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Dr. Md Jaanbasha
Associate professor, Deccan
College of medical sciences -
Hyderabad, Telangana, India

Dr. C Shamsundar
Professor and HOD, Department
of Orthopaedics, Deccan College
of Medical Sciences- Hyderabad,
Telangana, India

Dr. Lalitmohan
Professor, Department of
Orthopaedics, Deccan College of
medical sciences, Hyderabad,
Telangana, India

Corresponding Author:
Dr. Md Jaanbasha
Associate Professor, Deccan
College of Medical Sciences -
Hyderabad, Telangana, India

Role of tranexamic acid (TXA) administered locally into the surgical site intraoperatively in reducing the post-operative blood loss in hip Arthroplasty

Dr. Md Jaanbasha, Dr. C Shamsundar and Dr. Lalitmohan

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Abstract

Total hip arthroplasty (THA) has revolutionized the quality of life of men and women of all ages since the 1960s, earning the title of “the operation of the century. Being a measure surgery there is considerable loss of blood in intra and post operative period along with drop in the level of hemoglobin. Average blood loss is around 1000ml (450 to 1900ml) and the mean hemoglobin fall is 2.1 ± 1.1 g/dl. There are various methods available to control and decrease the blood loss intra and post operatively. Systemic administration of tranexamic acid has been studied and its effectiveness being proved in literature and commonly being used in orthopedics, gynecology and neuro surgery. But, Administration and the effects of tranexamic acid into the operative site haven't been published in literature, to the best of our knowledge. Present study is based on the estimation of effectiveness of TXA at the surgical site after wound closure.

Keywords: Total Hip, blood loss, tranexamic acid, orthopedics

Introduction

Total hip arthroplasty (THA) has revolutionized the quality of life of men and women of all ages since the 1960s, earning the title of “the operation of the century”^[1]. In 2010, a survey of National Joint Registries (NJR) estimated that around 959,000 annual primary and revision total hip procedures were being performed annually with the average rate at about 131 procedures per 100,000 populations^[2]. Being a measure surgery there is considerable loss of blood in intra and post-operative period along with drop in the level of hemoglobin. Average blood loss is around 1000ml (450 to 1900ml) and the mean hemoglobin fall is 2.1 ± 1.1 g/dl^[3]. Measures to minimize intra-operative blood loss including optimal preoperative physiological status, use of appropriate surgical approach, gentle and delicate tissue dissection, surgical expertise, rational use of electrocautery, and others should be employed during this procedure. The role of autologous blood transfusion, deliberate hypotension, and administration of fibrinolytic inhalators in reducing blood loss was emphasized in previous studies^[4].

Systemic administration of tranexamic acid has been studied and its effectiveness being proved in literature. It is found that Tranexamic acid 15 mg/kg given as a single preoperative bolus dose reduces postoperative and total blood loss, and packed cell transfusion requirements in primary total hip replacement surgery^[5].

Tranexamic acid (TXA) is a potent antifibrinolytic agent that exerts its effects by blocking lysine binding sites on plasminogen molecules and has the potential to enhance the effectiveness of the patient's own haemostatic mechanisms. Consequently, clot breakdown (fibrinolysis) is inhibited and bleeding is reduced^[6].

Administration and the effects of tranexamic acid into the operative site hasn't been published in literature, to the best of our knowledge.

Aims and Objectives

- To study the role of Topical Tranexamic acid intra-operatively in reducing post operative blood loss in total Hip Arthroplasty.
- To calculate the post operative drain and amount of fall of haemoglobin after TXA

administration, in the operation site.

Methodology

This is cohort study, done after IRB clearance, conducted on patients undergoing total hip arthroplasty in Tertiary care centre over a period of 3 years. Study was conducted on a population of 25 patients, 15 patients received TRANEXAMIC ACID (TXA) 10 patients did not receive TXA. Selection was purely a random selection by operating surgeon.

All surgeries done by same primary surgeon, using the same approach to expose the hip joint (posterior-lateral approach).

Inclusion Criteria:

- Patients willing to participate.
- Patients not on any medications before surgery.
- Normal Bleeding (CT/BT/PT/PTT/Platelets count) parameters.

Exclusion Criteria

- Patient not willing to participate
- Patients with the history of HTN/DM/Cardiac or other illness.
- Patient on any type of anticoagulant and steroid medications.

