

Short-term Use of Tranexamic Acid to Reduce Blood Loss in Endoscopic Nasal Surgeries

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ABSTRACT

Objective: To evaluate the effect of tranexamic acid, an antifibrinolytic agent, in reduction of surgical hemorrhage during endoscopic nasal surgery.

Design: Comparative analysis of the use of tranexamic acid in 200 patients undergoing endoscopic nasal surgery and its demonstrable reduction of hemorrhage and improvement of visibility of operative field.

Subjects: Around 200 patients with varied indications underwent endoscopic nasal surgery; 100 were given tranexamic acid perioperatively and 100 did not receive tranexamic acid and were used as a control. Selection of patients was done on random basis. We used the following parameters to measure intraoperative blood loss: Visibility of field of surgery, weight of blood swabs postoperatively and amount of blood from suction machine.

Result: Patient who received tranexamic acid showed reduction of blood loss amounting to 72.48% ($p < 0.05$). This reduction was compared with results published by other authors using various kinds of anesthesia.

Conclusions: Tranexamic acid is an antifibrinolytic agent which inhibits the action of plasmin. There is also reduction in blood level of D-dimer. It is seen to significantly reduce intraoperative blood loss during endoscopic nasal surgery. Additionally, there seems to be no alteration of coagulation parameters or untoward systemic effects. The consequent improvement in surgical field visibility is of great benefit which is encouraging and should prompt further trials.

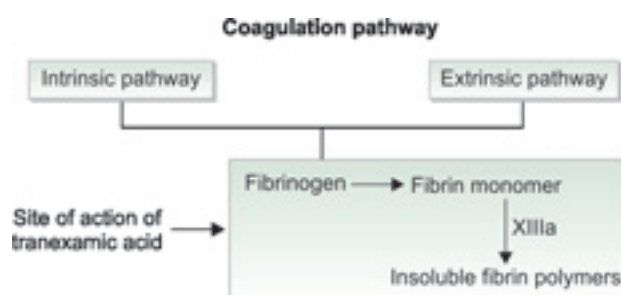
Keywords: Tranexamic acid, Blood loss, Endoscopic nasal surgeries.

INTRODUCTION

Blood loss occurring during any operative procedure is a cause of concern for the surgeon as well as anesthetist. Reduction of blood loss during endoscopic nasal surgeries improves visibility and, therefore, the safety of the procedure.

Tranexamic acid exerts its antifibrinolytic effect by blocking lysine binding sites on plasminogen molecules and thereby inhibiting the interaction of plasminogen and heavy chain of plasmin with lysine residues on surface of fibrin. Although plasmin can still be formed under these circumstances, it is unable to bind and degrade fibrin. Suppression of fibrinolysis by tranexamic acid is manifested in surgical patients by reduction in blood levels of D-dimer but the drug has no effect on coagulation parameters. Concurrent administration of heparin has no effect on action of tranexamic acid. The antifibrinolytic concentration of tranexamic acid remains in different tissues for about 17 hours and in serum for about 7 to 8 hours.

Site of Action



MATERIALS AND METHODS

Our study included 200 patients for endoscopic nasal surgeries (endoscopic sinus surgery, septoplasty, excision of nasal mass, etc.) who presented in ENT OPD of Mumbai Port Trust Hospital, from January 2006 to January 2010. Patients were randomly divided into two groups: One group was given tranexamic acid during perioperative surgical

procedure and the other group which did not receive tranexamic acid during surgical procedure.

Apart from routine investigations done for the surgery, specific coagulation profile was done for all patients, which included bleeding time, clotting time, prothrombin time (PT), partial thromboplastin time (PTT) and serum fibrinogen. Preoperative computed tomography scan of paranasal sinuses and diagnostic nasal endoscopy was done for all patients. Just before surgery, in preoperative room, the study group (100) was started on injection tranexamic infusion (500 mg in 100 ml normal saline) over a period of 20 to 30 minutes with careful monitoring of blood pressure. Nasal topical decongestant was instilled in the nose for all patients and nose was packed with 4% xylocaine with one in 2,00,000 adrenaline solution. A total of 134 cases were operated under local anesthesia, under intravenous sedation with injection Fortwin and Phenergan. General anesthesia was used for 66 patients who had extensive nasal polyposis. During surgery, 2% xylocaine with 1:2,00,000 adrenaline was used for injection and 4% xylocaine with adrenaline was used for topical anesthesia. Hypotensive anesthesia was not used for any patients.

Parameters used to measure intraoperative blood loss were:

1. Visibility of field of surgery
2. Weight of blood swabs postoperatively
3. Amount of blood from suction machine.

After surgery, nose was packed with liquid paraffin nose pack for 48 hours. Next day, the blood coagulation profile was repeated and compared with preoperative values.

RESULT

Our study included 200 patients between the ages of 18 and 58 years (mean 38 years). Males were 128 (64 %) and females were 72 (36%).

