

# PATIENT UNDER ANTI-CLOTTING THERAPY IN DENTAL OFFICE – MANAGEMENT, PROCEDURES, AND COMPLICATIONS: A SURVEY RESEARCH

Karolina Kiszka<sup>1</sup>, Paweł Kubasiewicz-Ross<sup>2</sup> , Artur Pitulaj<sup>3</sup> , Sławomir Gortych<sup>2</sup>, Łukasz Dubniański<sup>4</sup>, Maksymilian Harłukowicz<sup>4</sup>, Sebastian Dominiak<sup>2</sup>

<sup>1</sup>Student's Scientific Association, Wrocław Medical University, Wrocław, Poland

<sup>2</sup>Chair and Department of Oral Surgery, Faculty of Medicine and Dentistry, Wrocław Medical University, Wrocław, Poland

<sup>3</sup>Department of Dental Surgery, Faculty of Dentistry, Wrocław Medical University, Wrocław, Poland

<sup>4</sup>SCTT, Uniwersyteckie Centrum Stomatologiczne, Wrocław, Poland

## ABSTRACT

**INTRODUCTION:** An increasing number of patients are taking oral anti-clotting agents. As a result, there is an important patient safety concern in relation to a potential risk of bleeding complications following oral surgery.

**OBJECTIVES:** The aim of the study was to evaluate the contemporary management of patients undergoing anti-clotting therapy treated by Polish dentists, and to assess the most commonly observed complications following tooth extraction in that group of patients.

**MATERIAL AND METHODS:** The survey study was designed to include dentists and medical doctors. During the analysis, several aspects of medical professionals were considered, including years in the profession, field of specialty, medical sector (private or public), and size of the town where treatment was provided. The results were analyzed statistically.

**RESULTS:** Most of the dentists treat patients undergoing anti-clotting therapy more than once a week. Such patients are admitted more frequently into public sector clinics in minor cities, and treated by dentists specialized in oral or maxillofacial surgery. Most of general dentists do not exactly provide recommendation of international normalized ratio (INR) test. Most frequently observed complication in patients taking anti-clotting therapy after tooth extraction was hematoma.

**CONCLUSIONS:** Medical professionals should evaluate their knowledge in the scope of most recent recommendations regarding dental treatment in special groups of patients, including patients on anti-clotting therapy. On the other hand, patient should be effectively informed by physician and pharmacist about the way of action of these drugs as well as the importance of providing information about their intake to every medical professional, including dentist.

**KEY WORDS:** anti-coagulants, anti-platelet drugs, dental treatment, anti-clotting drugs.

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## INTRODUCTION

Post-extraction bleeding is frequently encountered complication in dental practice. It is defined as bleed-

ing following tooth extraction that continues for more than 8 hours. The incidence of post-extraction bleeding varies from 0% to 26% in different studies within whole population, regardless of general medical condition [1].

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Address for correspondence: Paweł Kubasiewicz-Ross, Chair and Department of Oral Surgery, Wrocław Medical University, 26 Krakowska St., 54-207 Wrocław, Poland, phone: +48 71 784 04 23, e-mail: [pawelkubasiewicz@wp.pl](mailto:pawelkubasiewicz@wp.pl)

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Systemic causes, including platelet and coagulation disorders as well as inherited or acquired conditions, such as anti-thrombotic drugs, can be specified as potential reasons for that complication [1, 2].

Anti-thrombotic drugs (e.g., anti-coagulants and anti-platelets) are effective in prevention and treatment of many cardiovascular disorders, such as acute coronary syndromes, stroke, and venous thromboembolism, and are among the drugs most commonly prescribed worldwide [3]. Anti-coagulants are divided into heparins, including low-molecular-weight heparin (LMWH), vitamin K antagonists (VKA; e.g., acenocoumarin or warfarin), and novel oral anti-coagulants (NOAC), such as direct thrombin inhibitors (dabigatran as a group representative) and direct factor Xa inhibitors (rivaroxaban as a group representative) [3, 4].

