WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Strategies for Controlling Post-Extraction Bleeding: A Review

[1]Dr. C S C. Satish Kumar, [2]Dr. E.Sivanesh, [3]Dr. P.Monesh, [4]Dr. Pradeep Christopher Jesudas, [5]Dr. K. Senthil Kumar

[1] MDS Reader, Department of Oral and Maxillofacial Surgery, Thai Moogambigai Dental College and Hospita
[2] UG Trainee, Thai Moogambigai Dental College and Hospital
[3] UG Trainee, Thai Moogambigai Dental College and Hospital
[4] Professor and Head of the Department, Department of Oral and Maxillofacial Surgery, Thai Moogambigai Dental College and Hospital
[5] MDS, Professor, Department of Oral and Maxillofacial Surgery, Thai Moogambigai Dental College and Hospital

ABSTRACT :

Post-extraction bleeding is a common and clinically significant complication in dental practice, potentially leading to delayed healing, patient discomfort, and emergency interventions. Its occurrence is influenced by a combination of local, systemic, and behavioral factors, including surgical trauma, tooth type, coagulopathies, anticoagulant therapy, systemic diseases, and patient habits such as smoking and poor oral hygiene. Effective management requires a multimodal approach encompassing mechanical methods (e.g., gauze pressure, suturing), local hemostatic agents (oxidized cellulose, gelatin sponges, collagen plugs, fibrin sealants), pharmacological interventions (topical thrombin, tranexamic acid, vasoconstrictors), and systemic optimization in high-risk patients. Emerging strategies, including autologous platelet concentrates, nanofiber and hydrogel-based hemostatic materials, laser or electrocautery techniques, and personalized bleeding management based on coagulation profiling, show promise in enhancing hemostasis and tissue healing. This review highlights current and novel approaches, emphasizing the importance of individualized, evidence-based strategies to minimize post-extraction bleeding and improve patient outcomes.

Keywords: Post-extraction bleeding, Hemostasis, Local hemostatic agents, Tranexamic acid, Platelet-rich fibrin

Introduction :

Bleeding is one of the most common complications following tooth extraction and represents a clinically significant concern in dental and oral surgical practice. While minor bleeding is usually self-limiting, uncontrolled or prolonged hemorrhage can result in substantial patient morbidity, delayed wound healing, increased pain, and in severe cases, may necessitate emergency intervention or hospitalization. Post-extraction bleeding not only impacts patient comfort but also poses medico-legal implications and can increase the overall burden on healthcare resources.[1] Effective recognition, prevention, and management of post-extraction bleeding are therefore critical components of dental surgical care. Incidence in the general population varies across studies. Minor postoperative bleeding has been reported in approximately 1.7% to 7% of extraction cases, with clinically significant hemorrhage occurring in about 2–3% of patients.[2] Although these rates suggest that most extractions are uncomplicated, the occurrence of bleeding events, even if infrequent, necessitates a structured approach to prevention and management. Certain patient populations are at significantly higher risk.[3] Individuals receiving antithrombotic therapy—including anticoagulants and antiplatelet agents exhibit post-extraction bleeding rates ranging from 6.9% to 27%, with studies indicating a 27% incidence in anticoagulated patients compared to 9% in non-anticoagulated controls.[4] Advanced age, extensive extractions, and comorbid conditions further compound this risk. Patients with thrombocytopenia (platelet count <150,000/μL) experience post-extraction bleeding in approximately 5% of cases, with bleeding risk present across subgroups ranging from severe (<50,000/μL) to moderate (100,000–150,000/μL) thrombocytopenia.[5]
Systemic bleeding disorders, including hemophilia, von Willebrand disease, and severe liver dysfunction, also predispose patients to excessive post-extraction bleeding. In these cases, careful preoperative assessment, perioperative optimization, and specialized hemostatic strategies are essential to prevent complications. The management of post-extraction bleeding involves a combination of preventive, intraoperative, and postoperative strategies.[6] Mechanical methods, such as direct pressure using gauze or use of a damp tea bag, remain the first-line approach to promote clot formation. Local hemostatic agents including gelatin sponges, collagen plugs, oxidized cellulose, and topical thrombin serve as adjuncts when simple pressure is insufficient.[7]

