those containing zinc oxide without eugenol

2.2.1. Coe-Pak

Coe-Pak is the most commonly used periodontal dressing in clinical practice. It is of 2 paste system that includes base paste (zinc oxide, added oils, gums & lorchido) and catalyst paste (unsaturated fatty acids & chlorothymol). Application of the dressing can be done by dispensing equal amounts of pastes and mixed using a spatula till thick, uniform consistency is achieved. The setting time of the material can be altered by immersing in cold or hot water to accelerate or decelerate the setting time. The mechanical interlocking of the material is a key point to maintain the retention of the material.

2.2.2. Cross Pack

Cross Pack in late 1940s was the powder part of zinc oxide– eugenol which is composed of neomycin sulphate, colophony powder, tannic acid, and bentonite is the filler component of Coe-Pak to give more bulk to the material.²

2.2.3. Peripac

Peripac (Dentsply, Konstanz, Germany) is a paste comprising of zinc sulphate & oxide, calcium sulphate, polymethyl methacrylate, dimethoxy tetraethylene glycol, ascorbic acid, flavour, and iron oxide pigment. It alters on contact to air or moisture through loss of the dimethoxy tetra ethylene glycol.

Peripac is suggested as a dressing subsequent to different minor periodontal surgical procedures and also used as a temporary rebasing material for immediate dentures preceding periodontal surgeries.⁸

2.2.4. Septo-Pack

Septo-Pack (Septodont, Saint Maur-des-Fosses, France) which contains of amyl acetate, dibutyl phthalate, butyl polymethacrylate, zinc oxide & sulphate and excipient is a plastic paste material which acts as a medium to carry

medicine to gingiva or tooth or at the alveolar ridge level to aid in better wound healing.⁸

2.2.5. Vocopac

Vocopac (Voco, Cuxhaven, Germany) is supplied in two paste system (base and catalyst) that is elastic in nature thorough its application in oral cavity. Vocopac comprises zinc oxide & acetate, purified colo-phonium, magnesium oxide, fatty acids, natural oils & resin and colorant e127.

2.2.6. PerioCare

PerioCare (Pulpdent Corp., Watertown, MA, USA) is a vastly pliable periodontal dressing. It is composed of metal oxides in vegetable oil in paste 1 and gel of rosin suspended in fatty acids in paste 2. Equal amounts of the pastes are dispensed, mixed and applied at the surgical site which sets sturdily hard.

2.2.7. Perio Putty

Perio Putty (Cadco Dental Products Inc., Los Angeles, CA USA) is a non-eugenol dressing containing methylparabens and propylparabens for their efficient fungicidal properties and benzocaine as a topical anesthetic.⁹

2.2.8. Periogenix

Periogenix is a noneugenol dressing manufactured by OroScience (New Line Medical Inc., Lafayette, LA, USA). It comprehends perfluorodecalin, purified water, glycerine, hydrogenated phosphatidylcholine, Cetearyl alcohol, polysorbate 60, tocopheryl acetate, benzyl alcohol, methylparaben, propylparaben, and oxygen.

Studies indicate that wounds treated with Periogenix established an acceptable result as there is an increase in I & II collagens, vascular endothelial growth factors and MMP levels and also plays a major role in the interchange of O₂ and CO₂ through incapacitated tissues. This asset of the dressing material encourages wound healing by stimulating a cascade of processes, comprising neovascularization, collagen production, epithelization, phagocytosis neutrophil-mediated oxidative microbial killing, and degradation of necrotic wound tissue.

The foremost benefits of non-eugenol dressings are trifling irritation of the mucous membrane, agreeable odour, neutral taste, ease of handling, malleability which facilitates easy removal from undercut areas and elimination of the objectionable taste of eugenol. Although they hold neither the analgesic nor antibacterial properties of eugenol dressings, they are less irritating and form a well amended adhesive barrier to saliva and oral bacteria.

2.3. Those containing neither zinc oxide nor eugenol

2.3.1. Cyanoacrylate

In 1949 A. E. Ardis obtained cyanoacrylate alkyls.¹⁰ Coover et al.¹¹ in 1959 synthesized $H_2C = C(CN)COOR$ (R ranging from methyl to decyl) a tissue adhesive that has been suggested to use as a surgical adhesive.

