



PATIENT ON DUAL ANTIPLATELET THERAPY: ASSESSMENT OF BLEEDING RISK AND ITS MANAGEMENT IN MINOR ORAL SURGERY WITH A FOCUS ON EXTRACTION SURGERY

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ABSTRACT

Background: Antiplatelet drugs are widely used to prevent and treat ischemic cardio-cerebrovascular conditions by inhibiting platelet aggregation and reducing thrombotic events. However, their use poses significant challenges in dental procedures due to the increased risk of bleeding. **Materials and Methods:** This study evaluates the safety of dental extractions in patients on dual antiplatelet therapy (DAPT) through clinical and statistical analysis of 48 patients undergoing 71 tooth extractions. Appropriate local hemostatic measures were employed to manage bleeding risks. **Results:** The results indicate that, with appropriate local hemostatic measures, dental extractions can be safely performed without significant hemorrhagic complications. The study highlights the importance of personalized patient management, especially in the presence of periodontal inflammation, to minimize bleeding risks. **Conclusions:** The findings support the continuation of antiplatelet therapy during minor oral surgeries, emphasizing the need for careful planning and collaboration with cardiologists to balance bleeding risks and thrombotic prevention.

KEYWORDS: Antiplatelet drugs, dual antiplatelet therapy, dental extractions, bleeding risk, hemostatic measures, periodontal inflammation, patient management

INTRODUCTION

Antiplatelet drugs are increasingly used to prevent and treat ischemic cardio-cerebrovascular conditions (1). These drugs work by preventing blood platelets from aggregating and forming clots, thereby reducing the risk of thrombotic events such as heart attacks and strokes (2). From a dental perspective, the use of antiplatelet agents presents specific challenges, particularly due to the risk of bleeding during and after dental procedures (3). Despite the significant benefits of these drugs in preventing thrombotic events, they can increase the risk of intraoperative and postoperative bleeding

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(4). Therefore, their management in the dental field requires attention and planning to minimize bleeding risks and ensure patient safety (5). The optimal management of patients on long-term dual antiplatelet therapy (DAPT) is not defined by appropriate approved guidelines (6). DAPT involves the use of two antiplatelet drugs taken simultaneously, typically acetylsalicylic acid (ASA) and a P2Y₁₂ inhibitor (7). Discontinuing therapy could elevate the risk of thrombotic complications, while continuing treatment could increase the risk of bleeding following extraction surgery and minor oral surgery (8). From the existing data, it appears that there is an increase in the incidence of minor immediate postoperative bleeding, but not a clinically significant increase in intra or postoperative hemorrhagic complications. For immediate postoperative bleeding, or in the rare case of prolonged bleeding, local hemostatic measures are generally sufficient (9). The results of Joel J. Napeñas literature review suggest that it is not necessary to modify or discontinue antiplatelet therapy before invasive dental procedures, as local hemostatic measures are effective in managing the rare case of postoperative bleeding (3).

The aim of this study is to demonstrate, based on clinical and statistical evidence from the treatment of 48 patients and a total of 71 tooth extractions, that these surgical procedures can be performed safely for both the patient and the operator. Despite antiplatelet therapy, tooth extractions can be carried out without a significant increase in the risk of hemorrhagic complications. It is important to note that, in some cases, local hemostatic measures were necessary to facilitate the coagulation process and accelerate the formation of the platelet thrombus. These measures include the use of sutures, local compression, and local hemostatic agents, and have proven effective in controlling postoperative bleeding. Additionally, the adoption of these techniques has reduced the risk of prolonged bleeding, ensuring safe healing for patients. This study is of crucial importance, as optimal postoperative hemostasis is essential for proper bone healing. This aspect is extremely relevant in the context of implant rehabilitations, where new bone formation is critical for optimal planning and implant placement. In this context, implant surface engineering has also been shown to influence bone healing dynamics and improve the predictability of osseointegration (10). Effective hemostasis, therefore, represents a fundamental prerequisite for the long-term success of implant-prosthetic procedures (11-16). The study also examined the local conditions of periodontal tissues, noting that in some situations these can increase the hemorrhagic risk in patients on DAPT. In particular, the presence of periodontal inflammation can further compromise coagulation ability, necessitating more careful and personalized patient management. This approach minimizes the risks of hemorrhagic complications and ensures the safety and well-being of both the patient and the operator during and after the surgical procedure.