Etiology and Risk Factors for Post-Extraction Bleeding

Post-extraction bleeding arises from a combination of local, systemic, and behavioral factors, each contributing to the overall risk of hemorrhage following dental extractions. Local factors include the extraction site and tooth type, with mandibular wisdom teeth and maxillary molars being particularly prone to bleeding due to complex root anatomy and the frequent need for surgical interventions such as flap elevation or bone removal. Extensive surgical trauma, prolonged operative time, and manipulation of soft and hard tissues further increase the likelihood of postoperative bleeding.[8] The presence of

local infection or poor oral hygiene, including periodontitis, also contributes significantly, as inflamed or granulation tissue can impair clot formation and stabilization. Systemic factors play a critical role, with coagulopathies such as hemophilia and von Willebrand disease markedly increasing bleeding risk due to impaired clotting mechanisms. Liver and renal diseases can disrupt the synthesis and function of clotting factors and platelets, further elevating the risk. Medications, particularly anticoagulants like warfarin and direct oral anticoagulants (DOACs), as well as antiplatelet agents such as aspirin and clopidogrel, substantially increase the probability of post-extraction hemorrhage.[9] Advanced age, particularly in patients over 60 or 75 years, is associated with higher bleeding risk, likely due to the presence of systemic comorbidities and tissue fragility. Other systemic conditions, such as diabetes and hypertension, have shown inconsistent associations with bleeding, though poor glycemic control may impair wound healing. Patient behaviors also influence outcomes; smoking can compromise tissue integrity and vascular function, alcohol use may interfere with coagulation and wound repair, and inadequate oral hygiene increases the likelihood of postoperative bleeding. In summary, post-extraction bleeding is a multifactorial event, where surgical factors, systemic health, and patient habits collectively determine risk, highlighting the importance of thorough preoperative assessment and tailored perioperative management to prevent or mitigate bleeding complications.[10]

Local Mechanical Methods for Controlling Post-Extraction Bleeding

Local mechanical methods are fundamental for controlling post-extraction bleeding and serve as the first-line approach in most cases. Gauze pressure packs are the simplest and most widely used technique, involving placement of a moist gauze pad over the extraction site with firm biting pressure applied for 10 to 30 minutes. This direct pressure compresses severed blood vessels, facilitating clot formation, and studies indicate that hemostasis is often achieved within 10 minutes.[11] Proper positioning of the gauze behind the last teeth is essential, and patients should bite firmly without excessive force. Frequent changing of the gauze is discouraged, as it may disrupt the clot and restart bleeding; heavily blood-soaked gauze can be replaced every 2 hours or as needed until bleeding subsides. As an adjunct, damp tea bags may be applied due to their tannin content, which promotes coagulation. Suturing provides additional mechanical control by stabilizing the clot, compressing soft tissues, and closing the socket.[12] Interrupted and figure-of-eight sutures are commonly employed, with figure-of-eight techniques preferred in high-risk areas for their enhanced tissue approximation and socket pressure. Sutures can also serve to anchor local hemostatic agents within the socket.[13] Surgical techniques further enhance mechanical hemostasis: primary closure of soft tissues over the extraction site offers tamponade and reduces bleeding, while alveolar ridge compression using digital pressure or instruments immediately after extraction minimizes socket size and hemorrhage. Adoption of minimally traumatic surgical techniques such as limiting flap elevation and bone removal also decreases bleeding risk by preserving tissue integrity. Collectively, these local mechanical measures are simple, effective, and form the cornerstone of immediate post-extraction bleeding control.[14]