Anti-platelet drugs are divided into COX-1 inhibitors (acetylsalicylic acid [ASA] as a group representative), adenosine diphosphate (ADP) inhibitors (e.g., clopidogrel), adenosine uptake inhibitors (PDE, dipyridamole as a group representative), and glycoprotein IIb/IIIa inhibitors (e.g., abciximab) [5, 6].

Dental procedures and peri-operative management provided to patients using anti-thrombotic drugs have been controversial in the past. The major concern in such cases was whether the anti-coagulant should be stopped before dental procedure or not. If the drug was not stopped, there was a risk of serious post-extraction hemorrhage. Therefore, such proceeding has been previously recommended. The reason was a conclusion that discontinuing anti-thrombotic medications for a short period of time presents negligible risk to the patient. However, since more recent studies evaluating the risk of thrombo-embolism associated with rebound hypercoagulable reported an increased thrombin activity after stopping warfarin, progressive recovery of platelet function with excessive thromboxane A<sub>2</sub> activity, and decreased fibrinolysis after interrupting aspirin, this paradigm has been debated and challenged [5, 7-10].

Due to the lack of well-defined procedures and confusion in the context of dental treatment of patients on anti-clotting therapy, the Common Cardiologic and Dental Statement (*Wspólne Stanowisko Kardiologiczno-Stomatologiczne*) has been appointed to develop and clarify the pharmaco-therapeutic procedures. Briefly, the risk of surgical bleeding has been graded as low, medium, or high. The vast majority of dental procedures, including single tooth extraction, have been classified as procedures with low-risk surgical bleeding, and in the case of anti-platelet therapy and anti-coagulant (NOAC) administration, the modification of therapy was not recommended, while in the case of VKA, it was recommended to assess international normalized ratio (INR) before procedure, which should not be above 3.0 [11, 12].

## OBJECTIVES

The aim of the study was to evaluate the contemporary management of patients undergoing anti-clotting therapy treated by Polish dentists, and to assess the most commonly observed complications following tooth extraction in that group of patients.

## MATERIAL AND METHODS

The current study lasted from March 2021 till November 2021, and was a continuation of previously conducted study [13]. Briefly, as described before, the research was based on a survey aimed at dentists and medical doctors. The questionnaires were distributed by social media, including Polish Dental Association website and in paper form in dental offices. The questionnaire consisted of a general and detailed parts. The general part included questions evaluating the number of years in profession, field of specialty, medical sector (private or public), and the size of town of the dental practice. In detailed part, the questions concentrated on experience, observations, and procedures in various clinical situations (Table 1). The survey was conducted with adherence to the principle of anonymity and under the guidelines of EU 2016/679 regulation of the European Parliament and the Council of the European Union. The results were analyzed statistically using Pearson's  $\chi^2$  test, and a significance level was set at  $p$ -value of 0.05.

## RESULTS

### RESULTS OF THE GENERALIZED PART OF THE SURVEY

Eventually, 221 dentists and 19 medical doctors agreed for participation in the study. Among medical doctors, 25% graduated up to 5 years ago, 35% obtained a medical degree over 5, but not more than 10 years ago, and 40% declared to be in the profession for over 10 years. At the same time, 28.5% of the dentists who took part in the survey graduated no more than 5 years ago, 20.4% between 5 and 10 years ago, and 51.1% stated to be more than 10 years in the profession. 81.4% questioned dentists admitted to be general dentists without any specialization, while 18.6% dentists declared to be dental specialists, of them 8.6% provided specialized dental treatment in the field of oral or maxillofacial surgery, and 10% declared being specialized in a different field. In the scope of the medical sector where the dental treatment was provided, according to the responses, 33.9% of the dentists were related to the public sector, while 66.1% declared to provide dental treatment in the private sector.

