

Hemiarthroplasty of Hip – A prospective study for Conservation of Blood Loss

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Abstract

Background: Hemiarthroplasty of hip joint is a very commonly performed surgery. Several studies have been done which support the use of tranexamic acid in total knee joint replacements and few in total hip replacements. These studies have shown interesting positive results, but its benefits in hemiarthroplasty of hip joint have not yet widely known. This study aims to establish the role of tranexamic acid in reducing the intra and post-operative bleeding in case of hemiarthroplasty of hip.

Material and Methods: This is a prospective study of thirty four patients who underwent hip hemiarthroplasty for fracture neck of femur. The patients were divided as treatment (Group A; n=17) and control (Group B; n=17) group. All the patients were alternatively assigned these two groups. In group A, the patients who underwent surgeries around hip joint were given a bolus dose of tranexamic acid intravenously 10mg/kg body weight about 10 minutes before starting skin incision and in group B, equal volume of normal saline was injected. Total blood loss during surgery was calculated by weighing the mops used and soiled by blood and measuring the volume of blood accumulated in suction apparatus used for the surgery. Pre and postoperative haemoglobin levels were compared. The volume of fluid accumulated in the post-operative suction drain was also recorded and the data collected were analysed.

Results: The treatment group showed intra operative blood loss of <600ml in 64.7% of patients and none lost >1000ml blood. Drain fluid after twenty four hours was <100 ml in 70.6% and >150ml only in one (5.9%). The difference in pre and post-operative Hb levels was <1gm in 76.5% of patients.

Conclusion: Tranexamic acid given intravenously before surgical skin incision is very effective in conserving bleeding during hip hemiarthroplasty; the drug is of significant advantage as compared to the control group.

Key words: Hemiarthroplasty, Blood loss, Tranexamic acid

Access this article online	
Quick Response Code:	Website: www.innovativepublication.com
	DOI: 10.5958/2395-1362.2016.00027.X

Introduction

Fracture neck of femur is the commonest fracture around hip joint and occurs commonly in geriatric patients with osteoporosis^[1,2] and other comorbid conditions like reduced hemoglobin level. It is most commonly treated by Hemiarthroplasty which usually result in considerable blood loss which in turn increases the mortality and morbidity in these patients. The blood loss in various elective surgeries results in blood transfusion rates that depend on specific surgery and may vary from 11% to 65%^[3]. The transfusion of blood is associated with various complications. Its resource is rare and is expensive. The risk of infection, immune suppression, allergic manifestations, anaphylaxis, volume over load, transfusion related lung injury and graft versus host reactions etc. is also common even in case of compatible blood transfusions. The packed red cells transfusion can cause coagulopathy and hypothermia. There are few groups of people, who deny

blood transfusion due to personal and some religious beliefs^[4]. Hence it is advisable to reduce the need for blood transfusions. The excellent outcome for surgeries around hip requires adequate intra operative haemostasis in order to reduce operative time and avoid formation of wound haematoma. Gaining satisfactory post-surgical range of movement also depends on soft tissue wound hemostasis. Continued bleeding even after surgery can result in pain, seroma formation, wound hematoma and arthrofibrosis of involved joint resulting in sub-optimal outcome with surgeries^[5]. Hence consideration to minimise operative blood loss is important. Tranexamic acid is a very well accepted hemostatic drug in menorrhagia, epistaxis, dentistry, haemophilia patients and also during coronary artery bypass graft surgery^[6]. There are several studies supporting the use of tranexamic acid in total knee joint replacements^[7]. This study was conducted to know the usefulness of tranexamic acid in reducing the intra and post-operative bleeding in this commonly performed surgery in hip.

Material and Methods

This is a prospective study of a total number of thirty four subjects who were enrolled for the study and underwent hemiarthroplasty of hip. A written and informed consent for inclusion in the study was collected from all the patients. The patients were alternatively allotted to the treatment group (Group A) and control

group (Group B). All the patients were assessed for their haemoglobin levels preoperatively. In 17 subjects of treatment group, a single dose of tranexamic acid 10milligram per Kg body weight was given by intravenous route, about 10 minutes before skin incision. The control group comprising of the remaining 17 subjects were not given tranexamic acid injection but were injected equal volume of saline instead.