Local Hemostatic Agents for Controlling Post-Extraction Bleeding

Local hemostatic agents play a critical role in controlling post-extraction bleeding by providing a physical matrix for clot formation and enhancing platelet aggregation. Oxidized regenerated cellulose (e.g., Surgicel®) acts as a barrier within the extraction socket, absorbing blood while promoting platelet adhesion and aggregation. It provides a scaffold that accelerates clot formation and stabilizes the blood clot, and it is fully resorbable within 1 to 2 weeks. Gelatin sponges (e.g., Gelfoam®) consist of a porous gelatin matrix that absorbs blood, concentrates clotting factors and platelets, and facilitates platelet aggregation, serving as a biodegradable scaffold for clot stabilization that typically dissolves over 4 to 6 weeks.[15] Collagen plugs, derived from bovine or porcine collagen, promote platelet adhesion and aggregation through exposed collagen fibers and act as a physical scaffold protecting the wound site. Clinical studies show that while collagen plugs can achieve faster hemostasis, there are occasional reports of recurrent bleeding compared to other agents. Fibrin sealants or glues contain human fibrinogen and thrombin, directly mimicking the final step of the coagulation cascade to form a stable fibrin clot, providing immediate hemostasis and a strong mechanical seal over the extraction site.[16] These agents are particularly useful in anticoagulated patients or those at increased bleeding risk. Mechanistically, all these local hemostatic materials function by creating a physical barrier, enhancing platelet aggregation, concentrating clotting factors, and stabilizing the formed clot to prevent premature dissolution. By supporting clot formation and protecting the wound site, local hemostatic agents accelerate hemostasis and reduce postoperative bleeding, making them essential adjuncts in both routine and high-risk dental extractions.[17]

Chemical and Pharmacological Methods for Controlling Post-Extraction Bleeding

Chemical and pharmacological interventions serve as important adjuncts to mechanical and local hemostatic measures, particularly in patients at increased risk of bleeding. Topical thrombin is a serine protease enzyme that catalyzes the conversion of fibrinogen to fibrin, promoting rapid clot formation at the bleeding site.[18] Applied directly as a solution, spray, or combined with collagen or gelatin sponges, thrombin enhances hemostasis where mechanical pressure alone may be insufficient and is especially beneficial in patients with coagulation disorders or those on antiplatelet or anticoagulant therapy. Antifibrinolytic agents, most commonly tranexamic acid (TXA), prevent fibrin clot breakdown by inhibiting the conversion of plasminogen to plasmin.[19] TXA can be applied locally as a mouthwash (typically 5% concentration) or via soaked gauze, stabilizing the clot and reducing postoperative bleeding. Clinical evidence indicates that TXA effectively controls bleeding without necessitating interruption of systemic anticoagulant therapy. Vasoconstrictors, such as epinephrine incorporated in local anesthetic solutions, constrict blood vessels at the extraction site, temporarily reducing local blood flow and minimizing intraoperative and immediate postoperative bleeding.[20] Although transient, this effect complements mechanical and chemical hemostasis. Collectively, these pharmacological methods work through three primary mechanisms: promoting rapid clot formation (thrombin), preserving clot integrity (tranexamic acid), and decreasing local perfusion (epinephrine). By enhancing hemostasis, these interventions provide reliable control of post-extraction bleeding, particularly in high-risk patients or complex surgical scenarios.[21]

