INTRODUCTION

Haemostasis at the site of a dental extraction is considered to be a prerequisite before the patient leaves the clinic. Failure of hemostasis could occur in any patient; however, a number of different medical conditions and medications may interfere with this process. The most recent Adult Dental Survey (2009) has shown a growing number of our patients remaining dentate. Longevity is longer as a result of increasing health awareness and the success of medical treatments. The concept of ‘polypharmacy’ management requires dental clinicians to have an increased and advanced knowledge of the drugs that may affect dental treatment and their potential for drug interactions. Some drug therapies can increase the potential for bleeding post-operatively. Risk assessment prior to embarking on a tooth extraction can allow the operator to foresee complications such as a haemorrhage. This involves careful planning and a thorough analysis of the medical history.

Types of Post Extraction Haemorrhage

The classification of haemorrhage is important as it has direct clinical implications.

- Post extraction haemorrhage may be categorised in relation to timing:
  - Primary haemorrhage: the bleeding occurs at the time of the surgery;
  - Reactionary haemorrhage: 2–3 hours after the procedure as a result of cessation of vasoconstriction;
  - Secondary haemorrhage: up to 14 days after the surgery. The most likely cause of this is infection.

The haemorrhage may also be classified according to the site affected:

- soft tissue
- bone
- vascular

**ABSTRACT**

*Introduction:* Continuous oral anticoagulant therapy has been used to decrease the risk of thromboembolism for more than half a century, prolonging the lives of thousands of patients. There is increased risk of haemorrhage doing dental procedures in patients on anticoagulant and antiplatelet therapy. Many physicians recommend interrupting continuous anticoagulant therapy for dental surgery to prevent haemorrhage. Tranexamic acid (TXA) is a good antifibrinolitic agent. In this study the evaluation of its haemostatic effect in post extraction haemorrhage by using pressure pack of TXA in patients on anticoagulant and antiplatelet therapy, has been studied. *Aims and Objectives:* The purpose of this study was to evaluate the post extraction control of haemorrhage with administration of TXA as pressure pack in patients on anticoagulant and antiplatelet therapy. *Materials and Methods:* Extraction was performed by pre-operative international normalised ratio (INR) and haemogram test without stoppage of anticoagulant therapy. Ten patients with history of anticoagulant and antiplatelet therapy requiring extraction of teeth were included in this study. *Results:* Records showed no instances of post extraction bleeding, except in 1 and whom intravenous TXA was given, which the bleeding was controlled. No TXA allergy was noted. And postoperative control of haemorrhage was there acceptable in all the cases. *Conclusion:* Extraction can safely be carried out without discontinuation of anticoagulant and antiplatelet therapy in vulnerable group of patients.

**KEYWORDS** Post extraction, haemorrhage, haemostasis, tranexamic acid
Tranexamic acid (TXA) is an antifibrinolytic agent and its predecessor epsilon amino caproic acid has been used to treat post-operative bleeding in healthy adults for over 30 years. It has also been used in the prophylaxis and treatment of patients at high risk of intra- and post-operative haemorrhage such as hemophiliacs and patients on thrombolytic therapy and has been found to be greatly efficient, without major side effects.1–6

Medical experts often recommend patients on anticoagulant and antiplatelet therapy to either discontinue or revise their medications prior to invasive surgical procedure because of fear of excessive and uncontrolled bleeding. Though there is increased hazard of intraoperative and post-operative bleeding if anticoagulant therapy is continued, there is added risk of thromboembolic events such as cerebrovascular accidents and myocardial infarction if medication is altered or discontinued. Although there is a speculative risk of haemorrhage after dental surgery in patients at therapeutic levels of anticoagulation, the risk is minimal, bleeding is usually easily controlled with local measures, and the risk may be greatly outweighed by the risk and morbidity of thromboembolism after withdrawal of anticoagulant therapy.

It was recommended traditionally to stop aspirin 7–10 days prior to invasive surgical procedure. However, there is scientific evidence which showed that stopping antiplatelet therapy is associated with a progressive recovery of platelet function and with a potential risk of rebound of thromboembolic vascular events. On discontinuation of aspirin, there is excessive thromboxane A2 activity and decreased fibrinolytic activity.