MATERIALS AND METHODS

Patient selection: population

i. Inclusion Criteria

The study was conducted on a total of 48 patients: 16 of whom were not on any antiplatelet therapy, 16 on single antiplatelet therapy, and 16 on dual antiplatelet therapy.

ii. Exclusion Criteria

The study excluded all patients who might have conditions that could alter the hemostasis process due to factors independent of antiplatelet therapy: cancer patients, patients on anticoagulant therapy, patients with hemophilia, patients with Von Willebrand disease, patients with liver disease, patients with thrombocytopenia, and patients with uncontrolled diabetes.

iii. Other Clinical Evaluations

The periodontal status of the patient was also considered because there is an increased risk of bleeding complications in patients on DAPT who have local factors such as periodontal or periapical disease.

Surgical Protocol

Anesthesia: Articaine 4% with a concentration of adrenaline 1:100000 was used (17). In dentistry, local anesthetics are often used in conjunction with vasoconstrictors like adrenaline. This is because vasoconstrictors counteract the blood vessel dilation caused by anesthetics, slowing their absorption into the cardiovascular system (18). This prolongs the effect of the anesthesia, reduces the risk of toxicity, and helps control bleeding during surgical procedures. Additionally, it improves intraoperative visibility due to its vasoconstrictive effect. However, it also stimulates β_1 receptors, increasing heart rate and blood pressure, which can be problematic for patients with heart conditions. Adrenaline must be

administered in limited quantities to avoid cardiovascular complications, especially in patients with pre-existing heart diseases (19).

The sutures used were 3-0 silk threads. Silk was chosen for its superior handling properties and its ability to maintain stable clot formation. The diameter was also selected for similar reasons, including good mechanical strength (20,21).

A tapercut needle was used, which has excellent cutting ability and minimal tissue trauma (22). The gauze used was sterile, 100% pure cotton, and therefore hydrophilic (23). The chosen size was 10 x 10 cm. Sterile Saline Solution was pre-cooled and brought to a temperature of approximately 5°C.

Gelatin-based hemostatic agents were used in the form of sponges. These materials are saturated with thrombin, which promotes clot formation and also acts mechanically through an expansion process. Initially, these materials undergo liquefaction within about a week and are completely resorbed within another 4-5 weeks (24).

Tranexamic acid (TXA): The antifibrinolytic drug TXA is widely recognized for its ability to effectively reduce blood loss during surgical procedures (25). In particular, tranexamic acid was used at a concentration of 500mg/5ml (26).

Oxidized regenerated cellulose (ORC): The specific size used in this case was 5cm x 7.5cm. Once fully saturated with blood, ORC transforms into a black or brown gelatinous mass, which promotes clot formation and helps stop local bleeding (27).

Hemostasis Evaluation

Extractions were performed following the evaluation of radiographic exams, orthopantomography, and periapical intraoral X-rays. The former was used for a macroscopic assessment, while the latter was used to specifically evaluate the conditions of the periodontium and periapex. Subsequently, the patient was asked to rinse with 0.2% chlorhexidine for approximately 60 seconds (28). A local infiltration with 4% articaine with a concentration of adrenaline of 1:100,000 was then administered for extractions in the upper arch and the anterior sectors of the lower arch. For the posterior sectors, anesthesia involved an inferior alveolar nerve block with a vial of 3% mepivacaine without a vasoconstrictor. Once the anesthetic effect was achieved, surgical procedures were carried out with the utmost respect for both soft and hard tissues. After the extraction, 3-0 silk sutures were placed using the back-and-forth technique. A sterile gauze moistened with saline solution, pre-cooled to 5°C, was applied to the surgical site to facilitate the formation of the platelet clot. The patient was then asked to apply instant ice to the area affected by the surgical procedure. These measures related to low temperatures were employed to maximize the vasoconstrictive effect produced by the cold (29). In the postoperative phases, various instructions were provided to patients to follow in the 72 hours following the procedure. Patients were advised to avoid hot foods and prefer foods with a particularly soft consistency, avoid physical exertion, and prolonged sun exposure, especially if temperatures were particularly high. Patients were instructed to intermittently apply ice during the first 24 hours and were provided with sterile gauze in case of minor bleeding. They were also given a phone number to contact in case of any doubts or other needs. The use of medications that could interact with antiplatelet drugs, such as ibuprofen, was also discouraged. Patients were evaluated one week later to assess healing, and sutures were removed where deemed appropriate; otherwise, another appointment was scheduled for an additional 7 days later. To better analyze hemostasis after surgery, we empirically evaluated clinical parameters. Specifically, we estimated the time and additional hemostatic measures required to stop the bleeding. The bleeding was assessed in various grades:

Grade 1: If it stops within 15 minutes of placing the sutures.