The last question in the general part of both questionnaires raised the matter of size of the town the treatment was provided: 14% of the dentists stated to provide

**TABLE 1.** The survey questionnaire. Questions marked with \* were addressed also to medical doctors

Question	Possible options of answer
<b>General part of the survey</b>	
Number of years in the profession	Less than 5 years, 5-10 years, more than 10 years
Field of dental specialty	No specialization, oral or maxillofacial surgery specialist, other specialist
Type of medical sector	Private sector, public sector
Size of the town, in which the practice is located	Small (less than 50,000 pop.), medium (50,000-100,000 pop.), big (more than 100,000 pop.)
<b>Detailed part of the survey</b>	
What group of patients is questioned by you regarding possible taking anti-thrombotic drugs?	Every single patient, in case of first-time patients, in elderly patients, when the procedure to be provided is combined with possible excessive blood lost
How often patients under anti-thrombotic therapy are treated by you?	More than once a week, 2-3 times a month, once a month, 2-3 times a year
In what situations INR is evaluated by you?	Never, before more excessive procedures, in every patient on anti-thrombotic therapy
What level of INR ratio is regarded by you as safe for performing tooth extraction procedure?*	< 1.5, < 2.5, < 3.0, < 4.0
How much time before tooth extraction INR test should be taken?*	Directly before, 24 hours before, 48 hours before
Is your proceeding tailored according to type of the procedure and risk of bleeding? And if so, in what way?*	Yes, No. In what way?
How often bleeding complication after tooth extraction is observed by you?*	Never, vary rarely, more than 1 case per 10 patients, less than 1 case per 10 patient but more frequent than 1 case per 100 patients
If you chose an affirmative answer on the above-mentioned question, what might be a reason for that?	Poor medical anamnesis provided by dentist; patients deny of anti-clotting therapy
What is the most commonly observed complication after tooth extraction in a patient under anti-thrombotic therapy?*	Early bleeding (within 24 hours), late bleeding (in a few days after), swelling, hematoma infection

dental treatment in a small town, 26.3% in a medium town, and 59.7% in a big town.

## RESULTS OF THE DETAILED PART OF THE SURVEY

Significantly, more frequently, patients taking anti-clotting drugs received their treatments in public dental sector than in private one, and 84% of the dentists who provided dental treatment in the public sector claimed that this group of patients visit a dental office more than once a week (in comparison with 58.2% of the private sector). Depending on specialization, the responses indicated that 40.5% dentists without specialty degree or with a specialty in a different field than oral and maxillofacial surgery, provided treatments to patients on anti-clotting drugs at least once a week. In comparison, significantly more frequently, the same response was provided by 75% of oral or maxillofacial surgery specialists.

On the other hand, 69.5% of dentists stated that they do not encounter hemorrhagic complications at all while providing treatments to patients on anti-clotting therapy. However, 28.2% dentists admitted having such complications less frequently than every 10<sup>th</sup> patient,

but more frequent than every 100<sup>th</sup> patient. Only 2.3% of dentists observed bleeding complication more frequently than every 10<sup>th</sup> patient.

Moreover, the questionnaire consisted of a question about situations when arranging INR examination was considered necessary. Reasonably, more than a half of participants (52%) claimed to assess INR of a patient under anti-clotting therapy before dental procedure associated with a high-risk of surgical bleeding. At the same time, as much as 21.33% of dentists, did not consider an INR examination to be required in any clinical situation. The rarest answer was chosen by 2.22% of dentists, who arrange an INR examination before every dental procedure. There was a visible discrepancy between responses given by oral and maxillofacial surgeons and dentists with specialty in different field or with no specialty degree. Specialist in the field of oral and maxillofacial surgery were divided into equal groups of 35%, including dentists who recommend an assessment of INR for patients under anti-clotting therapy before dental procedures with a high-risk of surgical bleeding, and dentists who recommend an INR examination before every kind of dental procedure. Remaining responses of dental surgeons were: 5% for the answer

