BULLETIN OF STOMATOLOGY AND MAXILLOFACIAL SURGERY
Volume 21, Issue 5

DOI: 10.58240/1829006X-2025.21.5-77

REVIEW ARTICLE

USE OF TOPICAL HEMOSTATIC AGENTS IN ORAL SURGERY: MINI REVIEW

Karen Lalayan
professor Dep Oral and Maxillofacial Surgery,Yerevan State Medical University after M. Heratsi,Yerevan, Armenia,
***Corresponding Author: Lalayan Karen** professor Dep Oral and Maxillofacial Surgery,Yerevan State Medical University after M. Heratsi,Yerevan, Armenia, e-amail:klalaev@gmail.com

Received: *Apr 5, 2025;* ***Accepted:*** *Apr. 30, 2025;* ***Published:*** *May. 13,2025*

ABSTRACT

Background: There are a huge number of hemostatic agents in dentistry that effectively prevent blood loss and heal wounds. Hemostasis with a correctly selected agent occurs instantly and reaches its peak within a few hours.
At present, new drugs affecting the hemostasis system and locally acting hemostatic agents are being intensively developed. However, despite the current situation, the issue of choosing methods for assessing the hemostatic activity of drugs in clinical practice remains open.
Material and methods: In this review, the author has summarized the literature on the use and application of topical hemostatics for bleeding in all types of oral surgery, their principles of action, and provided suggestions for selecting the right principle for different clinical situations. author conducted a literature review of scientific papers, using the resources of the Google Scholar, PubMed, Scopus, Web of, for the above keywords: Topical hemostatic agents, oral surgery, tooth extraction, bleeding, small blood loss.
Results: Local hemostatics work by activating the blood coagulation cascade at the site of vessel injury, resulting in rapid formation of a blood clot and stopping of bleeding. Efficacy depends on the mechanism of action, which can be mechanical, chemical or physiological.
Conclusion: Local hemostatics play a key role in stopping bleeding of various etiologies. These hemostatic agents provide rapid and effective cessation of bleeding, minimizing the risk of blood loss and promoting faster healing.

Keywords: Topical hemostatic agents, oral surgery, tooth extraction, bleeding, small blood loss.

INTRODUCTION

Many dental manipulations can result in damage to blood vessels. Problems related to controlling postoperative bleeding are often encountered in the daily clinical practice of dental surgeons and they use a local hemostatic agent as a means of stopping bleeding that promotes platelet activation or aggregation, forming a stable thrombus.[1-3] Tooth extraction is accompanied by bleeding of low intensity and small blood loss, since during the operation small diameter vessels (up to 100 microns) are damaged and, accordingly, low blood pressure (about 20-30 mm Hg). [4,5]The release of blood from the socket after tooth extraction is a normal physiological reaction and should be considered as a favorable outcome of the operation. The spilled blood serves as a substrate for the formation of a blood clot filling the socket, which performs both a hemostatic and plastic function (is a matrix for the tissue covering the wound defect).Patients with bleeding after tooth extraction make up from 0.25 to 5%.[6.] Bleeding that appears immediately after tooth extraction is called primary.

If it appears some time after the operation (after several hours or even days) - secondary bleeding. Alveolar bleeding is most often caused by local, less often - by general causes. Secondary bleeding is also more often associated with local factors. To stop bleeding, dentists use hemostatic agents. They are needed not only to avoid serious blood loss, but also to make it easier for a specialist to work with the patient's oral cavity. The selection of certain drugs also helps to reduce the risk of hematomas and inflammation. Hemostatic agents are indispensable tools for quick and effective stopping of bleeding, which plays an important role in the surgical procedure. To select a specific hemostatic agent for specific operations, it is necessary to have an understanding of the properties of various application hemostatic agents, their effectiveness, biodegradation characteristics, etc.

Local hemostatic agents Characterized by targeted action and used in case of damage to large vessels and diffuse bleeding. Often used in emergency surgery. Stop capillary and parenchymatous bleeding.[7-9]

Local hemostatic agents have a wide range of effects on the affected area and are selected based on a specific situation. They are aimed at preventing blood loss. Mechanical, thermal and chemical local hemostatic agents are distinguished. Requirements for hemostatic drugs in dentistry.[10,11]

Mechanical: Mechanical means intended to stop bleeding in the oral cavity include coagulating components. They create a physical barrier to bleeding, allowing the blood to quickly clot and form a clot. They are selected based on the nature of the bleeding, the structural features of the jaw, the condition of the gums and other nuances that the attending physician takes into account during the manipulations.For tamponade of the socket in case of post-extraction bleeding, gauze soaked in thrombin, epsilon-aminocaproic acid, hemophobin, amifer, as well as a hemostatic sponge or gauze, a fibrin sponge (film, cotton wool, foam), fibrin glue, a biological antiseptic tampon (BAT), a gelatin or collagen sponge and other means can be used.[12 -15]

Thermal: These are special devices for coagulation, the operation of which is based on physical principles. This includes electrocoagulation, photocoagulation, laser, ultrasound, radiofrequency, microwave, argon plasma coagulation.