Grade 2: If it stops within 30 minutes of placing the sutures, with hemostasis facilitated by the placement of a compression gauze previously moistened with sterile saline solution.

Grade 3: If it stops within 60 minutes of placing the sutures, with hemostasis facilitated by the placement of a compression gauze moistened with tranexamic acid.

Grade 4: If it stops within 24 hours of placing the sutures, with hemostasis facilitated by the placement of oxidized cellulose gauze over the surgical site, stabilized with 3-0 silk sutures.

These evaluation parameters were decided upon following the scheme used in the publication by Archana Shenoy et al. (30).

RESULTS

Below are the tables related to the three pharmacological groups analyzed: Control, single antiplatelet therapy (SAPT), and DAPT (Table I,II,III). The tables include data on the 48 patients studied, of whom 28 were male and 20 were female. The average age of the patients is 77.91 years, and a total of 71 extractions were performed. Each patient underwent at least one extraction, with a maximum of four extractions, which were not all performed in the same operative session. An

important aspect to note is that only one patient experienced grade 4 bleeding, and all treatments were performed with hemostasis control within two hours. Two qualitative independent variables were evaluated: Therapies (with three categories: Control, SAPT, DAPT), and bleeding on probing (BOP) or Periodontal Lesion (with two categories: yes or no), and one discrete quantitative dependent variable, Grade (with four categories: 1, 2, 3, 4). This is reported in Table I, Table II, and Table III.

Table I. *Control Patients Table.*

PZ	N.S.	Age	Sex M/W	Therapy	Treatment	BOP o Periodontal Lesion	Grade
1	T.F.	67	M	Control	Ext 2.6	No	1
2	R.C.	72	M	Control	Ext 3.5	Yes	1
3	A.V.	81	W	Control	Ext 1.3	Yes	1
4	R.L.	65	W	Control	Ext 4.2	No	1
5	E.D.	74	M	Control	Ext 3.4	Yes	1
				Control	Ext 3.5	Yes	1
6	D.B.	59	W	Control	Ext 2.6	No	1
7	S.B.	77	M	Control	Ext 1.8	No	1
8	P.F.	68	M	Control	Ext 2.7	Yes	1
9	C.N.	69	W	Control	Ext 2.7	No	1
10	P.O.	73	M	Control	Ext 1.2	Yes	1
				Control	Ext 1.3	Yes	2
				Control	Ext 1.4	Yes	2
11	N.F.	68	W	Control	Ext 3.2	Yes	1
12	A.V.	86	M	Control	Ext 4.2	No	1
13	N.P.	74	W	Control	Ext 2.2	No	1
				Control	Ext 2.4	No	1
14	L.P.	78	M	Control	Ext 1.1	No	1
15	M.R.	82	M	Control	Ext 2.6	No	1
				Control	Ext 1.7	No	1
16	F.L.	58	W	Control	Ext 4.4	No	1

Table II. *Single antiplatelet therapy (SAPT) Table.*

PZ	N.S.	Age	Sex M/W	Therapy	Treatment	BOP o Periodontal Lesion	Grade
17	F.G.	63	M	SAPT	Ext 1.3	No	1
				SAPT	Ext 1.4	No	1
18	A.A.	60	W	SAPT	Ext 3.6	Yes	1
19	G.V.	83	M	SAPT	Ext 1.7	Yes	3
20	M.P.	78	W	SAPT	Ext 3.1	Yes	1
				SAPT	Ext 4.1	Yes	1
				SAPT	Ext 4.2	No	1
21	G.P.	77	W	SAPT	Ext 4.2	No	1
				SAPT	Ext 4.3	No	1
22	F.C.	79	W	SAPT	Ext 3.4	Yes	1
23	G.A.	80	M	SAPT	Ext 4.6	Yes	1
24	S.B.	74	M	SAPT	Ext 4.2	No	1
25	C.O.	82	W	SAPT	Ext 3.6	Yes	2
26	P.F.	80	M	SAPT	Ext 3.2	Yes	1
				SAPT	Ext 3.3	Yes	1
27	I.T.	64	W	SAPT	Ext 1.5	No	1
28	G.B.	72	M	SAPT	Ext 1.1	Yes	2
				SAPT	Ext 1.2	Yes	1
29	F.C.	79	W	SAPT	Ext 2.3	No	1
30	G.L.	82	W	SAPT	Ext 4.7	Yes	1
31	T.S.	87	M	SAPT	Ext 1.4	No	1
				SAPT	Ext 1.5	No	1
32	P.S.	59	M	SAPT	Ext 2.4	No	1

