

Hemostatic Effect of Platelet Rich Fibrin Versus Tranexamic Acid After Tooth Extraction in Patients Under Anticoagulant Therapy

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ABSTRACT

Objective: The compare the efficacy achieved by platelet rich fibrin versus tranexamic acid dressing placed in bony socket after tooth extraction in patients who are taking anticoagulant drugs.

Study design: Experimental study.

Place and Duration of study: Department of Oral & Maxillofacial Surgery, Liaquat University of Medical & Health Sciences, Jamshoro / Hyderabad, from 13th April 2017 to 12th April 2018.

Methodology: All 84 patients were divided into 2 equal groups by lottery method, group-A and group-B. In group A, after the tooth extraction, socket was filled with dressing of 4.85% tranexamic acid (TXA). In group B, a platelet rich fibrin (PRF) extracted from the autologous blood and stabilized in the post extraction socket with sutures. Post-extraction site was monitored for one week to assess and record the bleeding from tooth socket on 1st two hours before dismissal, 2nd, 3rd, 5th and 7th days postoperatively. In case of no bleeding from socket on 7th postoperative day, positive efficacy was considered.

Results: There were 84 patients in total. Males were 50/84 (59.5%) while females were 34/84 (40.5%). Efficacy in Group A (Platelet rich fibrin) was found in 41/42 (97.61%) patients while in Group B (Tranexamic acid) it was found in 39/42 (92.86%) patients. When the Chi. square test was applied to see effects between efficacies in both groups, it was found that there were no significant association between both groups having p-value 0.306. After the stratification of gender, and duration of anticoagulant use, the efficacy was not found significant among both groups.

Conclusion: In conclusion, the efficacy achieved by platelet rich fibrin in much better then tranexamic acid dressing placed in bony socket after tooth extraction in patients who are taking anticoagulant drugs.

KEYWORDS: Haemostasis; Tranexamic acid; Palatelete rich fibrin; Anticoagulant drugs

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INTRODUCTION

Dental extractions are performed frequently on patients who receive treatment with an oral anticoagulant. In the past, it has been suggested that anticoagulant treatment be stopped or reduced for several days before a dental extraction [1]. However, now some recommend carrying out extractions without any interruption or diminution of anticoagulant treatment [2]. A recent study regarding dental extractions in patients undergoing anticoagulant treatment has shown that occurrence of postoperative bleeding depends on the degree of infection of the surgical site [3].

Bleeding during and after surgery can be troublesome for both patient and the surgeon and if uncontrolled can lead to serious consequences. It may also compromise visibility and possibly the procedure itself. Bleeding normally occurs when a vessel is cut or interrupted during surgery or due to trauma which can be managed successfully in most cases by applying pressure. The source of bleeding can be either from hard tissue (bone) or soft tissue (gums), and they can be classified as arterial, venous, or capillary bleeding based on the source of the vessel involved. Identification of the source of the bleeding requires good illumination, adequate retraction, and thorough suctioning [4].

In major oral and maxillofacial surgical procedures, electrocautery and suture ligatures are most used to control bleeding from small and major vessels. However, when generalized oozing is present, and the use of pressure is not effective, the use of electrosurgical instruments could endanger teeth or nerves, topical hemostatic agents may be needed [5]. In bony surfaces, parenchymal tissues, inflamed or friable vessels, or tissues with multiple and diffuse capillaries, it is extremely difficult to achieve haemostasis with mechanical and thermal methods. In such situations, one of the more common methods of intraoperative hemorrhage control involves the use of a topical hemostatic agent. Local hemostatic agents provide control of external bleeding by enhancing or accelerating the natural clotting process through various physical reactions between the agent and blood or by mechanical means.

According to British society of hematology the minor oral surgeries can be performed by keeping maximum dose of anticoagulants at the targeted range of International normalized ratio of 3-4. [6,7]

Majority of patients can bleed 3-5 days after tooth extraction because of local antifibrinolytic agents like plasminogen and plasminogen activators which dislodge the clot. In these cases, a local antifibrinolytic agent 4.8 percent tranexamic acid mouth wash is used for seven days to decrease fibrinolytic action of plasminogen and plasminogen activator [8]. Only five percent of patients bleed even after the use of tranexamic acid while in ninety five percent cases bleeding can be controlled successfully [9].

Choukroun et al. [10] in France developed a new biomaterial named platelet rich fibrin which contains high quantity of leukocytes and platelets. This material has strong fibrin structure that helps to achieve haemostasis. If platelet rich fibrin is placed in socket after tooth extraction, then it will not only increase haemostasis and healing but also reduce pain [10]. He collected the blood in a 10 ml tube and centrifugated it for 12 minutes, after this the tube contain three layers, base contain red blood cells, middle contain platelet rich fibrin and top one contain acellular plasma [11]. Platelet rich production is a natural process that does not use anticoagulants for harvesting blood, nor does it need bovine thrombin and calcium

chloride for platelet activation and fibrin polymerization. Platelet rich fibrin causes to release growth factors such as platelet derived growth factors-AB, transforming growth factors beta-1, vascular endothelial factors and matrix proteins like thrombospondin-1, fibronectin and vitronectin for at least 7 days. These factors have tissue healing, tissue engineering and drug delivery prosperities, hence can be used in minor oral surgeries like tooth extraction, implant placement, bone grafts and sinus lift procedures [12].

