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Original Research Article

Role of tranexamic acid as an adjunctive for chronic sub dural hematoma for early resolution and reduced recurrence rate: a prospective case-control study

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ABSTRACT

Background: Literature shows the effective use of tranexamic acid to reduce CSDH either as a primary treatment or as an adjunctive treatment. However, literature lacks conclusive evidence on the use of tranexamic acid for CSDH. There are not many Indian studies also on this subject. This study was aimed at finding the effectiveness of tranexamic acid in reducing the recurrence rate following surgery and early resolution.
Methods: From May 2023 to May 2024, single centric case control study was done in a tertiary care center (Government Mohan Kumaramangalam medical college hospital, Salem) in Southern India. All patients with chronic subdural hematoma with Markwalder grading 2-4 and grade 1 with midline shift more than 1 cm were included in the study. Patients with severe cardio-cerebrovascular disease, patients with allergy to tranexamic acid and patients not willing to participate were excluded from the study. Tranexamic acid was given at a dose of 500 mg twice a day for 10 days. Patients were allocated into two groups: group A: where tranexamic acid was used, group B: where tranexamic acid was not used.
Results: The mean duration of hospital stay was lesser in tranexamic acid group ($p<0.005$). The mean SDH thickness was lesser at 4th and 8th week in tranexamic acid group ($p<0.005$). Recurrence rate was lesser in tranexamic acid group at three months ($p>0.05$).
Conclusions: This study of patients with CSDH showed that the adjunctive use of TXA after burr-hole drainage is effective in achieving resolution of CSDH through faster hematoma reduction. TXA may have a favorable effect in reducing recurrence and can be administered safely in selected patients.

Keywords: Tranexamic acid, CDSH, Case-control study, South India

INTRODUCTION

Elderly population are affected by various medical and surgical issues. Chronic subdural hematoma is one of the common surgical issues faced by the senior population with an annual incidence of 1.7-58/100000 people. The incidence is increasing as elders are being increasingly treated with anticoagulant and antiplatelet drugs.[1-4] This incidence can be reduced through surgery though incidence of recurrent hematoma is up to 30%.[5-7] The main strategy is recurrent surgery though medical management through adjunctive use of multiple drugs.[4] A synthetic derivative of lysine, tranexamic acid is utilised to decrease the incidence of bleeding in surgery and trauma.[8]

A small cohort study showed to reduce CSDH by using tranexamic acid.[9] Literature shows the effective use of this drug to reduce CSDH either as a primary treatment or as an adjunctive treatment.[10,11] However, literature lacks

conclusive evidence on the use of tranexamic acid for CSDH. There are not many Indian studies also on this subject. This study was aimed at finding the effectiveness of tranexamic acid in reducing the recurrence rate following surgery and early resolution.

METHODS

From May 2023 to May 2024, single centric case-control study was done in a tertiary care center (Government Mohan Kumaramangalam medical college hospital, Salem) in Southern India.

Ethical committee approval was obtained from the institutional ethics committee. All patients with chronic subdural hematoma with Markwalder grading 2-4 and grade 1 with midline shift more than 1 cm were included in the study.

Patients with severe cardio-cerebrovascular disease, patients with allergy to tranexamic acid and patients not willing to participate were excluded from the study.

A sample size of 25 in each group were selected based on 80% power (95% CI) with a ratio of cases to controls being one. Openepi software was used for the sample size calculation.

Patients were allocated into two groups: Group A: where tranexamic acid was used, group B: where tranexamic acid was not used. Subjects were unmatched.

Tranexamic acid was given at a dose of 500 mg twice a day for 10 days.

All data was collected in Microsoft excel, data was cleaned and analyzed using IBM SPSS v23. Frequency and percentage analysis was done for categorical variables. Mean and standard deviation was measured for continuous variables. Chi-square analysis was done for comparing categorical variables. Student t-test was used to compare continuous variables between two groups. Statistical significance was set at 0.05.

RESULTS

The mean age of 2 groups is comparable (p>0.05) (Table 1). Table 2 show that gender distribution in 2 groups is similar (p>0.05). Mean duration of hospital stay lesser in tranexamic acid group (p<0.005) (Table 3).

Mean SDH thickness was lesser at 4th and 8th week in tranexamic acid group (p<0.005) (Table 4). Recurrence rate was lesser in tranexamic acid group at 3 months (p>0.05) (Table 5).