Chemical: Local chemical hemostatic agents include various applications that directly affect the blood coagulation system.[16,17] The ideal hemostatic agent should be biocompatible, easy to apply, safe and have an immediate effect. Local hemostatic agents can be classified as: [18]

1. Passive hemostatic agents

- Collagen-based products:Microfibillar collagen (Avitene) Absorbable collagen hemostat sponge (Helistat) Colla-Cote, Colla-Tape, Colla-Plug.
- Cellulose-based products; Oxidized regenerated cellulose (Surgicel) ActCel and Gelitacel
- Gelatin-based products: Gelfoam
- Polysaccharide hemospheres

Passive hemostatic agents form a physical matrix that adheres to the bleeding site and provides the core a platform around which platelets can gather unite, forming a blood clot. They are suitable for use as a first line agents, because they are easily accessible, not special storage is required and relatively cheap.

2. Active hemostatic agents

- Thrombin
- FloSeal (flowablehemostatic agent)
- Sealants Fibrin sealant (tisseel)
- Albuminderived hemostat(bioglue)

Topical Thrombin: Thrombin is used as an effective means of stopping bleeding by converting soluble fibrinogen to insoluble fibrin, forming a fibrin clot. It includes bovine thrombin (Trombin-JMI), human plasma-derived thrombin (Evithrom), and recombinant human thrombin (Recothrom). Human thrombin offers efficacy and less immunological response than bovine thrombin. Hemoblast™ contains three components: human thrombin, collagen, and chondroitin sulfate[19].

FloSeal (flowablehemostatic agent);Thse materials are a mixture of a flowing gelatin matrix (porcine or porcine) and a human-derived thrombin component that facilitates fibrin formation, promoting clotting and minimizing blood loss. Floseal® is composed of a bovine gelatin matrix and a porcine gelatin matrix and is indicated in surgical procedures as an adjunct to hemostasis[20,21].

Fibrin sealant (tisseel): Fibrin sealants contain fibrinogen and thrombin, where thrombin converts fibrinogen to fibrin and activates factor XIII. There are currently many different fibrin sealant products available, including dry fibrin TachoSil, Tacho-Comb, fibrin pad, dry fibrin sealant dressing, and Fibriseal[22,23]. Liquid fibrin sealants come in two separate vials in which fibrinogen and thrombin are mixed immediately before use. Tisseel, Crosseal, Evicel, and Quixil are examples of liquid fibrin sealant products.

Kaprofer:Pharmacological action (pharmacodynamic) Pharmacological action - hemostatic.[24,25] The combined drug has a local hemostatic effect that occurs immediately after its application. When interacting with blood, a blood clot is formed, firmly fixed on the wound surface, prevents repeated bleeding and prevents the penetration of secondary infection. Accelerates regeneration and postoperative epithelization of the wound surface, formation of granulation tissue. It also has anti-edematous and anti-inflammatory effects. Pharmacokinetics Indications for use Bleeding (in various dental procedures, in the treatment of pulpitis, to stop bleeding from tooth canals after tooth pulp extirpation), in surgical interventions on periodontal tissues to stop bleeding and remove collateral swelling of soft tissues in the postoperative period. Method of application and dosage With persistent bleeding, a cotton swab can be left in the hole for a day. The tampon is removed independently. In the canals of the teeth and gingival pockets, the drug is injected for 2-5 seconds.

REFERENCES

1.Scarano A, Leo L, Lorusso F, Tagariello G, Falisi G, Bugea C, Rapone B, Greco Lucchina A, Di Carmine MS. Topical hemostatic agents in oral surgery: a narrative review. Eur Rev Med Pharmacol Sci. 2023 Apr;27(3Suppl):135-140.

2.Vezeau PJ. Topical Hemostatic Agents: What the Oral and Maxillofacial Surgeon Needs to Know. Oral Maxillofac Surg Clin North Am. 2016 Nov;28(4):523-532.doi:10.1016/j.coms.2016.06.007.

3.Samudrala S. Topical hemostatic agents in surgery: a surgeon's perspective. AORN J. 2008 Sep;88(3):S2-11. doi: 10.1016/S0001-2092(08)00586-

4.Huang J, Liu J, Shi H, Wu J, Liu J, Pan J. Risk factors for bleeding after dental extractions in patients receiving antithrombotic drugs - A case control study. J Dent Sci. 2022 Apr;17(2):780-786. doi: 10.1016/j.jds.2021.10.005

5.Eichhorn W., Burkert J., Vorwig O., et al. Bleeding incidence after oral surgery with continued oral anticoagulation. Clin Oral Invest. 2012;16:1371–1376. doi: 10.1007/s00784-011-0649-1

6.Kumbargere Nagraj S, Prashanti E, Aggarwal H, Lingappa A, Muthu MS, Kiran Kumar Krishanappa S, Hassan H. Interventions for treating post-extraction bleeding. Cochrane Database Syst Rev. 2018 Mar 4;3(3):CD011930.

