Original Article - Comparative Study

Evaluation of Bleeding Time after Dental Extractions during Uninterrupted Single or Dual Antiplatelet Treatment - A Comparative Study

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Abstract

Introduction: This study aimed to assess the duration of bleeding after dental extractions amongst subjects with uninterrupted single antiplatelet therapy and dual antiplatelet therapy (DAPT) and to compare the bleeding time after dental extractions amongst those subjects undergoing various antiplatelet therapies. **Materials and Methods:** Post-extraction bleeding time was categorised as within 30 min, within 1 h and within 24 h. The bleeding time in different categories was compared and analysed using Chi-square. The antiplatelet agents assessed were aspirin, clopidogrel, ticagrelor and a combination of aspirin with clopidogrel and ticagrelor. **Results:** Bleeding time was significantly higher in patients under DAPT, compared to those under single antiplatelet therapy, and with an increase in the number of teeth extracted, there was an increase in bleeding time. All cases with prolonged bleeding could be managed with local haemostatic measures. **Discussion:** Simple extraction can be undertaken safely in patients under single antiplatelet therapy, considering that local haemostatic measures are available for use in the setup to control bleeding if necessary. Patients under DAPT are better managed if the therapy is altered, as there was a definite increase in bleeding time in patients under DAPT after extraction.

Keywords: Antiplatelet agents, bleeding time, dental extractions

Introduction

The most common minor surgical operation in dentistry, extractions, presents a serious problem in the growing proportion of patients undergoing long-term antiplatelet therapy due to the proven thrombotic risk. There is a potential risk of prolonged bleeding time after withdrawal of antiplatelet therapy.[1] An umbrella review suggests that dental extractions can be done in patients with dual antiplatelet therapy (DAPT) without discontinuing the antiplatelet therapy.[2] Post-extraction bleeding complications in subjects undergoing aspirin therapy were observed to be meagre.[3]

The use of DAPT and triple therapy amongst cardiologists in India has been on the rise in recent years, as revealed by a survey. There is a tendency to switch to single antiplatelet therapy after six months amongst cardiologists.[4] In an umbrella review conducted to evaluate the risk of bleeding during and after dental extractions amongst patients on dual antiplatelet agents, the conclusion was that even though DAPT carries an increased risk of bleeding, it is not mandatorily recommended to stop the antiplatelet regimen for dental extractions. Application of haemostatic agents locally is deemed sufficient to control bleeding amongst these patients. The review also suggested that the benefits of not discontinuing the antiplatelet therapy far outweigh the risks involved with discontinuing the therapy amongst the patients.[2] There have been opinions about shifting from DAPT to single antiplatelet therapy before extraction in acute patients with acute coronary syndrome. Measures to control extraction-related bleeding with the use of local haemostatic agents in the absence of antiplatelet therapy were found to be effective.[5] Withdrawal

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of DAPT before surgical procedures like extractions can lead to prolonged bleeding during or after the procedure.[6-8]

Materials and Methods

Patients selected were under single or combination antiplatelet therapy and were required to undergo extractions for caries, periapical pathology or a hopeless periodontal prognosis. The interventions comprised the surgical removal of one or more teeth (up to three) in a typical manner while under local anaesthesia with a vasoconstrictor agent. All patients got an intra-oral gauze pressure pack after the dental extraction, and they were all re-evaluated after 30 min to ensure haemostasis. The dental surgeon classified an extraction socket as having 'prolonged bleeding' and re-evaluated it to see if the bleeding or oozing persisted for more than 30 min. If the bleeding had subsided, it was determined that the detached periosteum was the main source of the bleeding, and the periosteum was sutured with a 3-0 silk suture. If applying horizontal pressure did not stop the bleeding, it was determined that the majority of the bleeding was coming from inside the socket. One-piece local haemostatic agents (Gel Foam/Surgicel) were then applied inside, and the socket was stabilised with a figure-of-8 suture across it. Intra-oral pressure packs were placed on the socket. After 30 min, sockets were once again checked, and pressure packs were reapplied. Post-extraction bleeding time was categorised as within 30 min, within 1 h and within 24 h. A Chi-square test was done to find any significant results between the bleeding times of different categories. $P = 0.05$ was taken as the level of significance.

