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Effect of Systemic Tranexamic Acid on Intraoperative Bleeding During Tonsillectomy

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Abstract

This study was conducted to assess the efficacy of tranexamic acid given preoperatively in controlling the bleeding during tonsillectomy. A total of 50 patients who underwent tonsillectomy were randomized into two groups Group 1 was given intravenous tranexamic acid preoperatively with dose of 15mg/kg. Group 2 tranexamic acid was not given. Intraoperative quantity of bleeding was noted in each case. Decreased quantity of bleeding was noted in the study group and the p-value was <0.05, which was statistically significant, when compared to control group. No side effects were observed. Single IV dose of tranexamic acid at a dose of 15mg/kg preoperatively is effective in controlling of tonsillectomy bleeding.

INTRODUCTION

Control of bleeding is an important part of tonsillectomy. It is a life-threatening complication. Post tonsillectomy too, hemorrhage become a risk due to airway obstruction, shock and ultimately death, if not diagnosed early or inappropriate treatment^[1].

Tranexamic acid is a synthetic derivative of the amino acid lysine that shows its antifibrinolytic effect through the reversible blockage of lysine binding sites on plasminogen molecules and thereby inhibiting the interaction of plasminogen and the heavy chain of plasmin with lysine residues on the surface of fibrin. The drug has no effect on blood coagulation parameters^[2,3]. Decreased fibrinolysis by tranexamic acid is due to reduction of D-dimer levels in blood.

This drug is used successfully in various surgical procedures to reduce the quantity of bleeding (e.g. cesarean section^[4,5], prostatectomy)^[6].

MATERIALS AND METHODS

Fifty patients who underwent tonsillectomy at Mamata Medical College, Khammam from JULY 2022 to JUNE 2023 were included in the study, after taking informed consent and clearance from ethical committee.

Inclusion Criteria: All patients of chronic tonsillitis who come under paradise criteria were included in the study.

Exclusion Criteria:

- Patients undergoing adenotonsillectomy
- Allergy to tranexamic acid
- Participation in other clinical trials
- Preoperative use of anticoagulant therapy within 5 days of surgery
- Fibrinolytic disorders requiring intraoperative antifibrinolytic treatment
- Hematological disorders

In this study 25 patients were given preoperative intravenous tranexamic acid of dose 15mg/kg, 2 hours before surgery. Another 25 patients who were kept as a control group were not given tranexamic acid.

For uniformity tonsillectomy was performed under GA and dissection and snare procedure done. Same surgeon has operated on all 50 patients. Gravimetric method and blood collected in suction jar are used for measuring blood loss.

Gravimetric method of measurement correlates well with the colorimetric method and it is accurate to measure intraoperative blood loss^[7]. The content in the suction jar is poured into the measuring cylinder and the lower fluid meniscus after the foam has settled was noted for the measurements. For weighing,

an electronic weighing scale with ISI mark of HMT company was used. Gauze pieces and swabs used for the tonsillectomy were weighed before surgery. All the blood-stained gauze pieces and swabs after surgery are weighed again and the difference was taken as the quantity of bleeding with the conversion of 1gm=1ml of blood^[8]. All the readings were tabulated and analysed. Tests of statistical significance were applied and the results were arrived at.

RESULTS AND DISCUSSIONS

A total of 50 patients who underwent tonsillectomy at Mamata Medical College, Khammam from JULY 2022 to JUNE 2023 were included in the study. Patients were selected on random basis. All the patients underwent dissection and snare method.

The mean age group is 13.5 to 14.5 years. There is no significant difference noted with regards to sex distribution, who are undergoing tonsillectomy.

The mean blood loss in the study group is 66.12ml and in the control group is 106.84ml. On applying unpaired t-test, we got a value of 2.65, suggesting a p-value of <0.05. Analysis of variance (ANOVA) is a statistical technique used to check if means of two or more groups are significantly different from each other. ANOVA checks the impact of one or more factors by comparing the means of different samples. No complications observed in both study and control groups. Adverse effects of tranexamic acid are not noted.

Thus, it is concluded that preoperative intravenous tranexamic acid given at a dose of 15mg/kg/BW significantly reduces tonsillectomy bleeding intraoperatively.

Tonsillectomy is a simple procedure but complications associated with it are high. The main complication is hemorrhage. During tonsillectomy bleeding occurs, resulting in hemodilution and initiation of both coagulation system and fibrinolytic system by releasing tissue plasminogen activator. Plasminogen is a single chain serine protease characterized by an active site and five kringle domains, four of which bind to lysine residues in interacting molecules. Tranexamic acid reversibly blocks the lysine binding sites of plasminogen, thus preventing its activation to plasmin and therefore stopping the lysis of fibrin resulting in control of bleeding during tonsillectomy surgery.

The study done in prostatectomy showed reduced blood loss of 52.94% with tranexamic acid. In orthopedic and cardiac surgeries, like total knee replacement^[9] and coronary bypass^[10] also use of tranexamic acid showed reduced blood loss of 45.32% and 39.81% respectively. In endoscopic sinus surgery in children done by Eldaba,^[11] it has been shown that single IV dose of tranexamic acid improves quality of

Table 1: 50 Patients who underwent tonsillectomy

Variables	Groups	n	Mean (ml)	Standard Deviation	Unpaired t Test
Blood loss	Study group	25	66.12	40.95	2.65
Blood loss	Control group	25	106.84	64.72	P<0.01

Table2: Study Group

Age (Years)	n	Mean (ml)	Standard Deviation	A nova
<10	2	49.50	43.13	F=0.59NS
10-15	17	63.65	39.79	
15-20	3	62.67	14.19	
>20	3	94.67	68.98	

NS=Nonsignificant

Table 3: Control Group

Age (Years)	n	Mean (ml)	Standard Deviation	A nova
<10	7	96.29	48.84	F=0.73NS
10-15	11	97.19	78.88	
15-20	1	130.70		
>20	6	160.82	53.93	

NS = Nonsignificant

surgical field and reduces duration of surgery and intraoperative bleeding.

Besides surgeries tranexamic acid is used to control bleeding in certain nonoperative conditions with a lot of success such as controlling upper gastrointestinal bleeding^[12] and menorrhagia^[13].

In this study, the efficacy of administering preoperative intravenous tranexamic acid in reducing intraoperative tonsillectomy bleeding was examined. There was a significant decrease in the volume of bleeding observed in the study group when compared to the control group.

The dose of tranexamic acid used in the present study was within the dose range previously found effective. It has been proposed that therapeutic plasma concentration of tranexamic acid is 5 to 10 mg/L and is maintained for approximately 3 hours. Considering the relative short duration of tonsillectomy procedure, we assumed that a single intravenous bolus dose of tranexamic 15 mg/kg/BW would fulfil the goal.

Tranexamic acid by its antifibrinolytic property inhibits the breakdown of clot formed around the oozing capillaries and small blood vessels and thus prevents intraoperative and postoperative hemorrhages^[14]. Usually, the formed clots naturally resolves on its own without hampering the vascular retraction and the tranexamic acid might act on the smooth muscle cells of the capillaries and small blood vessels causing contraction and retraction and helps in arresting of bleeding^[15]. In our study, none of the cases had any complications of large clot formation or dislodgement of clot.

CONCLUSION

Single dose of preoperative intravenous tranexamic acid of dose 15mg/kg is effective in controlling intraoperative tonsillectomy bleeding.

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