

Exodontic surgery in patients with coagulation disorders: a literature review

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Abstract

BACKGROUND: Nowadays, patients with coagulation disorders, whether inherited or acquired, have grown significantly. Anticoagulant drugs (vitamin K antagonists, VKA, and the new oral anticoagulants, NAO) and Antiplatelet drugs are a powerful means for prophylaxis and treatment of thromboembolic events. In oral surgery, patients on anticoagulant or anti-aggregating therapies require special precautions because the use of these drugs, which act on the coagulation cascade or platelet aggregation, may result in prolonged bleeding following dental extraction.

OBJECTIVE: As this is a controversial issue among physicians, dentists, and patients, this review aims to analyze, through a literature review, the risk of bleeding due to coagulopathy and to provide evidence-based principles of operative management to minimize this risk.

METHODS: This Review was guided and reported according to PRISMA parameters. To conduct this review, searches were performed on the online search engines: PubMed, Google Scholar, and Scopus from January 1, 2014, to January 31, 2025. The search strategy included the following terms: dental extraction, anticoagulants, antiplatelet agents, and hemophilia.

RESULTS: From the 124 articles obtained by entering search terms into various scientific databases, eliminating duplicates, and filtering them according to the inclusion criteria, we selected 27 articles for the final review. Cases of post-extraction bleeding, including principles of prevention and treatment methods, were observed.

DISCUSSION: The survey helped us understand the real risks that can occur during extractive surgery in patients with coagulation deficiency and the new protocols used in these cases. These findings showed that due to the variability of the medication taken, the comorbidities of the patient, and the procedure performed, it is impossible to create a single protocol. Therefore, the clinician must evaluate each case on a case-by-case basis and implement all the procedures known to them to stop bleeding.



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Introduction

The purpose of this review is to analyze updates on preoperative and complication management in oral surgery, particularly during dental element extraction surgeries in patients with hemostasis-related diseases and those treated with antiplatelet and anticoagulant drugs, as well as guidelines and protocols applicable for proper intraoperative management (1).

Extractive surgery is a specialized field of dentistry that involves the avulsion, through surgical procedures and techniques, of dental elements, whether intact or damaged by carious pathology or fractures.

There are several causes that lead to a dentist's choice of tooth extraction, including advanced infection, pain, cystic or dysplastic disease, or in anticipation of future orthodontic treatment (2, 3).

Regardless of the cause, the surgical technique involves inevitable bleeding from the alveolar site, which may or may not require the application of hemostatic materials and stitches.

In addition to local factors, such as laceration of arterial and venous vessels that result in blood leakage, there are also systemic coagulation alterations, platelet changes, medications, or hereditary conditions. With increasing life expectancy, there has been a corresponding increase in patients treated with anticoagulants and antiplatelet drugs.

In most cases, bleeding ends within 8 hours (4) but can complicate into what is known as "post-extraction bleeding" (PEB).

Another point to consider is the amount of blood that flowing out after an extraction; according to the American College of Surgeon Advanced Trauma Life Support (ATLS), it is unlikely that a blood loss of more than 750ml, leads to hemodynamic compromise, resulting in hypovolemia and reduced oxygen delivery to the tissues (5).

Severe studies have shown that in patients without coagulation deficits during extractions, even complex extractions, a blood loss of 750ml is not reached, as the extraction of a single tooth can cause a loss of 5-10ml of blood (6, 7).

This cannot be guaranteed in all those patients who will have to undergo dental extractions but suffer from hereditary diseases that interfere with the physiological hemostatic process, or in those patients being treated with drugs that alter or modify this function.

The main drugs that interfere with the hemostatic process are classified into Antiplatelet and Anticoagulant drugs, including Vitamin K Antagonists and new direct oral anticoagulants (DOACs). Guidelines state that the INR value in patients taking anticoagulants should be between 2 and 3, to ensure a balance between thrombotic and hemorrhagic risk (8).