‘every patient regardless of the risk of surgical bleeding’, and 20% for an assessment of INR examination before every procedure with a high-risk of surgical bleeding (regardless of patient’s pharmacotherapy) (Table 2). This demonstrates that dentists with a specialty related to oral and maxillofacial surgery were very aware of the importance of INR values within the context of hemorrhagic complications and safe dental treatment. Dentists with a specialty in different field or without specialization, most frequently chose an option ‘assessment of INR for patient under anti-clotting therapy before a procedure with high-risk of surgical bleeding’. In contrast, almost every fourth dentist (23.41%) stated to never recommend such an examination (in comparison, none of oral and maxillofacial specialists chose this option). The least frequent answer was ‘every patient regardless of the risk of surgical bleeding’, with an outcome of 1.95% responses. It is safe to assume that among these two groups of dentists, the awareness of hemorrhagic complications was poorer and the proceeding incoherent. Moreover, dentists who worked in a private sector, more often but with no statistically important differences, resign from INR assessment (22.98% of responses) compared with the public sector (18.18%). In distinguishing between the size of town, the responses of dentists who never recommend an INR examination, turned out to be obvious. Alarming, every third dentist who provided treatment in small town never recommended an INR examination (Table 2).

Another aspect referring to INR indicator was an issue of how much time before the dental procedure an INR examination should be conducted, and what is the range of values that allow to provide a safe dental procedure for the patient. Among both medical doctors and dentists, the most frequent answer was ‘24 hours before the procedure’ (successively, 44.89% and 70% of the responses). 16.89% of dentists stated to recommend an assessment of INR 48 hours before the procedure and 18.22% directly before the procedure. In comparison, none of the medical doctors approved the answer ‘48 hours before the procedure’, and every fourth would arrange the assessment directly before the procedure.

The great discrepancy between these two groups of medical professionals appeared regarding the INR value considered to be safe to provide a procedure with a low- or high-risk of surgical bleeding. Starting with the dental procedures with a low-risk of surgical bleeding, approximately 50% of oral and maxillofacial surgeons, and more than 9% of dentists without specialty degree or specialists in other field, considered the procedure safe with an INR less or equal 1.5. Every fourth medical doctor agreed with this group of participants. Higher values of INR (up to 2.5) were approved by 25% of dental surgeons, 37.56% of dentists without surgical specialty, and 45% of medical doctors. Alarming, among each group, some of the participants considered INR up to 4 to be safe for the patient. Analyzing responses regarding procedures with high-risk of surgical bleeding, a vast majority of medical doctors (80%) and 50% of dental surgeons declared that the treatment with high-risk of surgical bleeding was not a threat for the patient as long as INR was lower than 1.5. Dentists without surgical specialty were divided into two size-similar groups, in which half agreed with previous participants and the other half considered an INR value up to 2.5 as safe for the patient. Disturbingly, 15.61% of dentists without surgical specialty did not arrange INR assessment at all, and almost 1% considered an INR value of up to 4 as safe for the patient, even with a high-risk of surgical bleeding (Table 3).

Two of the most frequent complications pointed out by the dentists, included hematoma (20.45%) and late bleeding (17.33%). 11.11% of the dentists encountered early bleeding few hours after dental procedure. A complication chosen most rarely was the infection of hematoma (0.89%). That problem did not seem to differ significantly between the private and public medical sectors, while comparing between years of experience, dentists who obtained a degree over 5 but no more than 10 years ago, dealt with post-procedure complications more rarely than the rest of the participants (Table 4).

