

Effectiveness of tranexamic acid and hemocoagulase for bleeding management in dental extraction patients – A pilot study

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ABSTRACT

Aim: This study aims to compare the effectiveness of tranexamic acid and hemocoagulase (Botroclot) bleeding management in dental extraction patients. **Background:** Tranexamic acid is an antifibrinolytic agent that blocks lysine-binding sites on plasminogen, thereby reducing the local degradation of fibrin by plasmin. It works to stabilize and to inhibit the degradation of existing clots, and it is widely used to limit bleeding in clinical practice. Hemocoagulase reduces the bleeding time and promotes wound healing by promoting the growth of capillaries in wound space. **Methodology:** A total of 10 periodontally compromised patients requiring bilateral extraction were selected. Post-extraction, bleeding cessation was estimated by placing tranexamic acid soaked gauze on the extraction socket. After a week, the patients were recalled for extraction on contralateral side, bleeding cessation was estimated by placing hemocoagulase soaked gauze on the extraction socket. The bleeding time was noted and bleeding scores were estimated in both hemostatic agent patients. **Results:** Bleeding from extraction sockets was successfully ceased by compression of socket with the topical hemostatic agents soaked in gauze. There was no significant difference between tranexamic acid and hemocoagulase ($P = 0.7$) observed in bleeding management post-dental extraction. **Conclusion:** There is no significant difference between tranexamic acid and hemocoagulase in bleeding management; hence, both hemostatic agents are equally effective in the management of bleeding post-extraction.

KEY WORDS: Bleeding, Hemocoagulase, Hemostasis, Tranexamic acid

INTRODUCTION

Blood loss and subsequent transfusions are associated with major morbidity and mortality. The hemostatic system helps to maintain circulation after severe vascular injury, whether traumatic or surgical in origin.^[1] One of the most common methods of intraoperative hemorrhage control involves the use of a topical hemostatic agent. Common local hemostatic measures used in oral surgery in extraction socket include oxidized cellulose, Gelfoam, thrombin, collagen fleeces, cyanoacrylate, acrylic splints, local antifibrinolytic solutions, tranexamic acid mouth wash, and fibrin glue.^[2,3]

Tranexamic acid is an effective hemostatic agent for the reduction of blood loss, which has been widely

used in various areas of medicine.^[4] Tranexamic acid is a synthetic derivative of the amino acid lysine that inhibits fibrinolysis by blocking the lysine-binding sites on plasminogen.^[5] Tranexamic acid inhibits fibrin cleavage, thus reducing the risk of hemorrhage. It also blocks binding of α 2-antiplasmin and inhibits inflammatory reactions. It works to stabilize and to inhibit the degradation of existing clots, and it is widely used to limit bleeding in clinical practice.^[6] Tranexamic acid reduces post-operative blood loss and transfusion requirements in surgeries involving oral, cardiac, and gastrointestinal with potential cost and tolerability. Tranexamic acid significantly reduced mean blood losses after oral surgery in patients with hemophilia and was effective as a mouthwash in dental patients receiving oral anticoagulants.^[7]

Hemocoagulase is the first pharmaceutical preparation to be used therapeutically and is based on the coagulative and antihemorrhagic properties of those fractions isolated from the venom of “*Bothrops jararaca*”

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or “*Bothrops atrox* 2, 3.” Hemocoagulase reduces the bleeding time and promotes wound healing by promoting the growth of capillaries in wound space.^[8] Hemocoagulase has two different enzymatic activities, which promote blood coagulation. One of these accelerates the conversion of prothrombin to thrombin (thromboplastin-like enzyme) while the other one causes a direct transformation of fibrinogen to fibrin monomer, which can be converted by thrombin into fibrin clot (thrombin-like enzyme).^[9] Hemocoagulase has been successfully used for the management of bleeding in patients undergoing surgery.

The aim of the present study is to compare the effectiveness of tranexamic acid and hemocoagulase (Botroclot) in bleeding management of post-dental extraction in periodontally compromised patients.

MATERIALS AND METHODS

Patients with periodontitis who had to undergo dental extraction were enrolled for this study. This study was conducted at the Outpatient Department of Saveetha Dental College, Chennai. A sample size of 10 periodontally compromised patients aged between 30 and 50 years was selected based on inclusion and exclusion criteria. Patients requiring bilateral extraction of the lower arch in molar/premolar area were selected. This study consists of six female participants and four male participants. This study was conducted from January to March 2018. Informed consent was obtained from all the patients.

The bleeding time for the participants undergoing extraction was estimated previously with modified bleeding assessment tool. The bleeding time and clotting time were estimated in laboratory and noted for these patients. The patients were given local anesthesia with adrenaline before extraction. Extraction of tooth on one side was done followed by compression of the socket with gauze soaked with topical tranexamic acid during the first appointment; the gauze was removed after the estimated bleeding time to check if the bleeding was arrested. Bleeding score of 0 was given if the bleeding stopped within the estimated time, score of 1 was given if the bleeding stopped 15 s after the estimated time, and the scores were increasing subsequently or every 15 s after the estimated time till the bleeding was arrested. Bleeding cessation time and bleeding scores of the patients were noted who underwent cessation of bleeding using tranexamic acid.

The patients were recalled after a week for the extraction of teeth on the contralateral side. Similarly, the patients were given local anesthesia with adrenaline. Extraction of tooth on the opposite side was done, followed by compression of the socket with

gauze soaked with topical hemocoagulase (Botroclot). The bleeding scores of these patients were noted after cessation of bleeding.

