HEMOSTATIC AGENTS USED IN ORAL SURGERY - A SHORT REVIEW

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ABSTRACT

Hemostasis plays a critical and fundamental role in all surgical procedures. In major oral and maxillofacial surgical procedures and periodontal surgical procedures electrocautery and suture ligatures are most commonly used to control bleeding from small and major vessels. But if generalized bleeding is observed, and when use of pressure is not effective and the use of electrosurgical instruments could endanger teeth or adjacent nerves, topical hemostatic agents may be needed. In the last decade, the number of varieties of topical homeostatic agents has grown dramatically. This review aims to discuss various hemostatic agents and their usage in oral surgical procedures.

keywords: *Hemostasis, Hemostatic agents, Hemorrhage , collagen, thrombin*

Introduction

Hemostasis plays a critical and fundamental role in all surgical procedures.(1) Dentists on an everyday basis perform numerous surgical procedures requiring adequate hemostasis which would aid in the success of the procedure, better visibility and better healing.Thus it is necessary for dentists to have a basic knowledge of normal blood clotting mechanisms and abnormal diathesis to anticipate any potential problems that may arise during and after surgery.

Prevention is the best management of peri operative haemorrhage.Thus it is necessary for the dentist to have a thorough patient history, necessary medical consults, proper intra operative technique, postoperative instructions, timely follow up and basic knowledge about the type of haemorrhage and the kind of management it requires.

TYPES OF HAEMORRHAGE (2)

The classification of a haemorrhage is important as it has direct clinical implications.

Haemorrhage following minor oral surgical procedure can be classified in relation to timing:

1. Primary haemorrhage : Bleeding occurring at the time of surgery
2. Reactionary haemorrhage : Bleeding that occurs 2-3 hours after the procedure
3. Secondary haemorrhage : Bleeding that occurs up to 14 days after the surgery. The most likely cause of this is supposed to be infection.

The haemorrhage may also be classified according to the site affected:
Soft tissue, Bone, Vascular.

In major oral and maxillofacial surgical procedures and periodontal surgical procedures electrocautery and suture ligatures are most commonly used to control bleeding from small and major vessels. But if generalized bleeding is observed, and when use of pressure is not effective and the use of electrosurgical instruments could endanger teeth or adjacent nerves, topical hemostatic agents may be needed. (3,4) Local hemostatic agents provide control of external bleeding by enhancing the natural clotting process through various physical reactions between the agent and blood or by various mechanical means.(5) Hemostatic agents may be beneficial in various procedures like exodontia, tissue biopsies, placement of endosseous implants, and periodontal surgery to name a few. (6) Not only are these agents useful for specific procedures, but they also are valuable for certain group of patients especially those with clotting disorders.

In the last decade, the number of varieties of topical homeostatic agents has grown dramatically. An Ideal hemostatic agents does not exist. A perfect hemostatic agent must have easy storage, should be lightweight, easily and rapidly placed on the haemorrhaging wound as well as long acting. (6) The ideal haemostat should be able to reach sites in the wound where application of direct pressure is not possible thus fulfilling the purpose of usage of an hemostatic agent. Thus, it is essential for the surgeon to understand the effectiveness, merits and demerits , mechanism of action of each and adverse effects of each and every different hemostatic agent available in the market for them to choose the right one for the particular situation. This review aims to discuss various hemostatic agents and their usage in oral surgical procedures.

