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Study of efficacy of tranexamic acid in reducing perioperative blood loss in orthopedic surgeries

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Abstract
Introduction: Majority of the orthopedic surgeries are associated with significant blood loss due to the large amount of cut bone, soft tissue dissection, and prolonged operation time.
Aims and Objectives: To study efficacy of tranexamic acid in reducing perioperative blood loss in orthopedic surgeries.
Methodology: This was a cross-sectional study carried out in the patients undergoing the various orthopedic surgeries where more blood lost is anticipated during the one year period i.e. February 2018 to February 2019.
Group A: Given tranexamic acid (TXA) intravenously.
Group B: Given no any special drugs except routine management of patient. The statistical analysis was done by chi-square test and unpaired t-test SPSS 19- version software.
Result: In our study we have found The average age in both the groups was comparable i.e. 43.12±3.45 and 42.98±4.18 (p>0.05, t=0.98, df=48) and the male to female composition was also comparable i.e. 2.12:1 and 3.16:1 (X^2=0.09, p>0.05,df=1). Pre-operative HB (mean ± SD)-12.98± 2.76 and 13.27± 1.76 (p>0.05,t=0.76,df=48); Pre-operative HC (mean ± SD)- 35.78±3.45 and 36.12±.76 (p>0.05,t=0.26,df=48) was comparable but the Post-operative HB(mean ± SD) was 10.87± 2.73 and 9.12±1.73 (P<0.01,t=4.29,df=48); Post-operative HC (mean ± SD)- 34.87±3.48 and 33.19± 2.65 (P<0.001,t=5.32,df=48); Post-operative blood lost in ml (mean ± SD)- 749± 43.78 and 457±39.19 (P<0.0001,t=9.87,df=48) was significantly differed in Group A as compared to Group B**.**
Conclusion: It can be concluded form our study that the patients who received TXA were significantly less blood lost peri-operatively assessed by the various parameters like post-operative HB, HC, blood lost.

Keywords: Tranexamic acid (TXA), HB (Hemoglobin), HC (Hematocrit)

Introduction

Majority of the orthopedic surgeries are associated with significant blood loss due to the large amount of cut bone, soft tissue dissection, and prolonged operation time [1–3]. Surgical bleeding may require allogenic blood transfusions and the risk of serious adverse transfusion reactions may increase [4, 5]. Besides, transfusions can cause damage to vital organs and coagulopathy. Another concern regarding perioperative bleeding specially during spine surgery is the risk of spinal epidural hematoma formation, which might lead to spinal cord or cauda equina compression [6, 7]. Therefore, controlling perioperative bleeding and reducing exposure to allogeneic blood have become important for spine surgeons. Several techniques have been used to reduce bleeding, and consequently, reduce the frequency of exposure to allogeneic transfusions: controlled hypotension, regional anesthesia, autologous blood transfusion, intraoperative blood salvage, and administration of various medications [8]. Tranexamic acid (TXA) is a synthetic antifibrinolytic drug derivative of a lysine-binding site of plasminogen; it inhibits plasminogen from binding to fibrin and suppresses fibrinolysis [9]. Here we have studied the effectiveness of TXA for the control of Preoperative bleeding in orthopedic surgeries where much blood lost is anticipated.

Methodology: This was a cross-sectional, prospective study carried out in the patients undergoing the various orthopedic surgeries where more blood lost is anticipated during the one year period i.e. February 2018 to February 2019 by taking written and explained consent so during the one year period 50 patients were enrolled to study by all anesthetic and physicians required protocols. Out of them 25 included.

Group A: Given tranexamic acid (TXA) intravenously.
Group B: Given no any special drugs except routine management of patient. The Investigations like –HB, Hematocrit were carried out pre-operatively and post operatively. The post-operative blood lost was measured by dry and wet mop method and measurement of drain for 24 hours. The statistical analysis was done by chi-square test and unpaired t-test SPSS 19- version software.

Result

Table 1: Distribution of the patients as per the age and sex

	Group A (n=25)	Group B (n=25)	p-value
Average Age (mean ±SD)	43.12±3.45	42.98±4.18	p>0.05,t=0.98,df=48
Sex			X^2=0.09,p>0.05,df=1
Male	17	19	
Female	8	6	

The average age in both the groups was comparable i.e. 43.12±3.45 and 42.98±4.18 (p>0.05, t=0.98, DF=48) and the male to female composition was also comparable i.e. 2.12:1 and 3.16:1 (X^2=0.09, p>0.05, df=1).