Table III. *Dual antiplatelet therapy (DAPT) Table.*

PZ	N.S.	Age	Sex M/W	Therapy	Treatment	BOP o Periodontal Lesion	Grade
33	V.V.	83	M	DAPT	Ext 3.3	No	1
					Ext 3.4	No	1
34	D.C.	82	M	DAPT	Ext 1.6	Yes	4
					Ext 1.7	Yes	4
					Ext 3.6	No	2
35	A.C.	73	W	DAPT	Ext 1.7	No	1
36	A.P.	86	M	DAPT	Ext 3.4	No	1
37	R.R.	61	M	DAPT	Ext 4.4	No	2
					Ext 4.5	No	1
38	P.P.	65	M	DAPT	Ext 4.8	Yes	1
					Ext 1.6	No	2
39	D.F.	73	M	DAPT	Ext 2.2	No	1
40	S.D.P.	60	M	DAPT	Ext 2.4	No	2
					Ext 2.7	Yes	2
41	A.B.	67	M	DAPT	Ext 3.2	Yes	2
42	V.M.	84	M	DAPT	Ext 4.7	No	1
					Ext 4.8	No	1
43	T.P.	91	W	DAPT	Ext 2.5	Yes	2
44	G.P	83	M	DAPT	Ext 3.5	No	2
45	D.A.	65	M	DAPT	Ext 4.5	No	1
					Ext 4.7	No	1
46	M.R.	68	M	DAPT	Ext 4.6	No	1
47	M.C.	72	M	DAPT	Ext 2.4	No	1
					Ext 1.3	No	3
					Ext 1.4	No	3
					Ext 4.3	Yes	2
48	M.V.	81	W	DAPT	Ext 1.3	No	2

STATISTICAL ANALYSIS

Grade-Therapy

To investigate whether there is an association between therapy (Control, SAPT, DAPT) and the degree of bleeding, that is, whether therapy influences the level of bleeding in any way, a non-parametric test was chosen (Fig.1). Given the nature of the collected data, it is not possible to assume they come from a normal distribution. Therefore, a test that does not require assumptions about the data distribution was selected. The Kruskal-Wallis test, proposed in 1952 by W.H. Kruskal and W.A. Wallis, known as the “Kruskal-Wallis One-Way ANOVA by Ranks” or simply the “Kruskal-Wallis test,” was used. The test performed on the observed sample data shows sufficient statistical evidence to reject the null hypothesis of the test, which states that all groups of interest have the same median ($p\text{-value} < 0.05$). Thus, there is a statistically significant difference between Therapy and the Degree of bleeding.



Fig. 1. Average grade between types of therapy.

Grade – BOP – Periodontal Lesion

To perform this analysis, the correlation between the two variables under examination was calculated. Since the original dataset had BOP and Periodontal Lesions as dichotomous qualitative variables (Yes/No), they were converted into binary numerical variables (0-1), where 1 represents “Yes” and 0 represents “No”. This transformation allowed for the calculation of Spearman’s correlation. Spearman’s correlation is a non-parametric measure of the correlation (statistical dependence) between two variables. It is used to assess the monotonic relationship between two sets of ordinals, continuous, or a combination of both types of data. Spearman’s correlation does not assume that the data are normally distributed and can handle variables that do not follow a linear relationship (Fig.2). The results show a modest positive correlation between BOP and the degree of bleeding (0.37) and between periodontal lesions and the degree of bleeding (0.39) in both cases. Additionally, the test also reports the significance of the correlation, with a p-value much lower than 0.05 in both cases. This indicates that the correlation is not due to chance but that there is a significant association between the variables. Therefore, in general, as the correlation increases, the degree of bleeding will also increase, and vice versa. The same applies to lesions.