The rationale of this study is that it will help the patient to avoid thromboembolic effects by unnecessary stopping the anticoagulant drugs.

MATERIAL AND METHODS

This Experimental study was conducted at the Department of Oral & Maxillofacial Surgery, Liaquat University of Medical & Health Sciences, Jamshoro / Hyderabad Sindh, from 13th April 2017 to 12th April 2018.

After taking approval from ethical review committee and consent from patients, assessment for patient inclusion criteria done. Patients included in study were either Gender (Male and female), aged about 30 to 70 years, taking anticoagulant drugs 4-days or more than 4-days continuously before surgery, having international normalized ratio equal or less than 3.5, non-restorable teeth which need extraction.

Patients excluded from study were having liver disease or coagulopathy confirmed by liver functioning test with elevated liver enzymes, primary / supernumerary teeth, pregnant females in first and third trimester, confirmed by urine pregnancy test, 8-weeks after last menstrual cycle.

Data collected from patients by asking biodata including name, age, sex, occupation, presenting complain, taking history of presenting complain, Medical history about any bleeding disorder, Dental history about any previous extensive bleeding during or after tooth extraction, clinical extra oral examination to see any drainage or swelling associated with problematic tooth and intra oral examination to see the difficulty of tooth extraction, final diagnosis was done by clinical examination and Investigation i.e. Complete Blood Picture and suitable radiograph (Periapical / Orthopantomogram radiograph) to see the Periapical pathology of tooth.

All patients were divided into 2 equal groups by lottery method, group A and group B. In both groups when all other conservative approaches fail to preserve the tooth then is likely to be extracted. Antibiotic prophylaxis of Amoxicillin 875 milligram and clavulanic acid 125 milligram advised once a day for two days before tooth extraction. The normal blood pressure range, normal complete blood picture and International normalized ratio in the range of 3-4 are assured.

In group A, I (researcher) will inject local anesthesia lidocaine with adrenaline 2% (1:100,000), extract the tooth atraumatically by using straight and periosteal elevators and specified tooth extraction forceps. After this I had kept the dressing of 4.85% tranexamic acid dressing and repeat it after each hour for 24 hours, advice mouth wash of 4.8% tranexamic acid three times a day for 3 days.

In group B, a 20 milliliter of blood was collected in disposable syringe from the patient and transferred to two equal 10 milliliter sterile glass tube without anticoagulants. These tubes were

centrifugated at the rate of 3000 rotations per minute for 12 minutes.

After these three layers were formed in glass tubes, lower one contains red blood cells, middle one contains platelet rich fibrin and on the top acellular plasma. A good quality and usable platelet rich fibrin preparation could be obtained under good control over the speed of blood collection and transfer to centrifuge machine.

For tooth extraction local anesthesia of 2% lidocaine with adrenaline in the ratio of 1:100,000 was injected locally. Tooth is to be extracted in painless, atraumatic and blood less environment by using elevators and extraction forceps. After tooth extraction, freshly prepared platelet rich fibrin was stabilized in post-extraction socket with black silk 3-0 suture which was removed after one week.

In both cases antibiotic like amoxicillin 875 milligram with clavulanic acid 125 milligram and metronidazole 400 milligram, pain killers like acetaminophen 500 milligram were advised three

times a day for three days. Post-extraction site was monitored for one week to assess and record the bleeding from tooth socket on 1st two hours before dismissal, 2nd, 3rd, 5th and 7th days postoperatively.

Data collection was recorded on specific proforma and was analysed by statistical software package SPSS version 20.0. Descriptive statistics including age, duration, frequency and percentage were calculated for gender, bleeding, efficacy and duration of anticoagulant use. Chi-square test was used to compare efficacy between both groups-value less than or equal to 0.05 was taken as significant. Effect modifiers like gender and duration of anticoagulant drug use were addressed through stratification and post-stratification. Chi-square test was applied. P-value less than or equal to 0.05 was taken as significant.

RESULTS

There were 84 patients in total. Males were 50/84 (59.5%) while females were 34/84 (40.5%) as seen in (Figure 1).

