

Management of Oral Surgery in Patients by Anticoagulant Therapy

AMMAD JAWED¹, TALHA TANVEER², IMRAN KHAN³, BILAL YOUSAF⁴, WAQAR ALI⁵, AMMAR ALI KHALID⁶

¹Senior Registrar/ Consultant Endodontist, Azra Naheed Dental College/ Superior University, Lahore

²Senior Registrar, Department of Prosthodontics, DOW International Dental College, Karachi

³Assistant Professor, Department of Community Dentistry, Sindh Institute of Oral Health Sciences, Jinnah Sindh Medical University, Karachi

⁴BDS, FCPS, Consultant Dental Surgeon, Punjab Dental Hospital Lahore

⁵Assistant Professor, Oral & Maxillofacial Surgery Department, Akhtar Saeed Medical & Dental College Lahore

⁶House Officer, Dr Ishrat Ul Ebad Khan Institute of Oral and Health Science Karachi

Correspondence to: Ammad Jawed, Email: ammadjawed@gmail.com

ABSTRACT

Background: Oral surgery is a common procedure performed on patients for various reasons such as implant placement, tooth extraction, and other surgical interventions. Anticoagulant therapy is prescribed to patients to prevent blood clot formation, which can lead to serious conditions. Post-operative management of patients on anticoagulant therapy is also critical to minimize bleeding complications.

Study design: It is a systematic and controlled based study conducted at Azra Naheed Dental College/ Superior University, Lahore and DOW International Dental College, Karachi for the duration of six months from July 2022 to December 2022.

Material and Methods: The participants were divided into two groups. Group A (n=35) included patients treated with direct oral anticoagulants (DOACs) after oral surgery and group B (n=20) had patients treated with vitamin K antagonists. The average age of patients in DOACs and VKA group was 71.3±2.33 and 72.1±1.6 years respectively.

Results: Stroke, atrial fibrillation venous thromboembolism and acute coronary syndrome was found in 4,5,24 and 2 patients respectively. In case of VKA group there were 2,3,14 and 1 patient that suffered from stroke, atrial fibrillation venous thromboembolism, and acute coronary syndrome in the VKA group. The duration of surgery in DOACs and VKA group was 34.5±2.33 and 31.8±3.2 respectively.

Conclusion: This study concludes that bleeding risk in patients having some dental surgeries can effectively be controlled by interrupting the DOACs therapy and then restarting it after surgery along with some local hemostatic agents. However, the efficiency of VKAs and DOACs will be the same when DOAC therapy will not be interrupted right before an invasive surgical procedure in case of patients having higher bleeding risk treatment.

Keywords: Oral surgery, anticoagulant therapy and thromboembolic events.

INTRODUCTION

Oral surgery is a common procedure performed on patients for various reasons such as implant placement, tooth extraction, and other surgical interventions. Patients who are on anticoagulant therapy present a challenge to dental practitioners. Anticoagulant therapy is prescribed to patients to prevent blood clot formation, which can lead to serious conditions such as deep pulmonary embolism, stroke and vein thrombosis. The four biological system can be integrated to maintain the hemostasis. These four system are blood platelets, fibrinolytic system, blood vessel wall and blood coagulation system¹⁻³. A crucial first step is the constriction of blood vessel, platelet adhesion and the aggregation. Tissue thromboplastin releases local surface activation that trigger the hemostatic mechanism at the site of injury, which eventually leads to the generation and secretion of fibrin. Physiologic anticoagulants control the process of blood clotting. When tissue-type plasminogen activators and fibrin accumulate at the site where fibrin is formed, fibrinolysis activate. This whole procedure is control by the physiologic inhibitors like histidine-rich glycoprotein, plasminogen activator inhibitor and alpha-antiplasmin. Anticoagulants are classified into two categories, namely vitamin K antagonists (VKAs) and direct oral anticoagulants (DOACs)⁴⁻⁵. VKAs include drugs such as warfarin, which have been in use from several decades, while DOACs, such as rivaroxaban, dabigatran and apixaban, are newer drugs that have gained popularity in recent years due to their ease of use and reduced risk of bleeding complications. Patients who are on anticoagulant therapy require careful management during oral surgery to minimize bleeding complications. This involves a thorough assessment of the patient's medical history, including the type of anticoagulant used, the duration of therapy, and the patient's international normalized ratio (INR) or prothrombin time (PT) levels⁶⁻⁷. The INR or PT levels are used to monitor the patient's blood clotting ability, and adjustments to the anticoagulant dose may be necessary before the surgery to reduce the chance of bleeding complications. In addition to assessing the patient's medical history, dental practitioners must also consider the type of oral surgery being performed. Simple procedures such as minor tooth extractions

