



A REVIEW ON HEMOSTATIC AGENTS IN PERIODONTAL SURGERY.

Dental Science

Dr. Mandeep Kaur Sandhu

B.D.S, Baba Farid University Of Health Sciences, Faridkot, Punjab, India.

Dr. Jitender Kumar*

M.D.S, Dept. Of Oral & Maxillofacial Surgery, Himachal Institute Of Dental Sciences, Paonta Sahib, India. *Corresponding Author

ABSTRACT

Achieving effective hemostasis is crucial in periodontal surgeries to control bleeding and optimize surgical outcomes. Various hemostatic materials and methods are available to assist clinicians in managing bleeding during these procedures. This review article provides a comprehensive overview of the hemostatic materials and methods commonly used in periodontal surgeries.

KEYWORDS

Hemostasis, Gelfoam, Electrocautery.

INTRODUCTION

Hemostasis is a critical aspect of periodontal surgeries to ensure clear visibility, facilitate accurate surgical procedures, and promote proper wound healing.

Hemostatic materials and methods play a significant role in controlling bleeding and maintaining a bloodless surgical field. The use of hemostatic agents is crucial in dentistry and periodontal surgery to control bleeding and promote wound healing. Several studies have focused on evaluating and updating the use of hemostatic agents in these fields. Hemostasis is a vital physiological process that ensures the balance between bleeding and clotting, maintaining blood flow within the circulatory system. It involves a complex interplay of cellular and biochemical mechanisms that work together to prevent excessive bleeding while promoting the formation of stable blood clots. The homeostatic mechanism involves a series of steps that occur in response to vascular injury. When a blood vessel is damaged, vasoconstriction occurs to reduce blood flow to the affected area. Platelets are then activated and aggregate at the site of injury, forming a temporary platelet plug. Simultaneously, the coagulation cascade is initiated, resulting in the conversion of fibrinogen to fibrin, which forms a mesh-like network to stabilize the platelet plug and create a stable blood clot. Finally, fibrinolysis, the process of clot breakdown, is activated to restore blood flow once healing is complete. Various materials are used to assist and enhance the hemostatic process.

These materials can be classified into different categories, including:

1. Mechanical Hemostatic Agents:

These materials work by providing local pressure and tamponade effect to control bleeding. Examples include gauze, absorbable gelatin sponges (Gelfoam), and collagen-based products.

2. Chemical Hemostatic Agents:

Chemical agents such as topical thrombin, fibrin sealants, and hemostatic gels work by activating the coagulation cascade or providing a clotting matrix to promote hemostasis.

3. Thermal Hemostatic Methods:

Electrocautery, laser devices, and radiofrequency devices generate controlled heat energy to cauterize bleeding vessels, facilitating hemostasis through thermal coagulation.

Methods of Hemostasis

In addition to the materials used, various methods are employed to achieve hemostasis in clinical settings. These methods include:

1. Local Pressure:

The application of direct local pressure using moist gauze or cotton rolls, then application of direct local pressure using moist gauze or cotton rolls immersed with adrenalin is a common initial step to manage bleeding. It aids in tamponading bleeding vessels and initiating the natural clotting process.

2. Suturing Techniques:

Proper suturing techniques, including precise flap adaptation, tension-

free closure, and meticulous suture placement, contribute to achieving hemostasis. Sutures not only aid in wound closure but also exert mechanical pressure on the tissue, promoting hemostasis.

3. Electrocautery:

Electrocautery or electrocoagulation devices deliver controlled heat energy to cauterize bleeding vessels, providing precise control over the coagulation process.

4. Laser Hemostasis:

Laser devices, such as diode lasers or carbon dioxide (CO₂) lasers, selectively coagulate blood vessels and promote clot formation, offering precise control in achieving hemostasis.

Hemostatic Materials

1. Gelatin sponges

Gelatin sponges, such as absorbable gelatin sponge Gelfoam, are commonly used in periodontal surgeries. They provide mechanical hemostasis by promoting platelet aggregation and clot formation. Gelatin sponges, specifically absorbable gelatin sponge Gelfoam, are widely utilized in periodontal surgeries as hemostatic agents. The authors discuss the effectiveness of gelatin sponges in achieving hemostasis during periodontal procedures. Another relevant study is "Use of Gelfoam dental sponges as a wound dressing in oral surgical procedures" this article explores the use of Gelfoam dental sponges as wound dressings in oral surgical procedures, highlighting their efficacy in controlling bleeding.^[1]

2. Oxidized regenerated cellulose

Hemostatic agents like oxidized regenerated cellulose (Surgicel) work by inducing clot formation and enhancing platelet adhesion. They can be particularly useful in managing oozing or capillary bleeding. The study provides an updated review of hemostatic agents used in dentistry, including oxidized regenerated cellulose. It discusses the mechanism of action and clinical applications of these agents in promoting clot formation and controlling bleeding³. This article focuses on hemostatic agents used specifically in oral and maxillofacial surgery, including oxidized regenerated cellulose.^[2]