The study was approved by the Ethical Committee of Amrita School of Medicine (ECASM-AIMS-2022-212) on 18 October 2022. The procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional or regional) and with the Helsinki Declaration of 1975, as revised in 2003.

Results

Analysis of the study revealed that a total of 904 patients under anticoagulant therapy underwent extraction for three main reasons: periodontitis, dental caries and periapical diseases. No statistically significant difference was found between reason for extraction and stoppage of bleeding time ($P = 0.936$) [Table 1]. With gender, there were no significant differences between the bleeding times ($P = 0.959$) [Table 2]. Most of the patients under antiplatelet therapy were taking aspirin. Prolonged bleeding was mostly observed in patients undergoing DAPT, the aspirin–clopidogrel combination and the aspirin–ticagrelor combination. Haemostasis was achieved successfully using local measures. Individuals treated with aspirin and ticagrelor were found to have less time taken to stop the bleeding compared to other agents. The difference was found to be statistically significant ($P = 0.000$) [Table 3].

With less number of teeth extracted, bleeding time stopped in lesser time compared to a higher number of teeth, and the difference was statistically significant ($P = 0.039$) [Table 4].

Most of the patients who were under anticoagulant therapy were taking the drugs following stent placement. Whatever the reason for taking antiplatelet therapy, haemostasis could be achieved within half an hour in most cases. In none of the patients, bleeding prolonged beyond 24 h after extraction. There were no statistically significant differences in bleeding times or reasons for antiplatelet therapy ($P = 0.983$) [Table 5].

Discussion

Anticoagulants make an undeniable contribution towards the prevention of cardiovascular disease, with the use of oral anticoagulants increasing for adults with congenital heart disease.[9,10] However, due to their associated risk of causing bleeding, almost all studies have advised stopping the drug before invasive procedures like extraction, with the exception of some recent studies that reported that few minor oral surgical procedures can be done safely in patients taking low doses of aspirin.[11,12] Stopping the drug for a short period does not usually cause much harm; however, there have been reports of rebound hypercoagulability and even thromboembolism associated with it.[13] Minor oral surgery does not cause as much bleeding as

Table 1: Comparison between reason for extraction and time taken for bleeding to stop

Reason for extraction	Bleeding stopped			*P*
	Within half an hour, *n* (%)	Within 1 h, *n* (%)	Within 24 h, *n* (%)	
Periodontitis	469 (69.5)	148 (21.9)	58 (8.6)	0.936
Dental caries	122 (70.5)	39 (22.5)	12 (6.9)	
Periapical disease	41 (73.2)	11 (19.6)	4 (7.1)	

Table 2: Comparison between gender and time of stoppage of bleeding

Gender	Bleeding stopped			*P*
	Within half an hour, *n* (%)	Within 1 h, *n* (%)	Within 24 h, *n* (%)	
Male	496 (69.7)	157 (22.1)	60 (8.3)	0.959
Female	135 (70.7)	41 (21.3)	16 (8)	

Table 3: Comparison between antiplatelet agents and time of stoppage of bleeding

Drug	Time taken to stop bleeding			*P*
	Within half an hour, *n* (%)	Within 1 h, *n* (%)	Within 24 h, *n* (%)	
Aspirin	247 (100)	0	0	0.000
Clopidogrel	206 (100)	0	0	
Ticagrelor	1 (5.6)	15 (83.3)	2 (11.1)	
Aspirin–clopidogrel combination	178 (74.2)	62 (25.8)	0	
Aspirin–ticagrelor combination	0	198 (21.9)	74 (8.2)	

Table 4: Number of teeth extracted and post-extraction bleeding time

Number of teeth extracted	Time taken to stop bleeding			*P*
	Within half an hour, *n* (%)	Within 1 h, *n* (%)	Within 24 h, *n* (%)	
1	381 (70)	121 (22.2)	42 (7.7)	0.039
2	147 (68.4)	49 (22.8)	19 (8.8)	
3	90 (74.4)	22 (18.2)	9 (7.4)	
4	13 (65)	3 (15)	4 (20)	
5	0	3 (100)	0	