Systemic Approaches for Controlling Post-Extraction Bleeding

Systemic management is essential for patients with underlying coagulopathies or those receiving anticoagulant therapy, aiming to optimize hemostasis and minimize post-extraction bleeding risk. Correction of coagulopathies is a key component: patients with inherited bleeding disorders, such as hemophilia, require preoperative replacement therapy with clotting factor concentrates (e.g., factor VIII or IX) to normalize coagulation prior to extraction. Individuals with von Willebrand disease may receive desmopressin or von Willebrand factor concentrates to enhance clotting function.[22] Patients with liver disease, which impairs synthesis of clotting factors, may need fresh frozen plasma or vitamin K supplementation to correct deficiencies and ensure adequate hemostasis. Management of anticoagulants requires careful consideration of thrombotic versus bleeding risks.[23] While bridging therapy with short-acting agents or dose adjustments may be necessary in high-risk cases, current guidelines often recommend continuing anticoagulants during dental extractions, provided local hemostatic measures are employed, to avoid thromboembolic complications. For patients on warfarin, international normalized ratio (INR) monitoring is crucial, with extractions generally considered safe if INR is below 3.0.[24] Specific pharmacologic agents are also employed when rapid correction of coagulation is required. Vitamin K can reverse the anticoagulant effects of warfarin, while desmopressin (DDAVP) promotes the release of factor VIII and von Willebrand factor, improving hemostasis in mild hemophilia or von Willebrand disease. In summary, systemic approaches focus on thorough preoperative assessment and optimization of coagulation status through factor replacement, careful management of anticoagulant therapy, and targeted pharmacologic interventions. [25]These strategies are critical for preventing and managing post-extraction bleeding in high-risk patients, ensuring safe surgical outcomes while minimizing complications.[26]

Emerging and Novel Approaches for Controlling Post-Extraction Bleeding

Recent advancements in hemostatic technology and biomaterials have introduced innovative approaches for controlling post-extraction bleeding, aiming to enhance clot formation, accelerate wound healing, and improve patient outcomes. Platelet-rich fibrin (PRF) and platelet-rich plasma (PRP) are autologous biomaterials derived from the patient's own blood, rich in platelets and growth factors. These materials promote clotting through the release of cytokines and growth factors that stimulate platelet aggregation, fibrin matrix formation, and soft tissue healing.[27] Widely studied in oral surgery, PRF and PRP have been shown to reduce postoperative bleeding and accelerate tissue repair. Nanofiber and hydrogel-based hemostatic agents represent a promising area of research. Sprayable oxidized cellulose nanofiber hydrogels and self-assembling peptide hydrogels create physical barriers that adhere strongly to wet tissue surfaces and rapidly polymerize, effectively sealing bleeding vessels even under high-pressure conditions. These materials mimic the extracellular matrix and can complement physiological clotting mechanisms, demonstrating rapid hemostasis and enhanced wound healing in experimental models.[28] Laser and electrocautery techniques provide accelerated hemostasis by thermally coagulating blood vessels at the extraction site, reducing both intraoperative and postoperative bleeding. These methods improve surgical visualization and may contribute to faster recovery compared to conventional mechanical or chemical approaches.[29] The development of novel biomaterials continues to evolve, with research focusing on combining biocompatible polymers and bioactive molecules to create injectable, adhesive, and self-healing hemostatic agents suitable for dental surgery. Nanofiber-reinforced hydrogels and advanced biodegradable scaffolds are being investigated for their dual functionality in hemostasis and tissue regeneration. Finally, personalized bleeding management is an emerging paradigm enabled by advances in genetic testing and coagulation profiling. Tailored perioperative protocols based on patient-specific coagulation factor levels, platelet function, and genetic markers allow for optimized, individualized hemostatic strategies, reducing complications and improving outcomes.[30]

Conclusion :

Effective post-extraction bleeding control requires thorough patient assessment and tailored hemostatic strategies. Combining mechanical, chemical, local, and systemic approaches optimizes outcomes and minimizes complications. Emerging biomaterials and personalized management hold promise for improved hemostasis. Further standardized clinical trials are needed to establish the most effective protocols.