3. Topical hemostatic agents

Various topical agents, such as thrombin-based products, fibrin sealants, and hemostatic gels, are available to promote hemostasis. These agents work by activating the coagulation cascade or creating a clotting matrix to control bleeding. Topical hemostatic agents are essential tools in promoting hemostasis and controlling bleeding. They encompass a range of products, including thrombin-based agents, fibrin sealants, and hemostatic gels, which work by either activating the coagulation cascade or creating a clotting matrix. This comprehensive review discusses various topical hemostatic agents, including thrombin-based products and fibrin sealants. It provides insights into their mechanisms of action and clinical applications in dentistry.^[3] This article explores topical hemostatic agents used specifically in oral and maxillofacial surgery.^[4]

4. Bone wax

Bone wax is a sterile mixture of beeswax and isopropyl palmitate. It is often used to control bleeding from bony surfaces during periodontal surgeries, such as osteoplasty or osteotomy procedures. This study provides an update on hemostatic agents used in periodontal surgery and highlights the effectiveness of bone wax in controlling bleeding from bony surfaces.^[5] This article specifically focuses on local hemostatic agents used in oral and maxillofacial surgery and includes bone wax as one of the agents employed to achieve hemostasis. These studies emphasize the significance of bone wax as a hemostatic agent in periodontal surgeries. Its ability to effectively control bleeding from bony surfaces provides clinicians with a reliable method to manage intraoperative bleeding, ensuring optimal surgical outcomes and patient wellbeing.^[6]

Indications for Hemostatic Materials and Methods

1. Bleeding Control
2. Enhanced Wound Healing
3. Reduced Surgical Time

Advantages of Hemostatic Materials and Methods

1. Precision: precise control over bleeding sites
2. Immediate Hemostasis
3. Versatility
4. Minimized Complications: hematoma formation, infection, and delayed wound healing.
5. Reduced Postoperative Pain and Swelling^[7,8,9]

Potential Complications

1. Foreign Body Reaction

Hemostatic materials can trigger a foreign body reaction in some individuals. This immune response may lead to inflammation, tissue damage, delayed wound healing, or infection. The study found that certain hemostatic materials can cause inflammatory reactions, including foreign body reactions, leading to complications such as persistent pain, swelling, and delayed wound healing.^[10]

2. Infection Risk

Hemostatic materials, especially those of synthetic or animal origin, may increase the risk of infection if not properly sterilized or managed. Bacterial contamination can lead to local or systemic infections and may require additional treatment. A relevant article is "Adverse events associated with the use of bovine thrombin hemostatic matrix: A review of the literature" by Rawlins et al. (2014) published in the Journal of Oral and Maxillofacial Surgery. The study highlights the potential risk of infection associated with the use of bovine thrombin hemostatic materials and suggests the importance of adequate sterilization and strict aseptic techniques.^[11]

3. Allergic Reactions

Some individuals may develop allergic reactions to certain hemostatic materials, particularly those derived from animal sources, such as collagen-based agents. These allergic reactions can range from mild skin irritation to severe systemic responses. Supporting this, the article "Allergic reactions to bovine collagen dermal fillers discusses the risk of allergic reactions to collagen-based materials used in dermatological procedures. Although not specific to hemostatic materials, it highlights the potential for allergic responses in collagen-based products, including some hemostatic materials.^[12]

4. Interference with Wound Healing

In some cases, hemostatic materials may interfere with the normal wound healing process, leading to delayed healing, prolonged inflammation, or impaired tissue regeneration provides insights into the potential complications associated with hemostatic agents used in cardiac surgery. It discusses how certain hemostatic materials can interfere with wound healing, leading to adverse outcomes.^[13]

CONCLUSION

Effective hemostasis is crucial in achieving successful outcomes in periodontal surgeries. The selection and utilization of appropriate hemostatic materials and methods depend on various factors, including the extent of bleeding, surgical technique, patient characteristics, and clinician experience. Understanding the properties, indications, advantages, and potential complications of hemostatic materials and methods will assist periodontal surgeons in achieving efficient hemostasis and promoting optimal surgical outcomes. Hemostasis is a complex physiological process that ensures the balance between bleeding and clotting. Hemostatic materials and

methods assist and enhance this natural process in clinical settings. A wide range of materials, including mechanical and chemical agents, as well as thermal devices, are employed to achieve effective hemostasis. Various methods, such as local pressure, suturing techniques, electrocautery, and laser hemostasis, are utilized to control bleeding and promote successful surgical outcomes. Understanding the mechanisms, materials, and methods involved in hemostasis is essential for clinicians to effectively manage bleeding and optimize patient care.

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