Table 5: Reason for initiation of antiplatelet therapy and time taken for haemostasis

Reason for antiplatelet therapy	Bleeding stopped			*P*
	Within half an hour, *n* (%)	Within 1 h, *n* (%)	Within 24 h, *n* (%)	
Acute coronary syndrome	238 (70.6)	71 (21.1)	28 (8.3)	0.983
Bypass surgery	210 (69.1)	68 (22.4)	28 (8.6)	
Stent placement	632 (69.9)	198 (21.9)	74 (8.2)	

a major surgical procedure in the thorax, abdomen and limbs because major vessels are not commonly encountered. Hence, stopping the extraction of drugs may often seem unnecessary to many physicians. This leads us to the question, of whether to stop the anticoagulant, as most studies suggest, or to carry out the extraction without stopping the drug and use additional homeostatic measures if deemed necessary. Often, the clinician decides upon it depending on the severity of the procedure. The American College of Chest Physicians advocates that antiplatelet therapy be continued in patients requiring surgical procedures for stent placement within 6 weeks.[14] As to whether the anticoagulants should be discontinued or not, the decision remains in the realm of cardiologists.

In the present study, patients had to undergo extraction for different reasons, predominantly periodontitis, accounting for 74.6% of the cases, followed by caries (19.1%) and periapical disease (6.2%). It was expected that extraction in periodontitis cases would be easier due to the loosening of the tooth attachment apparatus, but this may not necessarily indicate a lower incidence of bleeding, as due to inflammation of the periodontium, there are proliferating blood vessels underlying the periodontium.[15] There are various methods to control bleeding through local treatment, including pressure packing, oxidised cellulose sponges and gelatine foams.[16] The present study involved observing post-extraction bleeding time in patients taking aspirin (e.g. Ecosprin), clopidogrel (e.g. Palaver), ticagrelor (e.g. Brilinta) and DAPT with aspirin–clopidogrel (e.g. Dospin) and aspirin–ticagrelor (e.g. Brilique) combinations, of which 51.21% were undergoing DAPT. DAPT has been made possible because different drugs have different modes of action, so when used together, they give a synergistic action. However, studies have shown a seven-fold increased risk of immediate bleeding post-extraction in patients undergoing DAPT.[5,17]

Late haemorrhage was more commonly seen in patients on DAPT than in patients undergoing monotherapy. Out of the 74 patients who experienced prolonged bleeding, 72 were under DAPT with aspirin and ticagrelor, and the other 2 were under treatment with ticagrelor alone. This increased risk of bleeding in patients undergoing treatment with ticagrelor may be attributed to its mechanism of action, which involves interacting with the P2Y12 adenosine 5'-diphosphate receptor and preventing signal transduction.[18] A vast majority of the cases took less than half an hour for bleeding to cease; most of the cases showing prolonged bleeding were under DAPT. The results of the study agree with those of a study conducted in Spain which concluded that there is no risk of prolonged bleeding in patients taking DAPT.[19] However, due to the limited number of subjects in that retrospective design study, it cannot be taken as a sole source of comparison. Tanimoto Y *et al*., also conducted a similar study where only local homeostatic agents were sufficient to stop bleeding without altering or modifying the antiplatelet therapy.[20] Patients were informed of the potential risks of carrying on with the procedure while on antiplatelet therapy, and their informed consent was documented.

There are a few limitations to the present study. The majority of cases were of extraction of a single tooth, and there were progressively fewer cases of extraction of multiple teeth. Studies have shown that the extraction of two or more teeth showed a significant increase in bleeding time in comparison to the extraction of a single tooth.[21] The prolonged bleeding could not be accurately correlated, as it could be either due to DAPT or the extraction of multiple teeth. Second, the surgical intervention was carried out by multiple surgeons who differed in expertise, in turn affecting the invasiveness of the procedure. It would have been better if extraction was carried out following certain protocols outlining the extent of damage to gingiva permitted while elevating the flap and if extractions were carried out by surgeons with a similar level of expertise.[22,23] Furthermore, the study did not include a platelet count test; hence, the role of platelet count in haemorrhagic risk could not be assessed. A retrospective study concluded that a history of bleeding a week before extraction was a better predictor of bleeding than the patient's platelet count.[24] Coagulation profile was not done before the extraction of the teeth in the patients and that was one drawback of this study.