REFERENCES :

1. Shao X, Xu XM, Yang X, Ji AP. Analysis of Risk Factors for Post-Extraction Bleeding and Study on Emergency Intervention Strategies. *Risk Manag Healthc Policy*. 2024;17:1279-1286 https://doi.org/10.2147/RMHP.S458260
2. Moore PA, et al. *Postoperative bleeding in oral surgery patients taking anticoagulants: A review.* J Oral Maxillofac Surg. 2019;77:1400–1408.
3. Lillis T, et al. *Local hemostatic agents in dentistry: Clinical review.* Br Dent J. 2018;224:345–352.
4. *Ahana Goswami, Tanmoy Ghorui, Rajarshi Bandyopadhyay, Anupam Sarkar, Amit Ray. A General Overview of Post Extraction Complications-Prevention, Management and Importance of Post Extraction Advices. Fortune Journal of Health Sciences 3 (2020): 135-147.*
5. Reddy V, et al. *Tranexamic acid mouthwash in prevention of post-extraction bleeding in anticoagulated patients.* Oral Surg Oral Med Oral Pathol Oral Radiol. 2017;124:171–176.
6. Marx RE. *Platelet-rich plasma (PRP): Review of basic science and clinical applications in oral surgery.* Int J Oral Maxillofac Implants. 2004;19:106–119.
7. Kim JH, et al. *Fibrin sealants in oral surgery: Current evidence.* J Craniofac Surg. 2020;31:123–129.
8. Ali FM. Tea Bags for Controlling Postoperative Bleeding after Extraction of Teeth: A Review of Literature. J Pharm Bioallied Sci. 2025 May;17(Suppl 1):S148-S151. doi: 10.4103/jpbs.jpbs_13_25. Epub 2025 Apr 29. PMID: 40511044; PMCID: PMC12156675.
9. 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. Epub 2021 Oct 20. PMID: 35756819; PMCID: PMC9201513.

10. Kang SH, Kang MJ. The incidence of postoperative hemorrhage after tooth extraction in patients with thrombocytopenia. J Korean Assoc Oral Maxillofac Surg. 2021 Jun 30;47(3):190-196. doi: 10.5125/jkaoms.2021.47.3.190. PMID: 34187959; PMCID: PMC8249185.

11. Iwabuchi H, Imai Y, Asanami S, et alEvaluation of postextraction bleeding incidence to compare patients receiving and not receiving warfarin therapy: a cross-sectional, multicentre, observational studyBMJ Open 2014;4:e005777. doi: 10.1136/bmjopen-2014-005777

12. AlSheef M, Gray J, AlShammari A. Risk of postoperative bleeding following dental extractions in patients on antithrombotic treatment. *Saudi Dent J*. 2021;33(7):511-517.

13. McCormick, N. J., Moore, U. J., & Meechan, J. G. (2014). Haemostasis part 1: the management of post-extraction haemorrhage. *Dental Update*, *41*(4), 290–296. https://doi.org/10.12968/DENU.2014.41.4.290

14. Pérez Velastegui, C. A., Astudillo Pacheco, P. D., & Cazar Almache, M. E. (2025). Manejo de la extracción dental en pacientes con tratamiento antiplaquetario: Revisión de la literatura. *Research, Society and Development*, *14*(1), e4914148033. https://doi.org/10.33448/rsd-v14i1.48033

15. Horax, T., Kamilah, T., & Diyatri, I. (2025). The effectiveness of antifibrinolytic drugs as anti-Haemorrhage treatment for patients with anticoagulant during tooth extraction procedure: A review. *World Journal Of Advanced Research and Reviews*, *25*(1), 1655–1659. https://doi.org/10.30574/wjarr.2025.25.1.0222

16. Nisi, M., Carli, E., Gennai, S., Gulia, F. S., & Izzetti, R. (2022). Hemostatic Agents for the Management of Bleeding Risk Associated with Oral Anticoagulant Therapy Following Tooth Extraction: A Systematic Review. *Applied Sciences*, *12*(21), 11017. https://doi.org/10.3390/app122111017