In patients with Hemophilia, the oral cavity is the most common district where the risk of bleeding can be dangerous; therefore, especially in less developed countries, dental extraction is the most common surgical treatment, but it can lead to significant complications.

Linked to the X chromosome, hemophilia is classified into type A (factor VIII absence) and type B (factor IX deficiency).

To this end, preventive measures for the risk of postoperative bleeding include the use of desmopressin, coagulation factors, and antifibrinolytic agents (9).

OBJECTIVES: The objective of this review is to collect and summarize the results obtained from studies addressing the management of patients with coagulation disorders during dental extractions, while providing an assessment of the incidence of potential complications.

Methods

Inclusion criteria

Among the study samples, there were no Gender or age differences, and the evaluation was not related to the technique used during dental extractions. The type of tooth element extracted is also not included as an exclusion criterion in this review.

Studies considering pathologic conditions related to patient coagulation, especially hereditary conditions such as Hemophilia, or patients on drug treatment with anticoagulants (VKA, DOAC) and antiplatelets, were included, considering an INR (International Normalized Ratio) value greater than or equal to 2.0.

Exclusion criteria

Types of studies not considered include preventive studies, studies performed on animals, abstracts only, articles not in English, and studies that report surgery outside of extractive surgery.

Sources of information

Randomized controlled trials (RCTs) evaluating the preoperative management of patients with hemostasis disease, the type of approach to exodontia, and the management of postoperative complications were assessed.

Search strategies

Searches were conducted using databases such as pubmed, cochrane central, and embase, considering a time interval from January 1, 2014, to January 31, 2025. Abstracts and titles were examined to assess the eligibility of the studies. We then obtained full-text copies and evaluated their admission into the review.

Data collection process

This review was conducted by the preferred reporting items for systematic reviews and meta-analyses (prisma) guidelines, which provide up-to-date guidance for reporting systematic reviews that reflect advances in study identification, selection, evaluation, and synthesis methods. The following data were extracted from the studies considered: dental extractions, post-extraction bleeding, antiplatelet agents, anticoagulants, hemophilic patients, and local hemostatics.

Data items

The following keywords were used and combined in the search approach: dentistry, oral surgery, dental

extraction, bleeding, anticoagulants, antiplatelet agents, hemostasis disorders, post-extraction bleeding, oral bleeding, dental extraction/adverse effects, hemophilia, antifibrinolytic therapy, heparin, warfarin.

Synthesis methods

We recorded the number of cases evaluated in individual studies that reported postoperative bleeding following tooth extraction, as well as the various treatments used to manage this complication.

Results

Study characteristics

The physiological hemostatic process leads to the formation of a clot, which is responsible for stopping bleeding following dental extraction. Patients with inherited disorders of hemostasis or those being treated with antiplatelet/anticoagulant drugs are prone to increased, prolonged post-extraction bleeding (peb), causing concern of the same or, in severe cases, requiring hospitalization.

Results of individual studies

In a study by Iwabuchi et Al. an incidence rate of post-extraction bleeding of 2.7 percent was observed in patients taking warfarin and with an INR (international normalized ratio) value of less than 3 (10), if the INR value does not exceed 2.2 the risk of bleeding appears to be similar to that of individuals without coagulation disorders (11).

Supporting this is a study conducted by Abdullah et Al., in which they evaluated 35 patients on anticoagulation therapy with warfarin. Each patient underwent a simple dental extraction, and it was observed that there were no cases of prolonged bleeding. However, this could change in cases of multiple, complex extractions and patients with an INR less than 3.5. In any case, however, the study recommends that patients taking warfarin should be monitored and reviewed shortly after extraction (12).

The risk of bleeding appears to be similar for those taking vitamin K antagonists (e.g., Warfarin) and direct oral anticoagulants (DOACs), as shown in a study conducted in Japan that evaluated two groups of patients taking these drugs (13).