Studies denote n-butyl cyanoacrylate to be biocompatible and aid for surgical procedural use (e.g., Histoacryl; B. Braun Biosurgicals, Germany and PeriAcryl; Glustitch Inc, Delta, Canada).

Cyanoacrylate as the dressing has been specified for post-operative use following an array of periodontal procedures.¹² Rapid haemostasis is an advantageous feature of the material. Other features are acceleration of initial healing by providing a protective barrier and antimicrobial property.⁹

2.3.2. Light cure dressings

Light cure periodontal dressing material is newer development in periodontal dressing materials which is based on a polyether urethane dimethacrylate resin. Because of its worthier physical properties like easy handling, better surface smoothness, interdental retention, and mechanical stability have been claimed to favour its clinical application. Furthermore it has the advantage of possessing a translucent pink colour, which is aesthetically pleasing and more acceptable to the patients as it mimics the colour of oral mucosa.¹

2.4. Cellulose periodontal dressings

2.4.1. Reso-pac

Reso-pac is commercially available cellulose-based periodontal dressing material. It is hydrophilic in nature and adheres to oral tissue. Manipulation of the material is not needed and when placed on the site of use adheres to the oral tissues. It gets dissolved in 2-3 days without leaving any residues of the material. Through this period of 2-3 days material remains elastic.⁵ Compared to COE-PAK which affects polymorphonuclear leukocytes and fibroblasts to induce a strong dependent reaction that decreases with an increase in zinc levels,¹³ Reso-Pac does not affect.

2.4.2. Mucotect

Mucotect (Hager & Werken Gm bH & Co. KG, Germany) is a carboxy-methyl cellulose dressing material containing of other constituents like polyvinyl acetate, ethyl alcohol, Vaseline and polyethylene oxide resin. Mucotect is hydrophilic in nature and adheres to the area for up to 30 hours. As it is hydrophilic it adheres well to moist and bleeding sites.

2.4.3. Collagen dressings

Collagen dressings provide a physiologic limit amongst the wound and the oral environment abetting to boost restorative deposition and organization of the fibres in granulation tissues. The gains of collagen dressings over other materials available are ease of application, nonimmunogenic, nonpyrogenic, hypoallergenic properties. Furthermore, an in-built property of in born collagen is the aptitude to stimulate haemostasis by enabling aggregation of platelets and subsequently, the coagulation cascade.

Commercially available collagen dressings have three forms:

- Tape (CollaTape; Zimmer Dental, Carlsbad, CA, USA),
- Cote (CollaCote, Zimmer Dental, Carlsbad, CA, USA) and
- Plug (CollaPlug; Zimmer Dental, Carlsbad, CA, USA).

Other commercially available collagen dressings are like CovaTec which is patented by Peter L. Steer and Howard Mathew in 1982 which is adhesive and nonsensitizing.¹⁴

2.4.4. Physical properties of periodontal dressings

An ideal periodontal dressing material should be easy malleability, slow-setting of the material which aids to create a smooth surface to avoid irritation to oral mucosa, adequate plasticity to sustain disfigurement and distribution of forces, should have better adhesive properties and coherent without being bulky, and must have dimensional stability.¹⁵

Goldman and Cohen indicated that addition of polyacrylic acid and cyanoacrylate to the dressing material composition can develop the rigidity of the material and secure it with good adhesive property.¹⁶

2.4.5. Retention of dressings

Splinting and incorporation of stents to withhold the periodontal dressings has been practiced in 1950's. In 1953, Waerhaug and Anerud explained the inclusion of spiral saws and lengthwise cotton thread to enhance interproximal retention the dressings.¹⁷ Hirschfeld and Wasserman explained various techniques, like using wire, floss, acrylic, adhesive tin foil and copper bands.¹⁸ Cowan suggested wiring to increase the retention of the dressings material.¹⁹ Addy and Douglas also endeavoured to integrate polyacrylic acid to enhance degree of adhesion into their chlorhexidine carrying material.²⁰