17. Mithiborwala, A., Shah, N., Mahajan, A., Bagga, I. K., Doshi, D., & Sanghvi, D. (2016). *Control of Post Extraction Haemorrhage by Tranexamic Acid Pressure Pack in Patients on Anticoagulant and Antiplatelet Therapy: A Prospective Clinical Study*. *1*(1). http://lawarencepress.com/ojs/index.php/JCR/article/view/27

18. Scarano, A., Murmura, G., Di Cerbo, A., Palmieri, B., Pinchi, V., Mavriqi, L., & Varvara, G. (2013). Anti-hemorrhagic agents in oral and dental practice: an update. *International Journal of Immunopathology and Pharmacology*, *26*(4), 847–854. https://doi.org/10.1177/039463201302600402

19. Bajkin, B. V., Mirkovi, M., Šar, I. N., Tadi, A. J., & Mileki, B. R. (2014). *Comparison of efficacy of local hemostatic modalities in anticoagulated patients undergoing tooth extractions Poreenje efikasnosti razli¸ itih metoda lokalne hemostaze kod pacijenata na oralnoj antikoagulantnoj terapiji posle ekstrakcije zuba*.

20. Babu, T. G. L. (n.d.). *Evaluation of Post Extraction Bleeding Control by Haemostatic Agent Coated Gauze Versus Standard Gauze in Dental Extraction Cases-An in Vivo Study*. https://doi.org/10.21275/art20164541

21. Visintini, E., Contardo, L., Biasotto, M., & Vignoletti, F. (2006). *Extracciones dentarias en pacientes en tratamiento con anticoagulantes: revisión de la literatura*. *22*(4), 241–245. https://doi.org/10.4321/S0213-12852006000400005

22. Puia SA, Hilber EM, 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. 2020 Jul-Dec;10(2):292-296. doi: 10.4103/ams.ams_276_20. Epub 2020 Dec 23. PMID: 33708570; PMCID: PMC7943974.

23. Marwa Salman Al Awad1, Hanan Ahmed Alghamdi2, Hend Abdrahman Ahmad3, Khadijah Ali Almomen3, Leena Faisal Al Jaafar1, Suhael Ahmed1* efficacy of Various Hemostatic Agents in Controlling Bleeding During Dental Procedures: A ystematic Review, J Res Med Dent Sci, 2022, 10 (11): 115-122.

24. 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. PMID: 37532770; PMCID: PMC10397210.

25. Lewandowski B, Myszka A, Migut M, Czenczek-Lewandowska E, Brodowski R. Analysing the effectiveness of topical bleeding care following tooth extraction in patients receiving dual antiplatelet therapy-retrospective observational study. BMC Oral Health. 2021 Jan 15;21(1):31. doi: 10.1186/s12903-021-01391-9. PMID: 33451310; PMCID: PMC7809775.

26. 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. doi: 10.1002/14651858.CD011930.pub3. PMID: 29502332; PMCID: PMC6494262.

27. Ahmed S. Management of Hemorrhage in Minor Dental Operations- A Systematic Review. Oral Maxillofac Pathol 2021; 12(2): 63-68

28. Hong, Y., Zhou, F., Hua, Y. *et al.* A strongly adhesive hemostatic hydrogel for the repair of arterial and heart bleeds. *Nat Commun* **10**, 2060 (2019). https://doi.org/10.1038/s41467-019-10004-7

29. Komatsu S, Nagai Y, Naruse K, Kimata Y (2014) The Neutral Self-Assembling Peptide Hydrogel SPG-178 as a Topical Hemostatic Agent. PLoS ONE 9(7): e102778. https://doi.org/10.1371/journal.pone.0102778

30. Irfan NI, Mohd Zubir AZ, Suwandi A, Haris MS, Jaswir I, Lestari W. Gelatin-based hemostatic agents for medical and dental application at a glance: A narrative literature review. Saudi Dent J. 2022 Dec;34(8):699-707. doi: 10.1016/j.sdentj.2022.11.007. Epub 2022 Nov 15. PMID: 36570577; PMCID: PMC9767835.