The purpose of the study was to determine whether post extraction control of haemorrhage by use of TXA pressure pack in patients on anticoagulant and antiplatelet therapy and effective in preventing prolonged or excessive post-operative bleeding and allowing uneventful discharge.

**SUBJECTS AND METHOD**

**Patient Selection**

Ten healthy adult patients undergoing extraction under local anaesthesia were enlisted into this analysis according to the following inclusion criteria. The protocol was approved by the Research and Ethics Committee.

**Inclusion Criteria**

- Patients on anticoagulant and antiplatelet therapy requiring extraction of teeth.
- Patients of any gender and any age group were recruited.
- Systemic fitness of the patients to undergo extraction procedures certified by physician of the patient/ general hospital was included in the study.

**Exclusion Criteria**

- Patients who were unwilling to participate in our study.
- Patient who are known allergic to TXA.
- Those that did not give informed consent.
- Those who had a known haemorrhagic diathesis.
- Patients requiring transalveolar extraction will be excluded.
- Those with a known hypersensitivity to the proposed medications including local anaesthetics used in the study.

**MATERIALS AND METHODS**

- The materials used in the study would be TXA injection vial or bulb.
- The basic extraction instruments and post-operative measures.
- A stop watch was used to know bleeding and oozing time after extraction.
- Routine haemogram and international normalized ratio (INR) was done.
- Physician opinion was taken for fitness to undergo extraction.
- Consent for procedure was taken from patient.

**Surgical Technique (Figs. 1–3)**

- All procedures were carried out under strict aseptic conditions.
- Atraumatic extractions were carried out by following basic exodontias principles.
- TXA pressure pack was applied. Patients were observed after 10 mins of pressure pack with TXA to ascertain the arrest of haemorrhage.
- Patients were allowed to go home after complete arrest of haemorrhage through the extraction socket.
- Stopwatch was used to measure time duration for bleeding and oozing.

![Fig. 1 Tranexamic acid.](image-url)
DISCUSSION

Anti-coagulant therapy produces an increased risk of bleeding. The common anti-coagulant is the coumarin, warfarin – a vitamin K antagonist (VKA). In the last 5 years there has been an introduction of new oral anti-coagulant drug (NOAC) e.g. Dabigatran, Rivaroxaban and Apixaban which in some cases have replaced Warfarin.

Once a tooth has been extracted, pressure should be placed on the buccal and lingual/palatal surfaces of the alveolus around the socket. Extraction of a tooth via the intra-alveolar approach causes expansion of the alveolus around the root(s) of the tooth. The instantaneous buccolingual pressure reduces the ‘dead space’ of the wound and is the first step to help gain haemostasis. This

RESULTS AND OBSERVATIONS

The results are given in Tables 1, 2, and Figs. 4, 5.

Table 1: Post haemorrhage extraction.

<table>
<thead>
<tr>
<th>Post extraction haemorrhage</th>
<th>Number of pts.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haemorrhage controlled</td>
<td>9</td>
</tr>
<tr>
<td>Haemorrhage not controlled</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 2: Post-op complication.

<table>
<thead>
<tr>
<th>Post extraction haemorrhage</th>
<th>Number of pts.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Secondary haemorrhage</td>
<td>1</td>
</tr>
<tr>
<td>Tertiary haemorrhage</td>
<td>0</td>
</tr>
</tbody>
</table>
should be done immediately following the extraction of a tooth with intact apices, usually termed digital pressure. A piece of sterile gauze may then be rolled up so that it is big enough to cover the socket. This can be positioned straight over the socket area and the patient was asked to bite down to apply the necessary pressure. It is essential to note if an edentulous area opposes the extraction. Continuous oral anticoagulant therapy has been used to decrease the risk of thromboembolism for more than half a century, prolonging the lives of thousands of patients. Many physicians recommend interrupting continuous anticoagulant therapy for dental surgery to prevent haemorrhage.

Bryant et al.\(^7\) reported an almost 6-fold increase in the total number of dentoalveolar procedures carried out as day cases under general anaesthesia over the past 20 years with third molar surgery showing a 7-fold increase. Daycare surgery patients have unique needs, distinct from those of traditional overnight or long-stay in-patients. The disadvantages of daycare surgery are that patients may present for surgery improperly prepared or may be discharged from direct supervision before they have adequately recovered. Their post-operative needs are central to achieving complete recovery and ensuring there are no unplanned readmissions to hospital.