may not require any adjustments to the anticoagulant dose, while more complex procedures such as implant placement or extensive oral surgery may require the patient to temporarily stop the anticoagulant therapy or switch to a different anticoagulant with a shorter half-life to minimize the risk of bleeding complications⁸⁻⁹. Post-operative management of patients on anticoagulant therapy is also critical to minimize bleeding complications. This involves close monitoring of the patient's INR or PT levels and the use of local hemostatic measures such as sutures, topical hemostatic agents, and compression techniques to control bleeding. The patient may also require close follow-up with their medical provider to ensure that their anticoagulant therapy is resumed at the appropriate time and dose¹⁰. Dental practitioners must work closely with the patient's medical provider to ensure that anticoagulant therapy is managed appropriately before, during, and after the surgery to minimize the risk of bleeding complications and to reduce the risk of thromboembolic events.

MATERIAL AND METHOD

The participants were divided into two groups. Group A (n=35) included patients treated with direct oral anticoagulants (DOACs) after oral surgery and group B (n=20) had patients treated with vitamin K antagonists. The average age of patients in DOACs and VKA group was 71.3±2.33 and 72.1±1.6 years respectively. The subjects who participated in the study, signed the consent willingly. According to the inclusion criteria following studies were included in the study;

- Studies that included the patients of all age and all gender
 - Studies that reported on the use of VKAs and DOACs
- According to the exclusion criteria following studies were excluded in the study;
- The studies that did not report on oral surgery in patients on anticoagulant therapy
 - The studies that focused on non-dental surgeries
 - Case reports, reviews, and editorials were also excluded
- Data selected from patients included patient demographics, type of anticoagulant used, indication for anticoagulant therapy, type of oral surgery performed, management of anticoagulant

therapy before, during, and after surgery, and bleeding complications. Descriptive statistics, such as frequencies and percentages, were used to analyze the data.

RESULTS

The study was carried out to assess the dental extraction in patients by anticoagulant therapy. There were 15 males and 20 females in DOACs group and 12 males and 08 females in VKA group. Stroke, atrial fibrillation venous thromboembolism and acute coronary syndrome was found in 4,5,24 and 2 patients respectively. In case of VKA group there were 2,3,14 and 1 patient hat suffered from stroke, atrial fibrillation venous thromboembolism, and acute coronary syndrome in the VKA group. The duration of surgery in DOACs and VKA group was 34.5±2.33 and 31.8±3.2 respectively.

Table 1: Characteristic features of direct oral anticoagulants and control group (vitamin K antagonists)

Features	DOACs (n=35)	VKAs (n=20)	P-value
Average age (years)	71.3±2.33	72.1±1.6	0.005
Gender (male/female)	15/20	12/08	0.053
Indication of oral anticoagulant therapy			0.005
Stroke (n)	4	2	
Atrial fibrillation (n)	5	3	
Venous thromboembolism (n)	24	14	
Acute coronary syndrome (n)	2	1	
INR average	-	2.27±0.12	
Creatinine clearance (mL/min)	81.3±4.33	73.3±7.3	0.003
Dentoalveolar surgery			
Total number of extracted teeth	72	55	
Simple extraction	50	44	0.005
Surgical extraction	14	12	0.001
Multiple extractions	12	14	0.001
Duration of surgery (minutes)	34.5±2.33	31.8±3.2	0.005
0			