Among dentists who provided treatment from 5 to 10 years, hematoma was the most frequent complication (17.02% of responses). At the same time, infection of hematoma was chosen by 2.13% of participants, and

**TABLE 2.** Question: In which clinical conditions INR test should be assessed?

INR assessment responses	Dental surgeons	Dentists without surgical specialty	Private sector	Public sector	Small town	Medium town	Big town
Never	–	23.41%	22.98%	18.18%	33.33%	16.95%	20.3%
Patients under anti-clotting therapy if a procedure with a high-risk of surgical bleeding is considered	35.0%	53.67%	50.0%	55.85%	48.49%	55.93%	51.13%
Patients under anti-clotting therapy (regardless of the risk of surgical bleeding)	35.0%	12.68%	15.54%	12.99%	9.09%	13.56%	16.54%
In every patient (regardless of the risk of surgical bleeding)	5.0%	1.95%	0.67%	5.19%	3.03%	5.09%	0.75%
In every patient if a procedure with a high-risk of surgical bleeding is considered	20.0%	8.29%	10.81%	7.79%	6.06%	8.47%	11.28%

**TABLE 3.** Question: What level of INR test results should be considered as safe prior tooth extraction?

INR	Low-risk of surgical bleeding			High-risk of surgical bleeding		
	Medical doctors	Dental surgeons	Dentists without surgical specialty	Medical doctors	Dental surgeons	Dentists without surgical specialty
< 1.5	25.0%	50.0%	9.76%	80.0%	50.0%	37.07%
< 2.5	45.0%	25.0%	37.56%	10.0%	35.0%	35.61%
< 3.0	20.0%	15.0%	31.22%	10.0%	15.0%	10.73%
< 4.0	10.0%	10.0%	6.34%	–	–	0.98%
No INR assessment	–	–	15.12%	–	–	15.61%

**TABLE 4.** Question: What kind of complications is most frequently observed following tooth extraction in patients undergoing anti-clotting therapy?

Complications	Total of responses	Years in profession		
		Up to 5	From 5 to 10	More than 10
No complications	50.22%	48.44%	61.70%	46.49%
Hematoma	20.45%	12.50%	17.02%	26.32%
Almost never	47.82%	62.50%	50.00%	43.33%
1-10% of patients	47.82%	37.50%	50.00%	50.00%
More than 10% of patients	4.36%	–	–	6.67%
Late bleeding	17.33%	32.81%	12.77%	10.53%
Almost never	25.64%	23.81%	16.67%	33.33%
1-10% of patients	69.23%	76.19%	66.66%	58.31%
More than 10% of patients	5.13%	–	16.67%	8.33%
Early bleeding	11.11%	6.25%	6.38%	15.79%
Almost never	48.00%	25.00%	100.00%	44.44%
1-10% of patients	48.00%	75.00%	–	50.00%
More than 10% of patients	4.00%	–	–	5.56%
Infection of hematoma	0.89%	–	2.13%	0.88%
Almost never	50.00%	–	100.00%	–
1-10% of patient	50.00%	–	–	100.00%
More than 10% of patients	–	–	–	–

was found to be the rarest complication. Prolonged bleeding occurring during the treatment was provided by 12.77% of dentists, while re-bleeding, twice less frequently. Among dentists who provided treatment for less than 5 years, almost half of the participants denied to deal with post-procedural complications. In comparison with the previous group, percentage of the answer ‘early bleeding’ was similar, but the most frequent answer giving was ‘late bleeding’, chosen by approximately every third dentist. None of the dentists who obtained a degree less than 5 years ago, declared to deal with an infection of hematoma. The most experienced group of dentists admitted to encounter hematoma most frequently (26.32%). Prolonged bleeding was chosen by 10.53% and re-bleeding by 15.79% of the participants (Table 4).

Every dentist who chose an affirmative option in the issue of facing complication was asked to consider whether the issue was related to poor medical anamnesis (10.6% of the answers), or the patient who despite specified questions did not reveal being under anti-clotting therapy (90.4%). Among the dentists who related the issue to poor medical review, 27% graduated no more than 5 years ago, and 73% of them obtained a medical degree more than 10 years ago. No participant in the group of dentists with 5 to 10 years of experience related the issue to poor medical anamnesis.