Data reported by Eveline T. Engelen (14) analyzes the use of Tranexamic Acid (an antifibrinolytic agent) to prevent postoperative bleeding after performing complex or straightforward dental extractions in a group of 253 participants on VKA therapy (specifically Warfarin). Although this measure is effective in preventing bleeding events, there is no evidence of a difference in bleeding rate between TXA use and standard measures (gauze compression and stitches). Another study, conducted by Ockerman et Al., evaluated Tranexamic Acid in the 10% mouthwash formulation prescribed for once before extraction and thereafter 3 times daily for 3 days; 222 patients divided into sample and control groups were included. These analyses again showed that even as a mouthwash, Tranexamic Acid can reduce the number of bleeding cases following extraction procedures. However, it was found to reduce

bleeding in cases of multiple extractions and delayed bleeding (15).

Among the various techniques of post-extraction hemostasis in patients with coagulation deficiency, we find the application of bone wax. Krasny et Al describe this protocol. In this study, 176 patients undergoing chronic anticoagulation therapy who are scheduled for extraction are included. After the surgical stage, each alveolus was filled with bone wax to stop bleeding. None of the subjects had bleeding episodes once they returned home (16).

In the context of inherited conditions, particularly Hemophilia, over the years, the main indication for reducing the risk of bleeding during dental extractions has been the use of coagulation factors (FRPs). However, recent studies have shown that preoperative and postoperative use of these factors does not further reduce the risk compared with a single preoperative administration; therefore, resulting in a similar risk, this allows the dose of factors administered to be reduced (17).

It is also crucial to consider a potential complication when performing anesthesia of the Inferior Alveolar Nerve, as this area is rich in vessels, which may lead to a hematoma in the pterygoid area. This, in turn, may result in partial or total narrowing of the airway. In this regard, systemic therapy to provide the genetically absent factors appears to be necessary (18).

In recent years, a bispecific monoclonal antibody, Emicizumab has been introduced to the market to prevent bleeding in patients with hemophilia type A; one study showed how this drug can stop bleeding or thrombotic episodes following an extraction by testing it on 17 extractions performed on a sample of ten patients with hemophilic disease (19).

The use of antifibrinolytics, such as TXA and Aminocaproic Acid, both local and systemic, is also within the guidelines for the management of these patients (20).

One study also evaluated the efficacy of a new local hemostatic agent that acts directly on fibrinogen, and the results show an inferior duration of postoperative bleeding. Some authors recommend it as a replacement for coagulation factor therapy. This medical device is called ABS (Ankaferd Blood Stopper) (21).

In addition to all the external substances that have been tried to study to find a reliable solution to stop bleeding in patients on anticoagulant therapy, autologous solutions have also been tried, of which L-PRF (Platelet Rich Plasma) is a biologically polymerized autogenous fibrin protocol, which is widely used in outpatient practice because of the possibility of being made easily, quickly and with a standardized protocol. A study conducted by Berton et Al. on 112 patients, partly treated with direct oral anticoagulants (DOACs) and partly with vitamin K antagonists (VKAs), followed various extractions at the post-extraction site. L-PRF was then applied and fixed with a non-absorbable suture. The study demonstrated that although not suspending anticoagulant therapy, the use of platelet-rich plasma led patients to only rare cases of postoperative bleeding (22).

Those drugs for post-extraction pain control that interfere with coagulation, e., nonsteroidal anti-

inflammatory drugs (e.g., aspirin), should be avoided. Despite the scientific evidence, however, no studies have compared the efficacy of hemostasis mechanisms. Furthermore, the significant heterogeneity of hematologic conditions associated with the small number of samples being studied suggests that further studies, based on the different severities of the disease, are needed to provide safer and more effective protocols (23).

Dentists often require consultation with the treating physician or cardiologist, and on their side, they do not have expertise in oral surgery; therefore, they often prescribe interruption of antithrombotic drugs. In order, however, to avoid risks related to bleeding or thrombotic events, the group of Lillis T. et al (24) proposed a classification, by the 2010 Bleeding Academic Research Consortium (BARC) guidelines (25) that evaluates bleeding in five points:

- No Bleeding
- Minor Bleeding (i.e., mild bleeding controlled at the first dental attempt or independently by the patient) (26)
- Clinically Significant Bleeding (i.e., blood loss not controlled by the primary attempt that continues for more than 12 hours, requires a second intervention but is not found to be life-threatening)
- Life-threatening (complication requiring specialized intervention by blood transfusion or surgery to drain deep-space hematomas) (27)
- Fatal outcome

Discussion

Dental element extraction surgery is the most common surgery in the general population, and postoperative bleeding appears to be the most common complication; however, it requires increased attention and management in clinical cases.