Procedure

50ml of 3gm solution by combining 6 vials of TXA with 20ml NS. Each 5ml vial contains 500mg of TXA. The solution was injected into the surgical drain after wound closure and the drain was kept closed for 6 hrs post operatively

The drain opened after 6 hrs postoperatively and amount of the blood collected in the drain over 24 hours was calculated. The HB% was checked post operatively after 8 hours of surgery and repeated if drain > 100ml after 24 hours of surgery and compared with pre-op level.

Results

Study was done over 25 patients, randomly divided into control and subject. All underwent total hip replacement by single surgeon and same approach. 15 patients administered TXA preparation.

Drain measured over 24 hours post operatively; it was found that drain was less than 100ml in 11 out of 15 patients with TXA injection (73%), 3 out of 10 patients without TXA administration (30%).

4 patients has >100ml drain with TXA (27%) and 7 patients without TXA had drain > 100ml (70%).

P-value calculated is 0.046 and Odds ratio is 5.88(1.027 to 41.52) and chance of getting <100ml drain for those used TXA is 73.33% (47.62% to 89.54%).

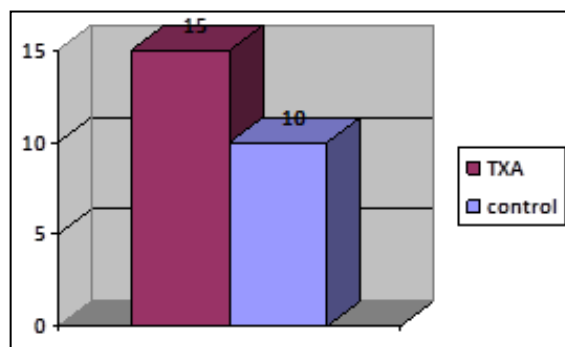
Post op fall of hemoglobin was 1 gm in 11 out of 15 patients (73%) who received TXA and 1 out of 10 patients (10%) with no TXA injection. 1-2 gm fall of hemoglobin was noticed in 3 patients (20%) with tranexamic acid when compared to 5 (50%) without it. Only 1 patient (7%) had Hb fall more than 2gm with tranexamic acid administration where 4 patients (40%) fall in this category who did not received TXA.

Discussion

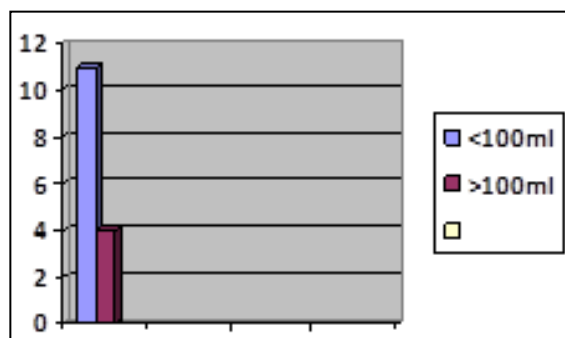
Though the study sample is too small to get proper interpretation, it was found that there was considerable advantage of using tranexamic acid at the site of surgery after wound closure. This may help in decreasing the need of post operative transfusions in major elective surgeries and

associated complications.

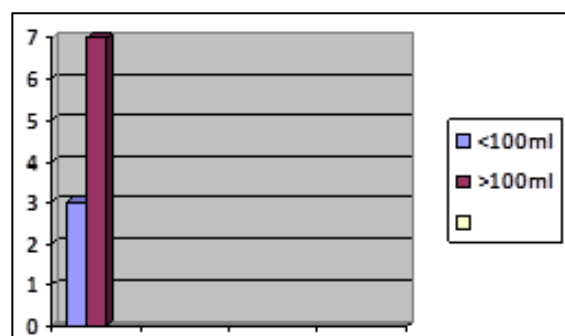
This can be extended to the reconstruction surgeries of tumors where mega prosthesis being used and where the expected blood loss post operatively is high.



Distribution of the patients and control



Drain output for 24 hours in patients with TXA



Drain output for 24 hours in patients with no TXA

Conclusion

Tranexamic acid injection at the site of surgery after total hip and knee replacements is effective in decreasing the blood loss and post op fall in hemoglobin levels. The use of this can be extended to other major surgeries where the expected blood loss after surgery is high.

Conflicts of Interest: none.

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