Inclusion criteria:

- Age more than 50 years
- Hemoglobin level at least 10mg/dl
- Subject ambulatory before the fracture

Exclusion criteria:

- Renal failure
- Upper gastrointestinal bleeding
- Subarachnoid bleed
- Acquired defect in colour vision

Injection of tranexamic acid was given in a dose of 10mg/kg body weight as bolus injection (group A) administered by slow intravenous route over five minutes. The respiratory rate, heart rate and blood pressure were measured and recorded for all the cases both intra and post operatively. The same brand of the drug from a well reputed company was utilised in all the cases so as to reduce the brand related bias for the drug and for standardization. Intraoperative loss of blood was measured by weighing the mops used and soiled by blood, while mopping the wound (**Fig. 1**) and measuring the amount of blood collected in suction apparatus used during the surgery (**Fig. 2**). A suction drain was kept in all the patients before wound closure (**Fig. 3**). The samples of venous blood were drawn from all the cases both pre and post operatively to compare haemoglobin levels. The drain fluid accumulated in the suction drain postoperatively was also measured after 24 hours and also after 48 hours when the drain was removed. All the cases were followed up until they were either discharged from hospital or the operative wound sutures were removed.



Fig.1: Mopping of wound



Fig. 2: Continuous suction



Fig. 3: Fixing suction drain

Results

There were thirty four patients in this study cohort of which, 17 patients received tranexamic acid and hence assigned to group A and remaining 17 patients who were not given the drug were assigned to control group B. (**Table 1**). In the treatment group out of 17 patients, 11

(64.7%) had blood loss of less than 600ml and none had a blood loss of more than 1000ml; (Table 2) whereas in control group out of 17 patients, only 2 (11.8%) had blood loss of less than 600ml and 2 (11.8%) had blood loss of more than 1000ml (Fig. 4).

Table 1: Distribution of patients

Study Group	Patients	Percentage
A (treatment)	17	50
B (control)	17	50
Total	34	100

Table 2: Intraoperative blood loss during hemiarthroplasty

Blood loss (ml)	Group A	Group B	Total
<600	11	02	13
600-700	03	01	04
700-800	01	03	04
800-900	01	05	06
900-1000	01	04	05
>1000	00	02	02
Total	17	17	34

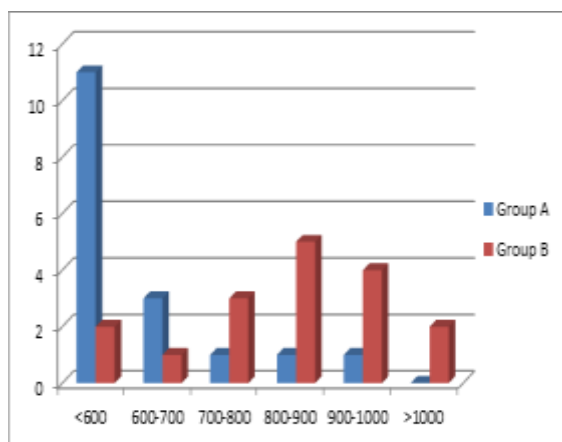


Fig. 4: Intraoperative blood loss (ml)

Drain was used in all the patients and blood loss during first postop day was measured using the amount of drain fluid (Table 3). In the treatment group out of 17, 12 (70.6%) had less than 100ml of blood loss during surgery and only one (5.9%) had a loss of more than 150ml. whereas in control group out of 17, 47.0% (8) had more than 150ml loss and only 23.5% (4) had a loss of less than 100ml (Fig. 5).

13 out of 17 in the treatment group (76.5%) had a difference in haemoglobin levels of less than 1gm% pre and postoperatively whereas 12 out of 17 in control group (70.6%) had a difference of up to 2gm% and 3 out of 17 had a difference of even more than 2gm% (Table 4).