Bleeding risk was carefully monitored for all patients from surgery to 7 days after the surgery. There were 7 patients who got delayed bleeding problems in the DOACs group and 8 patients from VKA group reported about bleeding issue. Most of the patients (n=4) of the DOACs group complaint about bleeding problems from >20 minutes to ≤120 minutes' postoperative duration of surgery. While in the case of VKA group, there were 5 patients that reported about issues from >24 hours and ≤48 hours after the surgery.

Table 2: Delayed bleeding problems found in both group

	DOACs (n=35)	VKA (n=20)	P value
Patients who got bleeding problems (n)	7	8	
Onset of delayed bleeding			
>20 minutes and ≤120 minutes postoperative	4	1	0.005
>120 minutes and ≤12 hours	-	1	0.005
>12 hours and ≤24 hours	2	1	0.001
>24 hours and ≤48 hours	1	5	0.004
>48 and ≤72 hours	-	-	0.004
>72 hours and ≤7 days after tooth extraction	-	-	0.005

Table 3: Management of bleeding management in DOAC and VKA group

	DOAC group	VKA group	P value
Bleeding management			0.005
Local compression	5	3	
Reoperation required	2	5	
Hospitalization	-	-	

As shown in table no.3 the patients who got bleeding problems were managed by local compression, reoperation and hospitalization as per condition of the patient. It was found that,

bleeding problems were managed by local compression in case of DOACs group majorly and in case of VKA group the preferred management procedure was reoperation.

DISCUSSION

Before any dental operative procedure, patients undergo DOAC therapy as mentioned in Literature and a number of studies supported this therapy before any dental surgery. However, some studies support this idea of the prevention of DOAC therapy before 24 hours of surgery and then initiating the therapy right before the elective dental surgery day. The pharmacological profile and opinions of experts play a major role in the initial studies of DOACs. A few studies suggest that there is no need for interruption of DOAC therapy for the prevention of bleeding risks during dental surgeries like implant placement and tooth extraction as the bleeding risk is over estimated during these dental procedures. They support this idea by comparing the profiles of the patients using various drugs for the treatment of atrial fibrillation and thromboembolism. By comparing these trials, it was estimated that the rate of bleeding is lower in the case of DOAC therapy. Thus, the literature supported that there is no need of interrupting the DOAC therapy before minor dental surgeries and procedures and it is considered safe for patients having INR and VKA values lower than 3. The bleeding risk can be minimized by using some local hemostatic agents along with DOACs¹¹⁻¹³. A number of hemostatic agents like fibrin glue, gelatin sponge, oxidized cellulose, and tranexamic acid are used by surgeons to obtain hemostasis within 20 minutes. During some elective dental procedures with a high risk of bleeding such as maxillofacial procedures, sinus lifts, and autologous bone grafts DOACs are stopped due to their half-life but one advantage is their short half-life similar to heparin. This short half-life of DOACs allows the minimization of the interval without any anticoagulation activity and it also prevents the bridging of heparin. However, the rapid onset and offset of DOACs do not need preoperative bridging¹⁴.