TYPES OF HEMOSTATIC AGENTS

Local hemostatic agents can be classified as passive and active hemostatic agents. (7)

Passive hemostatic agents

Passive hemostatic agents usually form a lattice like matrix which adheres to the bleeding site which in turn activates the extrinsic pathway and forms a base around which h platelets can aggregate to form clot. (4) These are mostly used as first line agents as they do not require any special storage facilities and quite easily available as well as inexpensive. (8)
Passive hemostatic agents have the potential to expand many times than their original mass when they come in contact with fluids, it is recommended to use the less amount of the agent required to achieve hemostasis as any excess can cause compression of surrounding nerves and vessels. Passive topical hemostatic products include collagens, cellulose, gelatins, and polysaccharide spheres. (9)

Active hemostatic agents

Active hemostatic agents have biologic activity and they participate directly in the coagulation pathway to induce the blood clot. Active agents include thrombin and those product formulations in which thrombin is combined along with a passive agent to provide an active product. It is normally used with gelatin foam. (10,11)

Passive hemostatic agents

Collagen based products :

These products (eg, CollaPlug, CollaTape, and Helistat [Integra LifeSciences]) are soft, white, pliable, nonfriable, coherent, sponge-like structures. They are fabricated from bovine collagen (usually from deep flexor tendons) and are nontoxic and nonpyrogenic. The products are highly absorbent and able to hold many times their own weight of fluid. (12,13)
These products must be held in place for about 2-5 minutes to achieve hemostasis and then may be removed. These get absorbed in 14-56 days.In addition to serving as a mechanical obstruction to bleeding, these materials affect the coagulation process. As with most hemostatic agents, collagens are not to be used in infected or contaminated wounds. The agents may serve as a nidus for abscess formation and may potentiate bacterial growth. Besides sponges and plugs, these products are available in microfibrillar form. However, the usage of this form is very less in oral surgical procedures.

Cellulose based Products : Surgicel

These are available as single or multiple absorbable, white knitted sheets composed of oxidised regenerated cellulose which is derived from plant based alpha cellulose.

It achieves hemostasis by mechanical pressure. It is relatively bacteriostatic when compared with other hemostatic agents. Absorption of Surgicel will occur in approximately 4-8 weeks.
It has low pH and this acidic nature can cause inflammation and necrosis of adjacent tissues. (4) . There is increased risk for encapsulation, thus it is better to avoid its usage in contaminated wounds.

Actcel and Gelitacel

It is a newer hemostatic agent very similar to surgicel hemostatic agent made from treated and sterilised cellulose.It is used to control bleeding in periodontal and orthognathic surgeries.It has a role in the modifying intrinsic pathway.

Gelitacel is relatively fast-working, oxidized resorbable cellulose hemostatic gauze of natural origin made from highest alpha- grade selected cotton. It resorbs as quick as in 96 hours, therefore giving it decreased risk for encapsulation. (4)(14)

Gelatin based products

Gelfoam is a porous absorbable gelatin sponge which is prepared from purified pork skin gelatin. It is the most commonly employed agents for the control of minor bleeding.It is manufactured in the form of films, gelatin sponges i.e Gelfoamor powder that is mixed to form a paste. Many studies have demonstrated that gel foam has very little tissue reaction and gets absorbed fully within 4-6 weeks. It is very useful in managing post-operative bleeding after dental extractions and periodontal surgeries.Gelatine based hemostat have been reported to induce a better quality clot than collagen based hemostats.(15,16)

Active hemostatic agents

Thrombin

These hemostatic agents are derived from either bovine or humanplasma or they are manufactured using recombinant DNA techniques. Thrombin can be used topically as a dry powder or as a solution along with gelatin sponges mixed with a gelatin matrix to treat moderate to severe bleeding or in the form of spray. Thrombin converts soluble fibrinogen into fibrin. (4)

Sealants

Sealants usually work by forming a barrier that is impervious to the flow of most liquids. Various types of sealants to achieve surgical hemostasis are: Fibrin sealants, PEG polymers, albumin with glutaraldehyde and the new cyanoacrylate sealant. (17,18,4)

There are various other newer hemostatic agents such as QuikClot (inorganic hemostat) Chitosan-based products, Polysaccharide-based hemostats, Poly-N-acetyl glucosamine-based materials.

CONCLUSION

Hemostatic agents are used in dentistry for hemorrhage control and wound protection. This article has reviewed few of the most commonly used active and passive hemostatic agents, their mechanism of action and their advantages and disadvantages.

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