The findings of the study support the notion that stopping antiplatelet therapy can be considered for patients taking multiple antiplatelet drugs, especially a therapy involving ticagrelor, but for single-drug treatment, it is not necessary. However, it is recommended that haemostatic agents be arranged in the clinic for managing certain cases. This prevents lag in performing extraction on patients who are under single-drug therapy, especially in government healthcare systems where treatment can be delayed up to a few months.[25] One of the

limitations of this study was that types of teeth extracted were not accounted for and third molar extractions were not done in this study. Practitioners should be cautious in their management of patients on antiplatelet therapy and extractions in such individuals should be done in well-equipped centres where competent and qualified healthcare professionals are available. However, it is anticipated that most clinicians will abstain from continuing the antiplatelet therapy before extraction fearing the risk of bleeding and a possible probe on their judgement.

Prolonged bleeding for more than one hour following extraction was seen in only 74 out of the total 903 patients, almost all of whom were under DAPT. Most of the cases could be managed by local haemostatic measures. However, it should be kept in mind that most of the cases were of simple extraction; for trans-alveolar extractions, more precautions would have to be taken as it involves damage to more hard- and soft-tissue structures. Although the results of this study suggest that extraction can be undertaken in patients under platelet therapy without modifying the therapy, post-extraction wound care and follow-up are strongly recommended.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patient has given his consent for his images and other clinical information to be reported in the journal. The patient understands that his name and initials will not be published and due efforts will be made to conceal his identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