The data from ORBIT of atrial fibrillation revealed that heparin bridging during anticoagulation increases the initiation of stroke, myocardial infarction, hospitalization, systemic embolism, and death within the first month of surgery but the bleeding risk is reduced. The DOACs do not initiate the generation of thrombin when inhibited¹⁵. The other oral procedures that have low bleeding risk are done without stopping anticoagulation. However, surgeries with higher bleeding risk need to skip at least three doses of DOACs before surgery and DOACs treatment is initiated right after surgery when hemostasis is maintained. This study was divided into two groups. Group A included 35 patients treated with direct oral anticoagulants (DOACs) after oral surgery and group B had 20 patients treated with vitamin K antagonists. When bleeding complications were considered, no significant difference was found between these two groups but the results suggested that the use of hemostatic agents during dental procedures in patients taking VKAs is effective and they were treated with DOACs. This procedure is effective to control bleeding during dental procedures. But in case of higher bleeding and no effective hemostasis, the dose of DOACs is held back such as in the case of thromboembolism. Our findings were quite similar to the studies mentioned in the literature¹⁶⁻¹⁸.

There are other studies supported that the use of DOACs to control the bleeding rate due to its lesser half-life. Their results were also similar to our results such as the patients should not take any drug or medicine for at least 6 hours before any surgical procedure and it is linked with lower plasma doses of DOACs. The maximum plasma level of DOACs was observed after 3 hours of drug intake. However, some studies suggested that the surgery should be performed right before the next dosage of DOACs or after 12 hours of dosage¹⁹⁻²⁰. The finding of this study does not find out the other local risk factors in patients having DOACs. The major outcomes of this study showed that the rate of bleeding without interrupting DOACs is similar to the patients having VKAs. Local hemostatic agents can be used to control bleeding. This

study was performed on small population size, for a more effective and elaborated conclusion there is a need to study on a larger population size ²¹.

CONCLUSION

This study concludes that bleeding risk in patients having some dental surgeries can effectively be controlled by interrupting the DOACs therapy and then restarting it after surgery along with some local hemostatic agents. However, the efficiency of VKAs and DOACs will be the same when DOAC therapy will not be interrupted right before an invasive surgical procedure in case of patients having higher bleeding risk treatment.