Table 3: Drain fluid one day (24 hrs) after surgery

Drain(ml)	Group A	Group B	Total
Upto 50	03	00	03
50-100	09	04	13
100-150	04	05	09
>150	01	08	09
Total	17	17	34

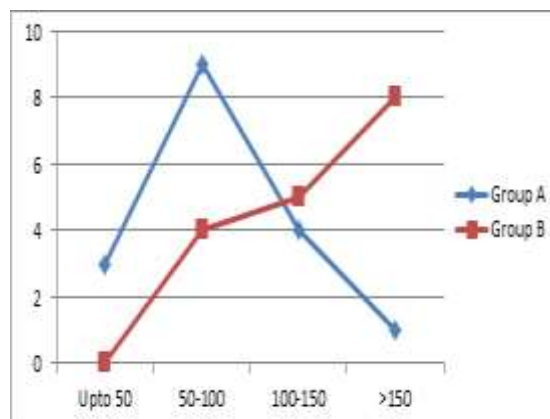


Fig. 5: Postoperative drain (ml) after 24 hrs

Table 4: Difference between Pre and Post-operative hemoglobin level

Pre-Postop Hb%	Group A	Group B	Total
≤1	13	02	15
1.1-2	04	12	16
>2	00	03	03
Total	17	17	34

Discussion

Fracture neck of femur is the commonest fracture which is operated upon around hip joint. The hip joint is thickly covered by muscles surrounding it and they have enormous blood supply through muscular branches. A lot of tissue injury is unavoidable during surgery for hemiarthroplasty causing Intraoperative bleed. Hence a method to reduce this intraoperative bleed would benefit the patient and surgeon. Surgical trauma activates both procoagulative factors and fibrinolysis^[8]. Tissue injury results in release of enzymes, mainly tPA [tissue plasminogen activator] which activates the fibrinolytic system in body^[9]. The effect of this fibrinolytic system is maximum during surgery and in early postoperative period.

Tranexamic acid acts as an anti fibrinolytic and by competitive inhibition it prevents the formation of plasmin from plasminogen and thus prevents dissolution of clot. Tranexamic acid has a half-life of 180 minutes hence can act throughout the surgical procedure. These results of our study reveal significantly less intraoperative bleeding and are in comparison to the study of Jashwant Singh et al.^[10] In our series we found a significant decrease in the post-operative blood loss as well. Benoni G et al. have studied the amount of

haematomas formed when their patients were treated with tranexamic acid and those by placebo; and recorded no much difference in results.^[11] Significant difference was also found in the preoperative and post-operative haemoglobin levels. The role of tranexamic acid has also been studied in liver transplantation^[12] and tumor resection^[13,14].

Review of the orthopaedic literature regarding tranexamic acid indicates its role in knee arthroplasty^[15-17] and also in case of total hip arthroplasty^[18] whereas; data regarding its use in other orthopaedic surgeries is less common in our country^[19,20]. Therefore, we performed a study to examine the results of the effects of tranexamic acid in conserving blood loss. This study suggests that this drug helps to decrease the perioperative blood loss and in turn reduced transfusion requirements in patients who were given tranexamic acid. There were no complication such as deep vein thrombosis in our study contrary to the one suggested by P. J. Zufferey et al^[21] tranexamic acid does not help in clot formation but it just stabilizes the blood clot that has already formed and it also does not affect the fibrinolytic action in veins as revealed in the research by Hippala et al^[22].

Conclusion

Tranexamic acid given before surgery is safe and effective method to reduce perioperative bleeding during hemiarthroplasty of hip. Its use is not associated with any complications. It effectively reduces the requirement of blood transfusion thereby avoiding its related economic burden and complications. Hence its potential use in future may be evaluated in other surgeries as well.