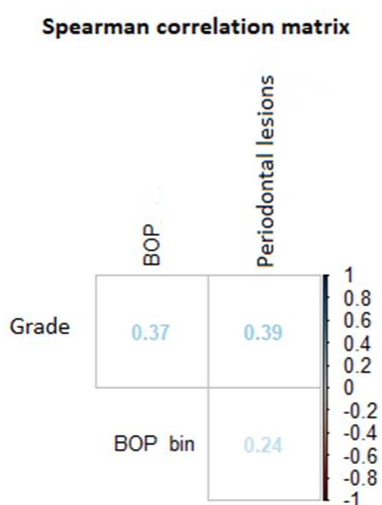


Fig. 2. Spearman correlation matrix.

DISCUSSION

In their studies, a higher frequency of postoperative bleeding was observed when dental procedures were performed. Therefore, it was decided to analyze the presence of these two parameters (31):

- Presence of bleeding on probing (BOP): This aspect was chosen for analysis because an element that already shows an inflammatory state and BOP is a candidate for a suboptimal hemostasis process. Periodontitis is associated with a higher tendency for bleeding complications. Inflammation, associated with an increase in inflammatory mediators such as IL-1, IL-6, TNF- α , and metalloproteinases in the affected area, along with increased local blood flow, increased vascular permeability, and possible vascular fragility, can lead to excessive bleeding after tooth extraction (32). As highlighted in the study by Tettamanti et al. (2018), inflammation mediated by mediators such as IL-33 can contribute to mast cell activation and influence the inflammatory response,

demonstrating how cytokines also play a crucial role in local inflammatory responses and potentially in excessive bleeding in inflammatory conditions (33). The presence of periodontitis and other periodontal diseases increases the risk of bleeding in patients undergoing dental therapies (34). Recent findings suggest that mast cells play a pivotal role in mucosal inflammation and that their activity may be modulated by anti-inflammatory cytokines such as IL-37 (35).

- Radiographic Presence of Periodontal Lesion: Periapical disease manifests with local inflammation, causing the destruction of bone and surrounding tissues, and areas of radiolucency (36). This condition is also associated with inflammation, which can lead to excessive bleeding (37,38).

Another aspect to consider, which was not directly addressed, is the number of dental elements extracted simultaneously. Often, a particularly cautious approach was chosen, and single extractions were frequently performed. The literature agrees that extracting multiple dental elements in a single operative session is necessarily associated with a higher risk of bleeding episodes (39). Several studies have demonstrated the crucial role of mast cells (40), cytokines (IL-33, IL-1b, etc.) (41), and genes (42,43) in oral and intestinal inflammation (40) and cancer development (44) and also in soft and hard tissue necrosis (45), allograft rejection (46), bleeding risk in oral surgery, implant osseointegration procedures (10) with an important capacity of drugs and novel laser technologies in their treatments (47,48). In addition to these considerations, recent studies have highlighted innovative surgical techniques for alveolar ridge preservation, which may be critical in minimizing bleeding complications and optimizing outcomes in dental procedures, particularly when immediate dental implant placement is involved (49). Recent evidence suggests that the use of biomaterials in immediate post-extractive implant procedures may enhance aesthetic outcomes, even if it does not significantly affect bone loss or probing depth (50).

CONCLUSIONS

The results obtained from this study clearly indicate a significant correlation in the degree of bleeding between the control group and the group on DAPT. This correlation is statistically significant. Additionally, a similarly significant correlation was observed between the degree of bleeding in patients with BOP or periodontal lesions compared to those with healthy periodontium. This finding underscores the importance of a careful and personalized evaluation of each clinical case, which should not be limited solely to local aspects of the oral cavity.

For patients on DAPT, it is advisable to plan particularly atraumatic operative sessions. This approach minimizes the risk of hemorrhagic complications during and after the procedure. Additionally, it is prudent to foresee a longer postoperative observation period compared to patients to monitor for any complications and ensure safe healing.

In this study, a specific protocol for hemostasis management was adopted, which involves the consecutive use of various hemostatic measures. In clinical practice, these measures could be used simultaneously to further accelerate the hemostasis process and reduce the risk of postoperative bleeding.

Despite the necessary precautions for major procedures, minor oral surgery, such as simple tooth extractions, can be safely performed even in patients on continuous DAPT. This is possible thanks to the adoption of adequate hemostatic measures and careful planning of the procedure. Emerging evidence highlights the role of neuropeptides in mast cell-mediated inflammation and suggests that anti-inflammatory cytokines such as IL-37 and IL-38 may offer novel therapeutic avenues (40).

Conflict of interest

The authors declare that they have no conflict of interest.

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