Table 2: Distribution of the patients as per the peri-operative blood lost in both the groups

Peri -operative blood lost	Group A (n=25)	Group B (n=25)	p-value
Pre-operative HB (mean ± SD)	12.98± 2.76	13.27± 1.76	p>0.05,t=0.76,df=48
Pre-operative HC (mean ± SD)	35.78±3.45	36.12± 2.76	p>0.05,t=0.26,df=48
Post-operative HB(mean ± SD)	10.87± 2.73	9.12±1.73	P<0.01,t=4.29,df=48
Post-operative HC (mean ± SD)	34.87±3.48	33.19± 2.65	P<0.001,t=5.32,df=48
Post-operative blood lost in ml (mean ± SD)	749± 43.78	457±39.19	P<0.0001,t=9.87,df=48

Pre-operative HB (mean ± SD)-12.98± 2.76 and 13.27± 1.76 (p>0.05,t=0.76,df=48); Pre-operative HC (mean ± SD)- 35.78±3.45 and 36.12± 2.76 (p>0.05,t=0.26,df=48) was comparable but the Post-operative HB(mean ± SD) was 10.87± 2.73 and 9.12±1.73 (P<0.01,t=4.29,df=48); Post-operative HC (mean ± SD)- 34.87±3.48 and 33.19± 2.65 (P<0.001,t=5.32,df=48); Post-operative blood lost in ml (mean ± SD)- 749± 43.78 and 457±39.19 (P<0.0001,t=9.87,df=48) was significantly differed in Group A as compared to Group B.

Discussion: The measures to reduce perioperative blood lost; these include the use of tranexamic acid (TXA), epinephrine, fibrin glue, Floseal hemostatic matrix, and transfusion. TA is gaining wide attention from surgeons because of its low cost, easy access and use, and is a medication which is widely known in the literature [10]. Considering this scenario, studies on the clinical effectiveness of TA in reducing blood loss during TKA are extremely important, since there is no consensus regarding the best application protocol or dosage in the current literature [11].
TA, which is a synthetic antifibrinolytic agent, contains the Trans isomer of 4-amino-carboxylic methyl cyclohexane (Transamin), a synthetic derivative of the amino acid lysine [12, 13]. Which acts through competition to inhibit the activation of plasminogen to plasmin. This formula has a strong attraction to the site where lysine connects to the plasminogen and plasmin, thus inhibiting the activation and competing action of plasmin. Its action is primarily based on slowing down the fibrinolytic process (it is a potent inhibitor of the fibrinolytic action of plasmin) after clot formation, extending the time of dissolution of the fibrin network, thus preserving the clot and not resulting in the activation of the coagulation cascade. These properties increase the efficiency of the hemostatic substance, reducing the intensity and the risks of bleeding in surgical procedures, trauma and diseases where bleeding is likely [12, 14]. TA has rapid absorption of approximately 90% of an intravenous dose excreted in the urine in 24 hours, a plasma half-life of approximately 2 hours, and therapeutic levels maintained for 6-8 hours [10, 15].
In our study we have found The average age in both the groups was comparable i.e. 43.12±3.45 and 42.98±4.18 (p>0.05, t=0.98, df=48) and the male to female composition was also comparable i.e. 2.12:1 and 3.16:1 (X^2=0.09, p>0.05, df=1).
Pre-operative HB (mean ± SD)-12.98± 2.76 and 13.27± 1.76 (p>0.05,t=0.76,df=48); Pre-operative HC (mean ± SD)- 35.78±3.45 and 36.12± 2.76 (p>0.05,t=0.26,df=48) was comparable but the Post-operative HB(mean ± SD) was 10.87± 2.73 and 9.12±1.73 (P<0.01, t=4.29,df=48); Post-operative HC (mean ± SD)- 34.87±3.48 and 33.19± 2.65 (P<0.001, t=5.32,df=48); Post-operative blood lost in ml (mean ± SD)- 749± 43.78 and 457±39.19 (P<0.0001, t=9.87, df=48) was significantly differed in Group A as compared to Group B.
These findings are similar to B. Hari Krishnan [16] *et al*. they found Out of 168 patients, who underwent TKA in our centre during the period of the study, 100 were included in the study, 50 patients were included in placebo group and 50 patients were included in TXA group. There was a statistically significant reduction in the use of transfusion (Fisher exact test; P=0.001). A total of 46 units of blood were used; 42 units transfused to participants in the placebo group and only 4 units transfused to participants in the TXA group and less change in the parameters like HB and HC