References

- Dhanwal DK, Dennison EM, Harvey NC, Cooper C (2011) Epidemiology of hip fracture: world wide geographic variation. *Indian J Orthop* 45:15–22.
- Johnell O, Kanis JA (2006) An estimate of the world-wide prevalence and disability associated with osteoporotic fractures. *Osteoporos Int* 17:1726–1733.
- Feagan BG, Wong CJ, et al. transfusion practices for elective orthopaedic surgery *CMAJ* 2002;166(3):310.
- Vamvakas EC, Blajchman MA. transfusion-related immunomodulation (TRIM); an update. *Blood* 2007;21:327–48.
- Flohe S, Kobbe P et al. Immunological reactions secondary to blood transfusion. *Injury* 2007;38:1405–8.
- Mongan PD, Brown RS, Thwaites BG. Tranexamic acid and aprotinin reduce postoperative bleeding transfusions during primary coronary revascularization. *Anesth Analg*. 1998;87:258–65.
- Benoni G, Fredin H. Fibrinolytic inhibition with tranexamic acid reduces blood loss and blood transfusion after knee arthroplasty. A prospective, randomized, double blind study of 86 patients. *J Bone Joint Surg Br*. 1996;78:434–40.
- Dahl OE. The role of the pulmonary circulation in the regulation of coagulation and fibrinolysis in relation to major surgery. *J Cardiothorac Vasc Anesth* 1997;11:322–8.
- Kluft C, Verheijen JH, Jie AF, et al. The postoperative fibrinolytic shutdown: a rapidly reverting acute phase pattern for the fast-acting inhibitor of tissue-type plasminogen activator after trauma. *Scand J Clin Lab Invest* 1985;45:605–10.
- Jashwant Singh et al: TA on blood loss during total hip arthroplasty. *Journal of orthopaedic surgery* 2010;18(3):282–6.
- Benoni G, Fredin H, Knebel R, Nilsson P. Blood conservation with tranexamic acid in total hip arthroplasty: a randomized, double-blind study in 40 primary operations. *Acta Orthop Scand*. 2001 Oct;72(5):442–448.
- Dalmau A, Sabate A, Acosta F, Garcia-Huete L, Koo M, Sansano T, et al. Tranexamic acid reduces red cell transfusion better than aminocaproic acid or placebo in liver transplantation. *Anesth Analg*. 2000;91:29–34.
- Wu CC, Ho WN, Cheng SB, Yeh DC, Wen Mc, Liu TJ, et al. Perioperative parenteral tranexamic acid in liver tumor resection. *Ann Surg*. 2006;243:173–80.
- Amar D, Grant FM, Zhang H, Boland PJ, Leung DH, Healey JA. Antifibrinolytic therapy and perioperative blood loss in cancer patients undergoing major orthopedic surgery. *Anesthesiology*. 2003;98:337–42.
- Jansen AJ, Andreica S, Claeys M, D'Haese J, Camu F, Jochmans K. Use of tranexamic acid for an effective blood conservation strategy after total knee arthroplasty. *Br J Anaesth*. 1999 Oct;83(4):596–601.
- Mac Gillivray RG, Tarabichi SB, Hawari MF, Raouf NT. Tranexamic acid to reduce blood loss after bilateral total knee arthroplasty: a prospective, randomized double blind study. *J Arthroplasty*. 2011 Jan;26(1):24–8. Epub 2010 Feb 19.
- Orpen NM, Little C, Walker G, Crawford EJ. Tranexamic acid reduces early post-operative blood loss after total knee arthroplasty: a prospective randomised controlled trial of 29 patients. *Knee*. 2006 Mar;13(2):106–10.
- Ekback G, Axelsson K, Rytberg L, Bror E, Zill KL, Johan W, et al. Tranexamic acid reduces blood loss in total hip replacement surgery. *Anesth Analg*. 2000;91:1124–30.
- Tanaka N, Sakahashi H, Sato E, Hirose K, Ishima T, Ishii S. Timing of the administration of tranexamic acid for maximum reduction in blood loss in arthroplasty of the knee. *J Bone Joint Surg Br*. 2001 Jul;83(5):702–5.
- Veien M, Sørensen JV, Madsen F, Juelsgaard P. Tranexamic acid given intraoperatively reduces blood loss after total knee replacement: a randomized, controlled study. *Acta Anaesthesiol Scand*. 2002 Nov;46(10):1206–11.
- P. J. Zufferey, M. Miquet 1, et al: Tranexamic acid in hip-fracture surgery. *British Journal of Anaesthesia*(2010);104(1):23–30.
- Hippala S, Strid L, Wennerstrand M, Arvela V, Mantyla S, Ylmen J, et al. Tranexamic acid (Cyklokapron) reduces perioperative blood loss associated with total knee arthroplasty. *Br J Anaesth*. 1995;74:534–7.