In recent years, the world has witnessed a rise in average life expectancy, coinciding with an increase in cardiovascular disease and the development of new drug therapies, particularly antiplatelet and anticoagulant medications for hemostasis-related disorders.

Not only that, in addition to patients with acquired disorders, there are hereditary diseases that are manifested by the absence of one or more coagulation factors.

Therefore, the management of patients facing dental extraction procedures, which, despite being routine procedures, can lead to complications and increased bleeding risks, is of paramount importance.

To this end, many authors have studied and tested various procedures to prevent and treat these risks, acting either by adjusting drug therapy, using local hemostatic materials, or by a combination of both.

Due, however, to the subjective variability of individual dentists during surgical procedures and the small sample sizes under study, it has not been possible to determine suitable guidelines for behavior according to the severity of the condition, as well as to establish a bleeding risk and predict the best management of interventions.

Similarly, in patients with hemophilia and hereditary disorders, there are no studies that provide reliable protocols; therefore, studies assessing risk according to the type of genetically missing factor and severity are needed to develop specific guidelines for each disease. Hemostatic measures are crucial, but there is no evidence to suggest differences in their efficiency.

In conclusion, the lack of a standardized and rationalized definition of post-extraction bleeding, coupled with the inherent limitations of the various studies, underscores the need for updating and further research to implement repeatable protocols based on the risk of each disease condition, thereby minimizing health risks.

References

1. Kumbargere Nagraj, Sumanth et al. Interventions for treating post-extraction bleeding. The Cochrane database of systematic reviews vol. 3,3 CD011930. 4 Mar. 2018, doi:10.1002/14651858.CD011930.pub3.
2. M. Martelli, W.L. Russomanno, S. Di Vecchio, B. Dapei, P. Bollero, A. Dolci, L. Ottria, M. Gargari, F. Gianfreda. Clear aligners: possible error considerations from the first visit to the delivery of retainers. *Oral and Implantology*, Vol. 17 No. 1 (2025), 44-49. DOI: 10.11138/oi.v17i1.118
3. M. Martelli, W. Russomanno, S. Di Vecchio, P. Bollero, L. Ottria, M. Gargari, F. Gianfreda. Orthodontic treatment from childhood to adolescence with minimally invasive therapy: correction of atypical swallowing and dental alignment. A case report. *Oral and Implantology*, Vol. 16 No. 3 (2024), 119-123. DOI: 10.11138/oi.v16i3.56
4. Amer, M. Z., Mourad, S. I., Salem, A. S., & Abdelfadil, E. (2014). Correlation between International Normalized Ratio values and sufficiency of two different local hemostatic measures in anticoagulated patients. *European journal of dentistry*, 8(4), 475-48. doi: 10.4103/1305-7456.143628.
5. Raissant R., Bouillon B., Cerny V., Coats T.J., Duranteau J. Management of bleeding following major trauma: an updated European guideline. 2, 2010, Vol. 14. doi: 10.1186/cc8943.
6. J.H.Sinclair. Loss of blood following the removal of teeth in normal and hemophilia patients. 4, 1967, Vol. 23. doi: 10.1016/0030-4220(67)90529-4.
7. Senghore N., Harris M. The effect of tranexamic acid (cy-clokapron) on blood loss after third molar extraction under a day case general anaesthetic. *Br Dent J* Vol. 186, 634-636, (1999). doi: 10.1038/sj.bdj.4800183.
8. Holbrook A, Schulman S, Witt DM, Vandvik PO, Fish J, Kovacs MJ, Svensson PJ, Veenstra DL, Crowther M, Guyatt GH. Evidence-based management of anticoagulant therapy. *Antithrombotic Therapy and Prevention of Thrombosis*, 9th ed: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines. Chest. 2012 Feb;141(2 Suppl):e152S-e184S. doi: 10.1378/chest.11-2295. PMID: 22315259; PMCID: PMC3278055.
9. Pomella, S.; Melaiu, O.; Dri, M.; Martelli, M.; Gargari, M.; Barillari, G. Effects of Angiogenic Factors on the Epithelial-to-Mesenchymal Transition and Their Impact on the Onset and Progression of Oral Squamous Cell Carcinoma: An Overview. *Cells* 2024, 13, 1294. <https://doi.org/10.3390/cells13151294>
10. Iwabuchi, H., Imai, Y., Asanami, S., Shirakawa, M., Yamane, G. Y., Ogiuchi, H., Kurashina, K., Miyata, M., Nakao, H., & Imai, H. (2014). Evaluation of postextraction bleeding incidence to compare patients receiving and not receiving warfarin therapy: a cross-sectional, multicentre, observational study. *BMJ open*, 4(12), e005777. <https://doi.org/10.1136/bmjopen-2014-005777>.
11. Valenzuela-Mencia J, Serrera-Figallo MÁ, Torres-Lagares D, Machuca-Portillo G, Sánchez-Fernández E, Valmaseda-Castellón E, Peñarocha-Diogo M, Fernández-Mosteirín N, Somoza-Martin JM, Pérez-Jardón A, Chamorro-Petronacci CM, García-García A. Clinical practice guideline of the spanish society of oral surgery for oral surgery in