In reviewing the available literature, there are no well-documented cases of serious bleeding problems from dental surgery in patients receiving therapeutic levels of continuous warfarin sodium therapy, but there were several documented cases of serious embolic complications in patients whose warfarin therapy was withdrawn for dental treatment. Many authorities state that dental extractions can be performed with minimal risk in patients who are at or above therapeutic levels of anticoagulation.\(^4\)

Recently, there has been a lot of buzz about the use of topical TXA for epistaxis or oral bleeds amongst the clinicians. Everyone seems so happy that it works so well, but we thought we would look through the literature and see what the evidence for use of topical TXA is and how best to compound it for these clinical dilemma.

While there is little evidence available directly regarding the use of topical TXA for epistaxis or oral bleeds in the emergency department (ED), the use of topical TXA has been used for epistaxis, hyphema and dental extractions in a variety of settings. Its use has been studied in patients both on and off oral anticoagulants and with or without bleeding disorders such as hemophilia. It can be extrapolated from the studies that topical TXA is effective in stopping or controlling bleeds, and has been shown to be safe for use in these cases. Use of topical TXA in epistaxis has also been shown to reduce time spent in the ED. Topical solutions can be compounded as a 5% solution using the intravenous solution (100 mg/mL) or a 3.25% solution using a 650 mg oral tablet dissolved in water and stored for up to 5 days in the refrigerator.

Anecdotally, one treatment site in South Africa has used crushed TXA tablets 500 mg suspended in water for dental surgeries and tooth extractions post-operatively. Patients with inherited bleeding disorders would either swish and swallow the solution, or bite down for 30 minutes on cotton soaked in the TXA solution with reported success in most cases.

In our study, before extraction, INR was reviewed and then the procedure was performed accordingly. No patients had post-operative complications and there were no complication noted with TXA. All patients on anticoagulant and antiplatelet therapy were given post-operative pressure pack with TXA instead of normal pressure pack. And there were only one patient we had which had post-operative uncontrolled haemorrhage which was then controlled with primary closure of extraction wound and systemic administration of TXA intravenously. Our study showed results which were similar to Bajkin et al.\(^7\) who conducted a prospective study to evaluate the post extraction bleeding in patients on aspirin monotherapy, oral anticoagulant therapy, and dual therapy with aspirin + oral anticoagulant (71 patients in each group). None of the patients on aspirin monotherapy has post-operative bleeding. Although the primary aim of the study was to evaluate safety of dental extractions in patients on continued use of combined oral anticoagulant and aspirin therapy.

Clye et al.\(^8\) reported a readmission rate to hospital of 0.25%, compared with 2.5% and 1.9% reported by Yee & Davis\(^9\) and Vickers & Goss\(^10\) respectively. The causes of readmission included prolonged post-operative bleeding. The reported overall incidence of excessive post-operative bleeding following third molar extraction varies from 0.43%\(^11\) to 5.8%\(^12\). Preventing such post extraction bleeding is also central to reducing morbidity and complications such as infection and delayed healing. It also allows patients to resume their normal daily routine early. Unexplained excessive post-operative bleeding may be due to activation of the fibrinolytic pathway\(^13\) and has been shown to respond to antifibrinolytic medication.

Gaspar et al.\(^8\) have advised that intravenous anti-fibrinolytic therapy may have a thrombotic effect on patients receiving anticoagulant therapy there is no published evidence for this claim. Furthermore such patients are unlikely to be considered eligible for day case surgery. The only other contra-indications for short-term usage are renal impairment and massive haematuria where there is a risk of ureteric obstruction, which again are not relevant here.

Likewise, Ferrari et al.\(^14\) and Chassot et al.\(^15\) doubted the existence of a biological platelet rebound phenomenon on stopping of aspirin therapy, thus generating a prothrombotic state which may eventually cause lethal thromboembolic events.
CONCLUSION

Extraction is one of the most common procedures performed in oral surgery. In our study we concluded that using of TXA will help to prevent post extraction haemorrhage in patients with anticoagulant therapy. It can be concluded that current recommendations and consensus are in favour of not stopping on anticoagulant and antiplatelet therapy prior to tooth extraction. Recommendation changes from time to time. Based on the review of literature, chances of embolism are less and procedures can be done at the same time with due risk.

REFERENCES