References

1. Khan F, Tritschler T, Kimpton M, Wells PS, Kearon C, Weitz JI, *et al.* Long-term risk for major bleeding during extended oral anticoagulant therapy for first unprovoked venous thromboembolism: A systematic review and meta-analysis. Ann Intern Med 2021;174:1420-9.
2. Yong CW, Tan SH, Teo GN, Tan TS, Ng WH. Should we stop dual anti-platelet therapy for dental extractions? An umbrella review for this dental dilemma. J Stomatol Oral Maxillofac Surg 2022;123:e708-16.
3. Sunu VS, Roshni A, Ummar M, Aslam SA, Nair RB, Thomas T. A longitudinal study to evaluate the bleeding pattern of patients on low dose aspirin therapy following dental extraction. J Family Med Prim Care 2021;10:1399-403.
4. Kulkarni N, Taur S, Kaur J, Akolekar R, Es S. A cardiologists' survey on the use of anticoagulants and antiplatelets in patients with atrial fibrillation and acute coronary syndrome or those undergoing percutaneous coronary intervention in India. Cureus 2023;15:e35220.
5. Krishnan B, Prasad GA, Madhan B, Saravanan R, Mote NP, Akilesh R. Post-extraction bleeding complications in patients on uninterrupted dual antiplatelet therapy – A prospective study. Clin Oral Investig 2021;25:507-14.
6. Yamamoto K, Watanabe H, Morimoto T, Domei T, Ohya M, Ogita M, *et al.* Very short dual antiplatelet therapy after drug-eluting stent implantation in patients who underwent complex percutaneous coronary intervention: Insight from the STOPDAPT-2 trial. Circ Cardiovasc Interv 2021;14:e010384.
7. Writing Committee Members, Lawton JS, Tamis-Holland JE, Bangalore S, Bates ER, Beckie TM, *et al.* 2021 ACC/AHA/SCAI guideline for coronary artery revascularization: A report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. J Am Coll Cardiol 2022;79:e21-129.
8. Kuliczkowski W, Żurawska-Płaksej E, Podolak-Dawidziak M, Cielecka-Prynda M, Karolko B, Dębski J, *et al.* Platelet Reactivity and Response to Aspirin and Clopidogrel in Patients with Platelet Count Disorders. Cardiol Res Pract 2021;2021:6637799.
9. Simon ST, Kini V, Levy AE, Ho PM. Medication adherence in cardiovascular medicine. BMJ 2021;374:n1493.
10. Freisinger E, Gerß J, Makowski L, Marschall U, Reinecke H, Baumgartner H, *et al.* Current use and safety of novel oral anticoagulants in adults with congenital heart disease: Results of a nationwide analysis including more than 44 000 patients. Eur Heart J 2020;41:4168-77.
11. Buchbender M, Schlee N, Kesting MR, Grimm J, Fehlhofer J, Rau A. A prospective comparative study to assess the risk of postoperative bleeding after dental surgery while on medication with direct oral anticoagulants, antiplatelet agents, or Vitamin K antagonists. BMC Oral Health 2021;21:504.
12. Milad MA, Ibrahim AE. The effect of single antiplatelet therapy on bleeding time during minor oral surgical procedure: A prospective study. J Med Sci 2022;17:49-53.
13. Laudani C, Capodanno D, Angiolillo DJ. Bleeding in acute coronary syndrome: From definitions, incidence, and prognosis to prevention and management. Expert Opin Drug Saf 2023;22:1193-212.
14. Douketis JD, Spyropoulos AC, Murad MH, Arcelus JI, Dager WE, Dunn AS, *et al.* Perioperative management of antithrombotic therapy: An American College of Chest Physicians clinical practice guideline. Chest 2022;162:e207-43.
15. Eldzharov A, Kabaloeva D, Nemeryuk D, Goncharenko A, Gatsalova A, Ivanova E, *et al.* Evaluation of microcirculation, cytokine profile, and local antioxidant protection indices in periodontal health, and stage II, stage III periodontitis. J Clin Med 2021;10:1262.
16. Ockerman A, Miclotte I, Vanhaverbeke M, Verhamme P, Poortmans LL, Vanassche T, *et al.* Local haemostatic measures after tooth removal in patients on antithrombotic therapy: A systematic review. Clin Oral Investig 2019;23:1695-708.
17. Li L, Zhang W, Yang Y, Zhao L, Zhou X, Zhang J. Dental management of patient with dual antiplatelet therapy: A meta-analysis. Clin Oral Investig 2019;23:1615-23.
18. Kamran H, Jneid H, Kayani WT, Virani SS, Levine GN, Nambi V, *et al.* Oral antiplatelet therapy after acute coronary syndrome: A review. JAMA 2021;325:1545-55.
19. Martínez-Moreno E, Martínez-López F, Rodríguez-Lozano FJ, Oñate-Sánchez RE. Bleeding complications in anticoagulated and/or antiplatelet-treated patients at the dental office: A retrospective study. Int J Environ Res Public Health 2021;18:1609.
20. Tanimoto Y, Hoshino T, Shin M, Kato Y, Takano M, Katakura A. Clinical study of medically compromised patients undergoing tooth extraction while receiving antithrombotic therapy. Oral Sci Int 2022;19:173-9.
21. Inokoshi M, Kubota K, Yamaga E, Ueda K, Minakuchi S. Postoperative bleeding after dental extraction among elderly patients under anticoagulant therapy. Clin Oral Investig 2021;25:2363-71.
22. Canellas JV, Soares BN, Ritto FG, Vettore MV, Vidigal Júnior GM, Fischer RG, *et al.* What grafting materials produce greater alveolar ridge preservation after tooth extraction? A systematic review and network meta-analysis. J Craniomaxillofac Surg 2021;49:1064-71.
23. Gadhia A, Pepper T. Oral surgery, extraction of teeth. In: StatPearls. Treasure Island (FL): StatPearls Publishing; 2024. Available from: http://www.ncbi.nlm.nih.gov/books/NBK589654/. [Last accessed on 2024 Sep 05].
24. Alvaro D, Caporaso N, Giannini EG, Iacobellis A, Morelli M, Toniutto P, *et al.* Procedure-related bleeding risk in patients with cirrhosis and severe thrombocytopenia. Eur J Clin Invest 2021;51:e13508.
25. Randhawa AK, Veeresha KL, Gambhir RS, Sohi RK, Bansal V, Dodamani A. Assessment of oral health status, treatment needs, coverage and access barriers of patients reporting to a rural dental college in Northern India. J Indian Assoc Public Health Dent 2011;9 Suppl 4:S899-904.