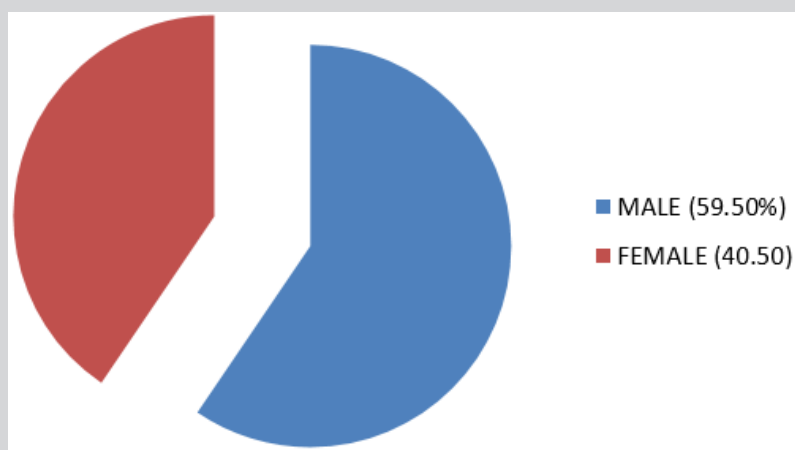


Figure 1: Pie chart presenting the percentage of gender.

There were 36/84 (42.9%) patients taking anticoagulant drug less than 3 years and 48/84 (57.1%) patients were taking anticoagulant drug 3 years or more the 3 years (Table 1).

Table 1: Descriptive statistics of duration of anticoagulant use.

Duration of Anticoagulant Use	Frequency	Percent
< 3 years	36	42.9
≥ 3 years	48	57.1
Total	84	100

The efficacy achieved by Group A (PRF) and Group B (TXA) has no significant association between them having p-value 0.306 (Table 2).

The efficacy was not found significantly associate in both groups regarding the duration of Anticoagulant drug used (Table 3).

DISCUSSION

The effect of antiplatelet drugs disappears within 96 hours after withdrawal Konrad et al. [11] reported that the effect of aspirin on platelets was detected at 3 hours and lasted for the

following 3 days. Cahill et al. [12] advocated the discontinuation of aspirin therapy 5 days before elective surgery. Omar et al. [13] conducted a retrospective study on 71 patients receiving clopidogrel who underwent full-mouth extraction. They did not find evidence to recommend that the continuation of clopidogrel during full-mouth extraction was safe. Grobe et al. [14] assessed the risk of postoperative haemorrhage after oral surgery under continued clopidogrel. They suggested that minor oral surgery can be done safely with continued mono-antiplatelet therapy such as clopidogrel or dual antiplatelet drugs [15].

Table 2: Stratification with respect to group (n = 84).

Groups	Efficacy		Total	P-value
	Yes	No		
Group A (Platelet rich fibrin)	41	1	42	0.306
Group B (Tranexamic acid)	39	3	42	
Total	80	4	84	

The authors of these studies concluded that the continuation of dual antiplatelet drugs is relatively safe but emphasised the need of further research because sample sizes were small [16-17].

Table 3: Stratification of outcome in both groups with regards to duration of anticoagulant drug (n=84).

Duration of Anticoagulant Drug	Group	Efficacy		Total	p-value
		Yes	No		
< 3 years	Group A (Platelet rich fibrin)	24	1	25	0.501
	Group B (Tranexamic acid)	11	0	11	
≥ 3 years	Group A (Platelet rich fibrin)	17	0	17	0.185
	Group B (Tranexamic acid)	28	3	31	
Total		80	4	84	

In this study, the effectiveness of the PRF and tranexamic acid was compared in those patients. Both the PRF and tranexamic acid have shown excellent haemostasis properties on the time of extraction. The incorporation of PRF for achieving the local haemostatic measure after the tooth extraction has been mentioned in many previous studies, it has been suggested that the PRF would not only accelerate socket wound healing after tooth extraction, but also appreciate the bone development and minimize bone resorption [18-19].

In previous study showed similar low bleeding rate for 4.8% tranexamic acid mouth rinse [20] and another study showed only 5% of patients bleed even after the use of tranexamic acid while in 95% cases bleeding were controlled successfully [21]. Interestingly, in a study reported by Souto et al. [22] patients rinsed postoperatively for a period of only two days with a similar low incidence of bleeding. In another study, there were 4% of patients in which bleeding was not stopped after using 4.8% tranexamic acid mouth wash while in 76% of cases it was successful and similar the results are found by this present study.

When the Chi. square test was applied to see effects between efficacies in both groups, it was found that there were no significant association between both groups having p-value 0.306. After the stratification of gender and duration of anticoagulant use, the efficacy was not found significant among both groups.

CONCLUSION

In conclusion the efficacy achieved by platelet rich fibrin in much better than tranexamic acid dressing placed in bony socket after tooth extraction in patients who are taking anticoagulant drugs. All effect modifier i.e. gender and duration of anticoagulant use had no significant association with outcome variable and the efficiency was not found significant between Group A (Platelet rich fibrin) and Group B (Tranexamic acid).

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