DISCUSSION

Reduction of bleeding during endoscopic nasal surgeries is a major benefit for the operating surgeon. The dictum “if you cannot see, stop” remains true till date.

Tranexamic acid inhibits plasminogen activity and fibrinolysis and thereby reduces capillary ooze. It thus increases clot formation and decreases blood loss. The added advantage is no postoperative alteration of patient's coagulation profile and absence of major side effects.

Tranexamic acid has been used earlier to control severe epistaxis, in plastic surgeries, for dental extractions in hemophiliacs and to control hemorrhage after prostatectomy. However, its use is contraindicated in acquired defective vision and active intravascular coagulation due to risk of

Table 1: Estimated blood loss intraoperatively

	Local anesthesia	General anesthesia	Average
Study group	53 ml	84 ml	68.5 ml (reduced by 72.48% as compared to control group)
Control group	220 ml	278 ml	249 ml

Table 2: Comparative study of estimated blood loss

	Local anesthesia	General anesthesia	Unspecified anesthesia
Gittleman ¹	23 ml	58 ml	
Stankiewicz ^{2,3}	215 ml	293 ml	
Levine ⁴	—	—	65-120 ml
Schaefer ⁵	—	—	77 ml
Hoffman ⁶	—	—	129 ml
Klaus Jacobi ⁷	—	100-198 ml	
Our study			
• Control group	220 ml	278 ml	
• Study group	53 ml	84 ml	

thrombosis. It should be used with caution in patients with hematuria as renal system clots can cause intrarenal obstruction. However, these considerations are not very relevant in the setting of our study as our use was strictly short-term perioperative.

The aim of our study was to see, if tranexamic acid given as a short-term dose reduced blood loss in endoscopic nasal surgeries. The methods used to measure blood loss are categorized into visual estimation, direct measurement, gravimetric, photometry and miscellaneous.⁸ A combination of direct measurement and gravimetric methods are the most practical. Photometry is not only the most precise but also the most expensive and complex to use. A variety of miscellaneous methods are presented, but none is a practical or reliable method. Visual assessment of blood loss taken singly is often reported to be inaccurate. However, no surgeon can underestimate its practical importance. Consequently, when taken in conjunction with other reliable methods, it may serve as a useful indicator of blood loss. It is noteworthy that not only is the total blood loss of relevance in endoscopic nasal surgeries but also the visibility of the operative field. We used the following parameters to measure intraoperative blood loss:

1. Visibility of field of surgery
2. Weight of blood swabs postoperatively
3. Amount of blood from suction machine.

The use of tranexamic acid caused 72.48% ($p < 0.05$) decrease in blood loss.

Since there was no change in the postoperative coagulation profile, no lasting systemic or hemodynamic

effects are to be feared. We had no significant side effects due to the use of tranexamic acid in our study. None of the patients exhibited diarrhoea, vomiting, nausea, dizziness, and hypotension or color vision disturbances.

We preferred to use local anesthesia in our patients. Topical 4% xylocaine and xylometazoline were used for preoperative preparation of nose followed by injection of 2% xylocaine with adrenaline. We used general anesthesia for extensive nasal pathologies and uncooperative patients. We did not use hypotensive anesthesia. Tranexamic acid was seen to be effective in both local and general anesthesia. Tranexamic acid may cause hypotension during rapid intravenous administration. However, good blood pressure control during its administration did not give us this problem. Table 1 gives the estimated blood loss in our study and Table 2 shows the blood loss during endoscopic sinus surgery as reported in the literature.

CONCLUSION

Poor visibility is one of the biggest bugbears of endoscopic nasal surgeries. Any method which improves the quality of the operative field in addition to decreasing the total blood loss would be worth considering.

Tranexamic acid by virtue of its overall systemic safety and lack of alteration of coagulation parameters seems to be an inexpensive way of achieving this. Using tranexamic acid, we did not need to employ hypotensive anesthesia in any patient. Tranexamic acid reduced blood loss by 72.48% ($p < 0.05$) in our study. This seems significant and the advantages are obvious. However, more study is probably required to validate the efficiency of this drug. Protocols of administration can then be further refined. We hope our study can provide a simple yet effective control for intraoperative control of bleeding in endoscopic nasal

surgeries. Considering the presence of tranexamic acid in the serum for 7 to 8 hours, it may also serve as a postoperative control of bleeding. This would be a worthwhile point to investigate by further studies.

SUMMARY

- Tranexamic acid decreases blood loss by 72.48% ($p < 0.05$) even in absence of hypotensive anesthesia and irrespective of the type of anesthesia used
- Tranexamic acid reduces capillary oozing, thus increases operative field visibility. It does not alter the coagulation profile and no lasting systemic or hemodynamic effects were seen in our study
- Tranexamic acid may well be an efficient and cheap method to control bleeding during endoscopic nasal surgery.

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