Table 1: Age distribution.

Variables	Age distribution (in years)		ANOVA	P value
	Non-tranexamic acid	Tranexamic acid		
N	25	25	0.001	0.974
Mean	59.48	59.44		
SD	4.1344	4.4729		
Minimum	52	48		
Maximum	68	68		
Median	60	60		

Table 2: Gender distribution.

Gender	Group		Total	Chi-square	P value
	Non-tranexamic acid	Tranexamic acid			
Female	5	2	7	1.495[a]	0.221
Male	20	23	43		
Total	25	25	50		

Table 3: Duration of stay.

Variables	Duration of stay		ANOVA	P value
	Non-tranexamic acid	Tranexamic acid		
N	25	25	49.688	0.000
Mean	11.44	8.8		
SD	1.4742	1.1547		
Minimum	10	8		
Maximum	14	12		
Median	12	8		

Table 4: Follow-up of SDH thickness.

Variables	SDH thickness at 48 hrs		SDH thickness at 10th POD		SDH thickness at 4 weeks		SDH thickness at 8 weeks	
	Non-tranexamic acid	Tran-examic acid	Non-tranexamic acid	Tran-examic acid	Non-tranexamic acid	Tran-examic acid	Non-tranexamic acid	Tran-examic acid
N	25	25	25	25	25	25	25	25
Mean	11.04	11.04	8.56	8.56	7.28	4.28	6.52	2.76
SD	1.0198	1.0198	0.9165	0.9165	0.8426	0.8426	0.5099	0.4359
Minimum	10	10	8	8	6	3	6	2
Maximum	12	12	10	10	8	5	7	3
Median	12	12	8	8	8	5	7	3
ANOVA	0.000		0.000		158.451		785.422	
P value	1.000		1.000		0.000		0.000	

Table 5: Recurrence at 3 months.

Recurrence at 3 months	Group		Total	Chi-square	P value
	Non-tranexamic acid	Tranexamic acid			
Positive	10	5	15		
No recurrence	15	20	35	24.73[a]	0.003
Total	25	25	50		

DISCUSSION

The study revealed that administration of tranexamic acid after CSDH surgery helped in early resolution and resorption of residual CSDH. Recurrence rate at three months was considerably lower in group that was administered tranexamic acid ($p<0.005$). Hence, it can be stated that the use of tranexamic acid reduces the rate of recurrence of subdural hematoma. This study also showed that the mean duration of hospital stay was reduced in the group that used tranexamic acid ($p<0.005$) and the mean SDH thickness was lesser at 4th and 8th week in tranexamic acid group ($p<0.005$). These findings are in agreement with the previous findings from the literature.[12,13] However, there are no large-scale studies to validate these findings.[14] In spite of low evidence in literature in support of using tranexamic acid, its role in reducing recurrence and hastening resolution is observed. This study of patients with CSDH showed that the adjunctive use of TXA after burr-hole drainage is effective in achieving resolution of CSDH through faster hematoma reduction. TXA may have a favorable effect in reducing recurrence and can be administered safely in selected patients. To understand the pathogenesis of CSDH, it typically starts with an acute hematoma caused by minor trauma and venous injuries which triggers the inflammatory process in the subdural space. CSDH is considered as angiogenic disease. Inflammation plays the key role in it. Plasmin, activated by a tissue plasminogen activator, key role in pathophysiology of CSDH. Fibrinolytic system is activated by plasmin, which promotes liquefaction and expansion of CSDH. Plasmin also activates kallikrein system which enhances inflammation and vascular permeability. Tranexamic acid a synthetic analog of lysine, causes inhibition of plasminogen activator and plasmin leads to antifibrinolytic effect in addition it reduces increased vascular permeability of CSDH by inhibiting the fibrinolytic activity resulting in resolution of hematoma.

Limitations

The study is single centric with smaller sample size. The duration of study is short. The cases and controls were unmatched. Better insights can be derived from multicentric large sample longitudinal studies with matched cases and controls.

CONCLUSION

This study of patients with CSDH showed that the adjunctive use of TXA after burr-hole drainage is effective in achieving resolution of CSDH through faster hematoma reduction. TXA may have a favorable effect in reducing recurrence and can be administered safely in selected patients.

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