Retention of dressing over palatal wounds is important as the wounds are more prone to postoperative morbidity when left open. Ferguson (1992) explained a technique to enhance the retention for palatal wounds by employing light-cured periodontal dressing – i.e., Barricaid in combination with the surgical involved maxillary canines.²¹

2.4.6. Therapeutic effect of dressings

Ward backed the idea of using a periodontal dressing to evade pain, infection and root sensitivity and to prevent the

accumulation of debris.² Orban observed that use a eugenol dressing has better healing following gingivectomy if the dressing was changed every 2 to 4 days for a span of 10 to 14 days and, also mentioned that if dressing left more than 12 days leads to delayed healing.²²

Bernier and Kaplan described that the use of a dressing assists in the healing process by functioning as a external barricade and benefit in primary healing, while the constituents of the dressings appeared to be of secondary importance.²³ Loe and Silness described that unprotected tissue will heal regardless of the provision of a dressing.²⁴

Linsky et al. supposed that if a when wound was closed with dressing the inflammatory response formed would be suggestively less than that of open wounds.²⁵ Eaglstein stated that dermal wounds that have been provided with a dressing heal considerably earlier. To the wounds that are not dressed.²⁶

2.4.7. Biological properties

Studies indicate that eugenol-based dressings may cause less growth inhibition of long-lasting cells and primary human leukocytes than some non-eugenol products.²⁷

Eugenol-based dressings were found to constrain fibroblast proliferation to a greater degree than non-eugenol dressings.²⁸

Where as light-cured periodontal dressings showed no cytotoxicity on different cell types²⁹ Collagen-based dressings, such as CollaCote had superior clinical and histological outcomes on palatal wound healing.³⁰

Smeecken et al, (1992) in an animal study, proposed that eugenol containing materials elicit more inflammatory reactions, although this increase was not substantial in other studies.³¹

B. Alpar et al., have reported that cell culture medium extracts of Coe-pak, Voco pac, Peripac, and Barricaid have compared and evaluated where results have shown barricade is cytocompatible.³²

2.5. Modifications of periodontal dressings

2.5.1. Chlorhexidine in periodontal dressings

Chlorhexidine is an antibacterial agent. Addy and Douglas verified the antibacterial effects of methacrylate gel as a medium to transport chlorhexidine in vitro and in vivo, and established that it is a good intermediate for transportation and steady discharge of chlorhexidine to the wound area.²⁰

Othman et al established a statement that surgical dressings containing antimicrobial agents are advantageous to other material due to their high retention and slow - releasing property of the chlorhexidine.³¹

Zyskind et al., reported that application of a varnish that contains chlorhexidine aids in less plaque formation in comparison to not coated teeth.³²

2.6. Antibacterial agents in periodontal dressings

Studies show that the use of antibacterial agents with periodontal dressings enhances healing. Grant et al reviewed the probable advantages of combining bactericidal and bacteriostatic drugs in periodontal dressings and stated that there would be chances of allergy and sensitization with potential chance of candidiasis occurrence.³³

Heaney et al implied the removal of a dressing within 1st week of use, as antimicrobial agents imbibe discerning inhibitive action on microorganisms and bring about disparities in oral microbiota.³⁴ Romanow observed inoculating bacitracin has improved growth of yeast compared to tetracycline.³⁵ Breloff and Caffesse compared and evaluated effect of Achromycin when applied underneath a dressing and on topical application with results showing that topical application has no beneficial effect.³⁶

2.6.1. Modifications to periodontal dressings

Swann et al. added steroids and Dilantin to dressings to improve postoperative healing.³⁷ Srakaew et al. reported that sodium phosphorylated Chitson could be used in periodontal dressings to modify reaction rate.³⁸

3. Conclusion

In this article it has been reviewed regarding different properties, availability, and therapeutic effects of periodontal dressings. Studies have not indicated a specific unanimity concerning the absolute suggestion for the incorporation of periodontal dressings preceding the procedures. There has been identified that no periodontal dressing material satisfies all the ideal properties of a material. Choosing an optimal periodontal dressing is a difficult decision as many parameters are to be considered to employ them at the surgical site. However, literature does elaborate on the benefits of the application of a dressing post-surgically.

4. Source of Funding

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5. Conflicts of Interest

None.

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