- patients with coagulation disorders. *Med Oral Patol Oral Cir Bucal*. 2024 Jan 1;29(1):e58-e66. doi: 10.4317/med-oral.26063. PMID: 37330959; PMCID: PMC10765342.
12. Abdullah W. A., Khalil H. Dental extraction in patients on warfarin treatment. *Clin Cosmet Investig Dent*, 2014, Vol. 6. doi:10.2147/CCIDE.S68641.
13. Yagyu, T., Kawakami, M., Ueyama, Y., Imada, M., Kurihara, M., Matsue, Y., Imai, Y., Yamamoto, K., & Kirit, T. (2017). Risks of postextraction bleeding after receiving direct oral anticoagulants or warfarin: a retrospective cohort study. *BMJ open*, 7(8), e015952. <https://doi.org/10.1136/bmjopen-2017-015952>.
14. Engelen ET, Schutgens RE, Mauser-Bunschoten EP, van Es RJ, van Galen KP. Antifibrinolytic therapy for preventing oral bleeding in people on anticoagulants undergoing minor oral surgery or dental extractions. *Cochrane Database Syst Rev*. 2018 Jul 2;7(7):CD012293. doi: 10.1002/14651858.CD012293.pub2. PMID: 29963686; PMCID: PMC6513563.
15. Ockerman A., Miclotte I., Vanhaverbeke M., Vanassche T., Belmans T., Vanhove J., Meyns J., Nadjimi N., Van Hamelen G., Winderickx P., Jacobs R., Politis C., Verhamme P. Tranexamic acid and bleeding in patients treated with non-vitamin K oral anticoagulants undergoing dental extraction: The EXTRACT-NOAC randomized clinical trial. *PLoS Med*, 2021 May 3, Vol. 18 (5). doi: 10.1371/journal.pmed.1003601.
16. Minervini G, Franco R, Martelli M, Hafedh S, Maddalena Marrapodi M, Di Blasio M, Bollero P, Cicciù M. Low-level laser treatment's ability to reduce dry socket pain. *Acta Odontol Scand*. 2024 Nov 12;83:631-641. doi: 10.2340/aos.v83.42261. PMID: 39530606; PMCID: PMC11633036.
17. Brewer A, Correa ME. Guidelines for dental treatment of patients with inherited bleeding disorders. . s.l. : World Federation of Hemophilia Treatment of Hemophilia Monograph, 2006. Available from: <http://www1.wfh.org/publications/files/pdf-1190.pdf>. Accessed May 8, 2019.
18. Grigorita O, Omer L, Juodzbals G. Complications and Management of Patients with Inherited Bleeding Disorders During Dental Extractions: a Systematic Literature Review. *J Oral Maxillofac Res*. 2021 Jun 30;12(2):e1. doi: 10.5037/jomr.2021.12201. PMID: 34377378; PMCID: PMC8326879.
19. Takahiro Y., Shoko F., Miki Z., Yata S., Imada M., Nogami K., Kirit T. Peri-operative hemostatic management of tooth extraction in patients with hemophilia A, with and without inhibitors, receiving emicizumab prophylaxis. 2023 Jan, Vol. 29 (1):172-179. doi: 10.1111/hae.14667.