Conclusion

It can be concluded form our study that the patients who received TXA were significantly less blood lost peri-operatively assessed by the various parameters like post-operative HB, HC, blood lost.

References

1. Neilipovitz DT, Murto K, Hall L, Barrowman NJ, Splinter WM. A randomized trial of tranexamic acid to reduce blood transfusion for scoliosis surgery. Anesth Analg. 2001; 93:82-7.
2. Sethna NF, Zurakowski D, Brustowicz RM, Bacsik J, Sullivan LJ, Shapiro F *et al*. Tranexamic acid reduces intraoperative blood loss in pediatric patients undergoing scoliosis surgery. Anesthesiology. 2005; 102:727-32.
3. Wong J, El Beheiry H, Rampersaud YR, Lewis S, Ahn H, De Silva Y *et al*. Tranexamic Acid reduces perioperative blood loss in adult patients having spinal fusion surgery. Anesth Analg. 2008; 107:1479-86.
4. Nuttall GA, Horlocker TT, Santrach PJ, Oliver WC Jr,

Dekutoski MB, Bryant S *et al*. Predictors of blood transfusions in spinal instrumentation and fusion surgery. Spine (Phila Pa 1976). 2000; 25:596-601.
5. Seicean A, Alan N, Seicean S, Neuhauser D, Weil RJ. The effect of blood transfusion on short-term, perioperative outcomes in elective spine surgery. J Clin Neuron sci. 2014; 21:1579-85.
6. Kebaish KM, Awad JN. Spinal epidural hematoma causing acute cauda equina syndrome. Neurosurg Focus. 2004; 16:e1.
7. Sokolowski MJ, Garvey TA, Perl J 2nd, Sokolowski MS, Cho W, Mehbod AA *et al*. Prospective study of postoperative lumbar epidural hematoma: incidence and risk factors. Spine (Phila Pa 1976). 2008; 33:108-13.
8. Cardone D, Klein AA. Perioperative blood conservation. Eur J Anaesthesiol. 2009; 26:722-9.
9. Hardy JF, Bélisle S. Natural and synthetic antifibrinolytics: inert, poisonous or therapeutic agents? Can J Anaesth. 1997; 44:913-7.
10. Kim TK, Chang CB, Koh IJ. Practical issues for the use of tranexamic acid in total knee arthroplasty: a systematic review. Knee Surg Sports Traumatol Arthrosc off J ESSKA. 2014; 22(8):1849-58.
11. Fu Y, Shi Z, Han B, Ye Y, You T, Jing J *et al*. Comparing efficacy and safety of 2 methods of tranexamic acid administration in reducing blood loss following total knee arthroplasty. Medicine (Baltimore). 2016; 95(50):e5583.
12. Dunn CJ, Goa KL. Tranexamic acid: a review of its use in surgery and other indications. Drugs. 1999; 57(6):1005-32.
13. Pachauri A, Acharya KK, Tiwari AK. The effect of tranexamic acid on hemoglobin levels during total knee arthroplasty. Am J Ther. 2014; 21(5):366-70.
14. Jadad AR, Moore RA, Carroll D, Jenkinson C, Reynolds DJ, Gavaghan DJ *et al*. Assessing the quality of reports of randomized clinical trials: is blinding necessary? Control Clin Trials. 1996; 17(1):1-12.
15. Hoylaerts M, Lijnen HR, Collen D. Studies on the mechanism of the antifibrinolytic action of tranexamic acid. Biochim Biophys Acta. 1981; 673(1):75-85.
16. B. Hari Krishnan, Akshay Pushkar. A study of efficacy of tranexamic acid in reduction of blood loss in primary total knee arthroplasty. Int J Res Orthop. 2018; 4(2):309-314.