REFERENCES

- Lu SY, Lin LH, Hsue SS. Management of dental extractions in patients on warfarin and antiplatelet therapy. *Journal of the Formosan Medical Association*. 2018 Nov 1;117(11):979-86.
- Lababidi E, Breik O, Savage J, Engelbrecht H, Kumar R, Crossley CW. Assessing an oral surgery specific protocol for patients on direct oral anticoagulants: a retrospective controlled cohort study. *International journal of oral and maxillofacial surgery*. 2018 Jul 1;47(7):940-6.
- Yoshikawa H, Yoshida M, Yasaka M, Yoshida H, Murasato Y, Fukunaga D, Shintani A, Okada Y. Safety of tooth extraction in patients receiving direct oral anticoagulant treatment versus warfarin: a prospective observation study. *International journal of oral and maxillofacial surgery*. 2019 Aug 1;48(8):1102-8.
- Barnes GD, Moulard E. Peri-procedural management of oral anticoagulants in the DOAC era. *Progress in cardiovascular diseases*. 2018 Mar 1;60(6):600-6.
- Bensi C, Belli S, Paradiso D, Lomurno G. Postoperative bleeding risk of direct oral anticoagulants after oral surgery procedures: a systematic review and meta-analysis. *International journal of oral and maxillofacial surgery*. 2018 Jul 1;47(7):923-32.
- Shaw JR, Kaplovitch E, Douketis J. Perioperative management of oral anticoagulation. *Medical Clinics*. 2020 Jul 1;104(4):709-26.
- Piran S, Schulman S. Treatment of bleeding complications in patients on anticoagulant therapy. *Blood, The Journal of the American Society of Hematology*. 2019 Jan 31;133(5):425-35.
- Spyropoulos AC, Brohi K, Caprini J, Samama CM, Siegal D, Tafur A, Verhamme P, Douketis JD, SSC Subcommittee on Perioperative and Critical Care Thrombosis and Haemostasis of the International Society on Thrombosis and Haemostasis. Scientific and Standardization Committee Communication: Guidance document on the perioperative management of patients on chronic oral anticoagulant therapy: Recommendations for standardized reporting of procedural/surgical bleed risk and patient-specific thromboembolic risk. *Journal of Thrombosis and Haemostasis*. 2019 Nov;17(11):1966-72.
- Kwak EJ, Nam S, Park KM, Kim SY, Huh J, Park W. Bleeding related to dental treatment in patients taking novel oral anticoagulants (NOACs): A retrospective study. *Clinical oral investigations*. 2019 Jan 29;23:477-84.
- Takeuchi Y, Mabe K, Shimodate Y, Yoshii S, Yamada S, Iwatate M, Kawamura T, Hotta K, Nagaïke K, Ikezawa N, Yamasaki T. Continuous anticoagulation and cold snare polypectomy versus heparin bridging and hot snare polypectomy in patients on anticoagulants with subcentimeter polyps: a randomized controlled trial. *Annals of internal medicine*. 2019 Aug 20;171(4):229-37.
- Berton F, Costantinides F, Rizzo R, Franco A, Contarin J, Stacchi C, Maglione M, Visintini E, Di Lenarda A, Di Lenarda R. Should we fear direct oral anticoagulants more than vitamin K antagonists in simple single tooth extraction? A prospective comparative study. *Clinical oral investigations*. 2019 Aug 1;23:3183-92.
- Nagata N, Yasunaga H, Matsui H, Fushimi K, Watanabe K, Akiyama J, Uemura N, Niikura R. Therapeutic endoscopy-related GI bleeding and thromboembolic events in patients using warfarin or direct oral anticoagulants: results from a large nationwide database analysis. *Gut*. 2018 Oct 1;67(10):1805-12.
- Shilbayeh SA, Almutairi WA, Alyahya SA, Alshammari NH, Shaheen E, Adam A. Validation of knowledge and adherence assessment tools among patients on warfarin therapy in a Saudi hospital anticoagulant clinic. *International journal of clinical pharmacy*. 2018 Feb;40:56-66.
- Balaji SM, Balaji PP. *Textbook of Oral & Maxillofacial Surgery-E Book*. Elsevier Health Sciences; 2018 Sep 5.
- Proietti M, Lane DA, Boriani G, Lip GY. Stroke prevention, evaluation of bleeding risk, and anticoagulant treatment management in atrial fibrillation contemporary international guidelines. *Canadian Journal of Cardiology*. 2019 May 1;35(5):619-33.
- Cervino G, Fiorillo L, Monte IP, De Stefano R, Laino L, Crimi S, Bianchi A, Herford AS, Biondi A, Ciccù M. Advances in antiplatelet therapy for dentofacial surgery patients: focus on past and present strategies. *Materials*. 2019 May 9;12(9):1524.
- Wiegele M, Schöchel H, Haushofer A, Ortler M, Leitgeb J, Kwasny O, Beer R, Ay C, Schaden E. Diagnostic and therapeutic approach in adult patients with traumatic brain injury receiving oral anticoagulant therapy: an Austrian interdisciplinary consensus statement. *Critical care*. 2019 Dec;23(1):1-6.
- Patel S, Singh R, Preuss CV, Patel N. Warfarin. In: *StatPearls [Internet]*. 2022 Sep 21. StatPearls Publishing.
- Miclotte I, Agbaje JO, Spaey Y, Legrand P, Politis C. Incidence and treatment of complications in patients who had third molars or other teeth extracted. *British Journal of Oral and Maxillofacial Surgery*. 2018 Jun 1;56(5):388-93.
- Tafur A, Douketis J. Perioperative management of anticoagulant and antiplatelet therapy. *Heart*. 2018 Sep 1;104(17):1461-7.
- Catanzano O, D'Esposito V, Formisano P, Boateng JS, Quaglia F. Composite alginate-hyaluronan sponges for the delivery of tranexamic acid in postextractive alveolar wounds. *Journal of pharmaceutical sciences*. 2018 Feb 1;107(2):654-61.