The obtained data were subjected to statistical analysis. Mann–Whitney U-test (non-parametric) was done by SPSS analysis.

Exclusion Criteria

The following criteria were excluded from the study:

- Hypersensitivity reaction
- Renal dysfunction
- Hemorrhagic disorders
- Systemic disease.

RESULTS

A total of 10 periodontally compromised patients underwent bilateral dental extraction under local anesthesia. The extraction was done on one side and after 7 days, the patients were recalled and the tooth on the contralateral side was extracted. The bleeding was arrested by hemostatic agent with gauze soaked in hemostatic agent and the socket was compressed. The bleeding cessation time post-extraction with both tranexamic acid and hemocoagulase of the respective patients was noted in seconds. The patients were recalled after a week and none of the extraction sockets developed any post-extraction complications. The noted time was compared with the already measured estimated time and bleeding scores were given, respectively. The bleeding scores were calculated for all the patients under tranexamic acid and hemocoagulase and were tabulated. The obtained scores were subjected to statistical analysis; Mann–Whitney U-test was done which showed a mean bleeding time of 45 ± 1.32 and 44 ± 1.96 for tranexamic acid and hemocoagulase, respectively [Table 1]. There was no significant difference between tranexamic acid and hemocoagulase ($P = 0.7$) observed in bleeding management post-dental extraction.

DISCUSSION

Bleeding during oral surgical procedures can cause distress, agony, and discomfort to the patient. It also distracts the oral surgeon from operating, leading to frustration and time consumption. Uncontrolled bleeding can lead to serious consequences.^[10] Hence, dentist must be aware of bleeding management procedures to avoid complications. There are various

Table 1: Cessation of bleeding post-dental extraction

Mean bleeding cessation time with hemocoagulase (s)	Mean bleeding cessation time with tranexamic acid (s)	Mann–Whitney U-test (<i>P</i> value)
45±1.32	44±1.96	<i>P</i> =0.07

hemostatic agents available in market to control bleeding. This study was done to compare the efficacy using two different hemostatic agents, i.e., tranexamic acid and hemocoagulase in bleeding management post-dental extraction. The mean bleeding cessation time post-dental extraction was calculated for both the hemostatic agents.

The investigation from our study shows that there is no significant difference between tranexamic acid and hemocoagulase ($P = 0.7$) in bleeding management post-dental extraction. When comparing the mean rank of bleeding cessation score, there was no significant difference between hemocoagulase and tranexamic acid. This shows that both the hemostatic agents are equally effective in bleeding management post-dental extraction. On review after a week, the patients were examined for post-extraction complications, and there were no such complications such as infection, dry socket, and hematomas.

Zirk *et al.* in his cohort study reported topical tranexamic acid helps as a useful supportive tool to stop mild bleeding events such as the blood oozing from oral wound.^[11] It has also been studied that, when tranexamic acid is injected along with antifibrinolytics, it reduces the risk of bleeding during surgery in patient with hemophilia.^[12] Gupta in a systematic review concluded that topical hemocoagulase is significantly effective in reducing bleeding, pain, and swelling after extraction of tooth when compared to saline pressure packs which also acts as a promoter of wound healing.^[13] Majumder *et al.* reported that hemocoagulase after the minor oral surgery provides faster hemostasis as well as it enhanced healing by rapid formation of healthy tissue so lesser the chances of infection over other conventional methods of bleeding control.^[3] Kiruthika *et al.* reviewed that local hemostatic agents are additionally effective than the conventional suturing technique in post-operative bleeding management in patients undergoing anticoagulant therapy.^[14] Karşlı *et al.*, in 2011, conducted a comparative study and concluded that local hemostatic agents help in bleeding management in patients receiving warfarin therapy who underwent dental extraction with an Indian Rupee between 1 and 4, without altering the anticoagulant regimen with no significant risk of bleeding.^[15]

The limitation of our study is that it was carried out only in non-carious periodontally compromised tooth which had poor prognosis. There might have been difference in score if this study was carried out in carious tooth with pulpal inflammation which has to be extracted, as there is progressive bacterial inflammation which may have a change in bleeding cessation time and bleeding score. Blinder *et al.* evaluated post-operative bleeding in patients with

oral anticoagulant therapy and who underwent dental extractions without interruption of the therapy. They compared the effect of different hemostatic modalities among three groups. The study showed that the local hemostasis with resorbable gelatin sponge, fibrin glue, and sutures was not more efficient than local hemostasis with resorbable gelatin sponge and sutures alone or resorbable gelatin sponge, sutures, and mouthwash with tranexamic acid.^[16] Meanwhile, Morimoto *et al.* studied about the risk factors affecting post-operative bleeding and found that post-operative bleeding in the presence of an acute inflammation in the surgical region is higher in patients undergoing oral antithrombotic agents.^[17] Further comparative study can be done to the rule out the effectiveness of hemostatic agent in bleeding management in patients with periodontitis and pulpitis.

CONCLUSION

Hemostasis is a key factor in safe practice of any surgical procedure. It can be concluded that there is no significant difference between tranexamic acid and hemocoagulase ($P = 0.7$) in the management of bleeding in bilateral dental extraction sockets. Hence, both the hemostatic agents are equally effective and can be used to arrest bleeding in post-dental extraction sockets.

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