## DISCUSSION

Performing oral surgery in a patient presenting clotting or platelet disorder might arise complications,

including prolonged bleeding, oedema, and hematoma, leading to pyogenic infection. Every not correctly managed complication may result not only in patient's distress, but can also lead to life-threatening situations. However, under the condition of sufficiently provided knowledge of general medical status of the patient, vast majority of the complications can be easily treated in dental office by pressing the wound with a gauze dressing, fibrin-collagen patches, stiches, application of topical hemostatic agents, or providing an adequate pharmaco-therapy [14, 15]. In previous studies, the incidence of severe bleeding complications were recorded in five tooth extractions (2.11% of the total extractions) in three anti-coagulated patients. From the five events, four were in patients treated with NOACs (1.68%), and one occurred in a patient anti-coagulated with acenocoumarin (0.42%) [15]. Doganay *et al.* [16] investigated 222 cases, out of which 11 patients suffered from bleeding complications; three presented moderated bleeding and eight mild bleeding. Controversially, in that study, bleeding rate was higher in patients under dual anti-platelet treatment compared with anti-coagulative therapy patients. In other study among patients who underwent a dental extraction by another practitioner, a total of 542 patients who attended an emergency unit due to presenting delayed bleeding were assessed. Moderate bleeding events were more frequent in patients taking LMWH. 19 cases of severe bleeding were mostly observed within patients under warfarin or LMWH treatments. In 42 cases, hospitalization was needed, and the remaining 500 patients left the unit after bleeding was under control 1 hour later [17].

In the current study, the weight of a problem might be assumed by the level of affirmative answers of the first questions from the detailed part of the survey. The majority of the dentists claimed that this group of patients appears in a dental office more than once a week. Surprisingly, there was a difference between group of dentists working in public (84%) and private sectors (58.2%), and the size of the city. Among dentists providing treatment in small towns, 51.5% stated that the issue exists. In cities up to 100,000 residents (medium town), the issue referred to every fifth patient. Among the dentists working in towns above 100,000 residents (big town), 32.3% chose an affirmative option. Such results suggest that the problem exist, however, is diverted. It might be explained with some general statistical data. As the population of a bigger city in Poland consists of generally younger residents, including students, the need of using anti-thrombotic treatment concerns mostly elderly individuals. Similarly, the patient of private dental service might be considered as generally younger with higher economic status and presenting healthier lifestyle, which prevents development of civilization diseases [18, 19]. The interesting finding arising from the results of our study is the fact that even if the incidence of anti-thrombotic drugs administrated in public sector is higher than

in private one, the level of bleeding complications is comparable.

Considering the responses of the detailed part of the survey, it might be assumed that more correct management of patients undergoing anti-clotting therapy is provided by dentists specialized in oral and maxillofacial surgery. This is especially noticeable in the issue of INR test recommendation, and its' acceptable levels prior tooth extraction.

Fortunately, although the frequency of admitting patients under anti-thrombotic therapy was generally high, the surveyed dentists in the majority have not experienced bleeding complication. This finding is in compliance with the contemporary state of knowledge, which assumes that anti-thrombotic therapy does not provoke frequently hemorrhagic complications in the field of dental procedures in general [7, 11, 16].

The importance of detailed and carefully provided anamnesis was suggested in the present study. Moreover, the general medical questionnaire for dental patients should be well-addressed, designed in readable and comprehensible way, while over 90% of dentists who handled bleeding complication as a result anti-thrombotic therapy stated that the reason behind such complications was the lack of information about the treatment from the patients.

## CONCLUSIONS

In our opinion, recommendation for more detailed information given to patients concerning the way of working of anti-thrombotic drugs should be established. This recommendation can be addressed mostly to general physicians and cardiovascular diseases specialists, by whom the prescriptions are made, along with pharmacists and persons connected with pharmacological industry who provide professional information, such as drug leaflets.

## CONFLICT OF INTEREST

The authors declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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