20. Hewson I, Makhmalbaf P, Street A, McCarthy P, Walsh M. Dental surgery with minimal factor support in the inherited bleeding disorder population at the Alfred Hospital. *Haemophilia*. 2011Jan;17(1):e185-e188. doi: 10.1111/j.1365-2516.2010.02346.x.
21. Barlattani A Jr., Franco R., Martelli M., Gianfreda F., Ferro R., Basili M., Bollero P. (2019) Guided bone regeneration in patients taking bisphosphonates: two case series. *ORAL and Implan-tology*, 2019, 12(2), pp. 194-204
22. Berton F., Constantinides F., Stacchi C., Corradini A., Di Lenarda A., Di Lenarda R. Is L-PRF an effective hemostatic agent in single tooth extractions? A cohort study on VKA and DOAC patients. *Clinic Oral Investig*, 2023, Vol. 27 (6):2865-2874.. doi: 10.1007/s00784-023-04880-z.
23. Coppola A, Windyga J, Tufano A, Yeung C, Di Minno MND. Treatment for preventing bleeding in people with haemophilia or other congenital bleeding disorders undergoing surgery (Review). *Cochrane Database Syst Rev*. 2015 (2):CD009961. doi: 10.1002/14651858.CD009961.pub2.
24. Lillis T, Didagelos M, Lillis L, Theodoridis C, Karvounis H, Ziakas A. Impact of Post-Exodontia Bleeding in Cardiovascular Patients: A New Classification Proposal. *Open Cardiovasc Med J*. 2017 Sep 30;11:102-110. doi: 10.2174/1874192401711010102. PMID: 29204220; PMCID: PMC5688390.
25. Mehran R, Rao SV, Bhatt DL, Gibson CM, Caixeta A, Eikelboom J, Kaul S, Wiviott SD, Menon V, Nikolsky E, Serebrany V, Valgimigli M, Vranckx P, Taggart D, Sabik JF, Cutlip DE, Krucoff MW, Ohman EM, Steg PG, White H. Standardized bleeding definitions for cardiovascular clinical trials: a consensus report from the Bleeding Academic Research Consortium. *Circulation*. 2011 Jun 14;123(23):2736-47. doi: 10.1161/CIRCULATIONAHA.110.009449. PMID: 21670242.
26. A. Pitino, F. Gianfreda, A. Dolci, E. Fossati, G. Voghera, P. Bollero, M. Gargari, D. Karimi, M. Martelli. A Step-by-step technical report on the novel "PREMADE protocol" for fabricating acrylic provisional prostheses for all-on-4® treatment concept. *Oral and Implantology*, Vol. 16 No. 3 (2024), 133-139. <https://doi.org/10.11138/oi163133-139>
27. F. Gianfreda, L. Nucci, P. Bollero, A. Danieli, A. Palermo, P. Salvadori, M. Gargari, M. Martelli. A rare case of impacted mandibular premolar associated to dentigerous cyst and periodontal lesion: clinical management and histological analysis. *Oral and Implantology*, Vol. 16. No. 3 (2024), 113-118. <https://doi.org/10.11138/oi163113-118>