7.Scarano. A, Leo L, Lorusso F, Tagariello G, Falisi G, Bugea C, Rapone B, Greco Lucchina A, Di Carmine MS. Topical hemostatic agents in oral surgery: a narrative review. Eur Rev Med Pharmacol Sci. 2023 Apr;27(3 Suppl):135-140.

8.Vezeau PJ. Topical Hemostatic Agents: What the Oral and Maxillofacial Surgeon Needs to Know. Oral Maxillofac Surg Clin North Am. 2016 Nov;28(4):523-532. doi: 10.1016/j.coms.2016.06.007

9.Mahardawi, B., Jiaranuchart, S., Arunjaroensuk, S. *et al.* The effect of different hemostatic agents following dental extraction in patients under oral antithrombotic therapy: a network meta-analysis. *SciRep* **13**, 12519 (2023). https://doi.org/10.1038/s41598-023-39023-7

10.L Moreno-Drada, J. A. *et al.* Effectiveness of local hemostatic to prevent bleeding in dental patients on anticoagulation: A systematic review and network meta-analysis. *J. Craniomaxillofac. Surg.* **49**, 570–583. https://doi.org/10.1016/j.jcms.2021.04.014 (202 1). 11.Puia, S. A., Hilber, E. M. & Garcia-Blanco, M. Randomized clinical trial comparing three local hemostatic agents for dental extractions in patients under chronic anticoagulant therapy—A comparative study. *Ann. Maxillofac. Surg.* **10**, 292–296. https://doi.org/10.4103/ams.ams_276_20 (2020).

12.da Silva RV, Gadelha TB, Luiz RR, Torres SR. Intra-alveolar epsilon-aminocaproic acid for the control of post-extraction bleeding in anticoagulated patients: randomized clinical trial. Int J Oral Maxillofac Surg. 2018 Sep;47(9):1138-1144. doi: 10.1016/j.ijom.2018.02.01 13.van Galen KP, Engelen ET, Mauser-Bunschoten EP, van Es RJ, Schutgens RE. Antifibrinolytic therapy for preventing oral bleeding in patients with haemophilia or Von Willebrand disease undergoing minor oral surgery or dental extractions. CochraneDatabase Syst Rev. 2015 Dec 24;(12):CD011385.

14.Kalantar Motamedi MH, Navi F, Shams Koushki E, Rouhipour R, Jafari SM. Hemostatic Tampon to Reduce Bleeding following Tooth Extraction. Iran Red Crescent Med J. 2012 Jun;14(6):386-8.

15.Malmquist JP, Clemens SC, Oien HJ, Wilson SL. Hemostasis of Oral Surgery Wounds With the HemCon Dental Dressing. J Oral Maxillofac Surg. 2008;66:1177–83.

16.Tarighi P, Khoroushi M. A review on common chemical hemostatic agents in restorative dentistry. Dent Res J (Isfahan). 2014 Jul;11(4):423-8.|

17.Mahardawi B, Jiaranuchart S, Arunjaroensuk S, Tompkins KA, Somboonsavatdee A, Pimkhaokham A. The effect of different hemostatic agents following dental extraction in patients under oral antithrombotic therapy: a network meta-analysis. Sci Rep. 2023 Aug 2;13(1):12519. doi: 10.1038/s41598-023-39023-7.|

18.Jamali B, Nouri S, Amidi S. Local and Systemic Hemostatic Agents: A Comprehensive Review. Cureus. 2024 Oct 24;16(10):e72312. doi: 10.7759/cureus.72312.

19.Lew WK, Weaver FA. Clinical use of topical thrombin as a surgical hemostat. Biologics. 2008 Dec;2(4):593-9. doi:10.2147/btt.s2435.

20.Echave M, Oyagüez I, Casado MA. Use of Floseal®, a human gelatine-thrombin matrix sealant, in surgery: a systematic review. BMC Surg. 2014 Dec 20;14:111. doi: 10.1186/1471-2482-14-111.

23.Skriabin ON, Karitskiĭ AP. Primenenie novogo gemostaticheskogo preparata kaprofera v lechebnoĭ éndoskopii [Use of a new hemostatic preparation kaprofer in therapeutic endoscopy]. Klin Med (Mosk). 1995;73(4):90-1. Russian. PMID: 7474839

24.Kurygin AA, Grinev MV, Skriabin ON, Baranchuk VN, Serova LS, Korobchenko AA. Primenenie gemostaticheskogo preparata "Kaprofer" v neotlozhnoĭ khirurgii [The use of the hemostatic preparation Kaprofer in emergency surgery]. Vestn Khir Im I I Grek. 1995;154(1):91-5. Russian. PMID: 7793004.

25.Dunaĭvitser BI, Gulunian EA, Lalaev KV, Manukian VM. Opyt primeneniia mestnogo gemostaticheskogo sredstva Kaprofera v otorinolaringologicheskoĭ praktike [Experience in the use of the local hemostatic agent Kaprofer in otorhinolaryngologic practice]. Vestn Otorinolaringol. 1987 Sep-Oct;(5):71-3.