

ORIGINAL ARTICLE

Comparison the Postoperative Blood Loss in Total Knee Arthroplasty with and without Perioperative Tourniquet Release

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ABSTRACT

Objective: To compare the postoperative blood loss in total knee arthroplasty with and without perioperative tourniquet release.

Study Design: Randomized control trial

Place & Duration of Study: Department of Orthopaedic, M. Islam Teaching Hospital Gujranwala 1st January 2020 to 31st December 2020.

Methodology: Ninety patients of both genders undergoing total knee arthroplasty were included in this study. Patient's demographics were recorded after written consent. Patients were equally divided into two groups. Group A (45 patients) received total knee arthroplasty with tourniquet while group B (45 patients) received total knee arthroplasty without tourniquet. Postoperative blood loss was measured by suction drain, levels of haemoglobin were examined and compare between two groups.

Results: The mean age of the patients in group A was 57.76±2.4 years while in group B it was 58.16±7.8 years. 32 (71.11%) and 34 (75.56%) were males while 13 (28.89%) and 11 (24.44%) were females in group A and B. We observed patients at the three different points and found lower blood loss in patients who received total knee arthroplasty with tourniquet as compared to no tourniquet group (p-value <0.05). No significant difference was observed regarding hemoglobin at 2 hours and significant differences were observed at 24 and 48 hour postoperatively.

Conclusion: Tourniquet is useful to decrease loss of blood in patients undergoing total knee arthroplasty.

Keywords: Total knee arthroplasty (TKA), Tourniquet, Blood loss

INTRODUCTION

The loss of blood due to extensive soft tissue release and bone cutback following total knee arthroplasty (TKA) can lead to a significant anemia and a prolonged recovery from postoperative treatment.¹ The total blood loss included a visible bleeding loss and hidden blood loss reported by Sehat et al.² After TKA, patients frequently have lower than anticipated postoperative hemoglobin (Hb), indicating that a significant proportion of the overall blood losses are caused by hidden blood loss. It may range from 50% to 38%. Total knee arthroplasty is a major cause for blood loss during operations, and several studies have shown that these operations have a high transfusion rate.³

Using tourniquet enables the orthopedic surgeon to operate without blood and leads to better cementation. The timing of the removal of tourniquet is however a controversial subject and different perspectives in the literature as the best way to preserve blood stock levels. Newman et al found less blood loss after the suture and pressure dressing was released.⁴ A tourniquet may also lead to swelling of the local tissue or hypoxia, which affects injury cure⁵⁻⁷ and leads to further pain in a postoperative immediate operation.^{8,9} For these reasons, further support is needed in the conclusions of these meta-analyses. In addition, there is no published meta-analysis to examine for patients with osteoarthritis the effects of the tourniquet on blood loss in primary TKA. We aimed therefore to assess the effects of tourniquet use on blood loss reduction and to assess the potential risks to patients with osteoarthritis of using tourniquet in primary TKA.

MATERIALS AND METHODS

This randomized control trial study was carried out at Department of Orthopaedic, M. Islam Teaching Hospital Gujranwala 1st January 2020 to 31st December 2020 and comprised 90 patients and age 35 years of age. Complete details of patients were recorded after taking written consent and the patients who not agreed were excluded. Patients were divided in two groups with equal numbers (45). Groups A underwent TKA with tourniquet while the other group B was without tourniquet. Pre and Postoperative data was calculated by the surgical team by following same TKA procedure. We used standard techniques for all cases. A mid vastus approach was used through an anterior midline skin incision. Bone cuts and soft tissue balancing were done in the same sequence. The patella was not replaced in either group. The patellar was reshaped to match the shape of the femoral component trochlea better and the soft tissue around the patellar was cauterized with an electric scalpel to partly destroy the innervation of the patellar. To reduce the blood loss from the femoral canal an intramedullary plug with bone grafts was used before closure of the wound. In group A the tourniquet was inflated to 100 mmHg above the systolic blood pressure after the leg was elevated and exsanguinated, and deflation was performed after the wound was closed and the compressive dressing applied. The tourniquet was not used in group B and the active bleeding points were promptly sealed with electric coagulation. Hemostatic powder (3g) was used on the wound surface before incision closure in both groups.

Postoperative blood loss was measured at 2, 24 and at 48 hour. The data was entered and analyzed through SPSS-24.0 and T-test was applied to see the significant difference.

RESULTS

The mean age of the patients in group A was 57.76±2.4 years while in group B it was 58.16±7.8 years. 32 (71.11%) and 34 (75.56%) were males while 13 (28.89%) and 11 (24.44%) were females in group A and B (Table 1). Loss of blood was assessed in patients in both the intervention groups. The patients were observed at three different points which gave blood loss at 2hours (248.26±13.6) in group A while in group B it was (278.23±21.13), at 24 hours in group A (160.82±5.43) and in group B (188.61±9.93) and at 48 hours it was (105.7±9.39) and (111.6±9.26) in both groups. We found lower blood loss in patients who received tourniquet for TKA but in group B ratio of blood loss was excessive (Table 2).

Table 1: Demographically complete details of enrolled patients (n=90)

Variable	Group A (=45)	Group B (n=45)
Age (years)	57.76±2.4	58.16±7.8
Gender		
Male	13 (28.89%)	11 (24.44%)
Female	32 (71.11%)	34 (75.56%)

Table 2: Differentiation of Knee Society Score between the patients in two groups

Variable	Group A (=45)	Group B (n=45)	P value
Blood loss (ml)			
At 2hrs	248.26±13.6	278.23±21.13	<0.005
At 24hrs	160.82±5.43	188.61±9.93	0.002
At 48hrs	105.7±9.39	111.6±9.26	<0.04
Post-operatively hemoglobin (gm %) level			
At 2 hours	15.54±0.23	15.99±0.18	0.74
At 24 hours	13.66±0.45	11.35±0.76	0.05
At 48 hours	12.47±0.93	10.93±0.47	0.02

DISCUSSION

This study found to significantly reduce blood loss due to the use of tourniquet in patients undergoing TKA knee surgery. Total knee arthroplasty is a common operative procedure to treat high effectiveness and improved functional outcomes in arthritis patients. The results showed that an intraoperative use of the tourniquet was efficiently reduced blood loss as demonstrated in previous meta-analyses.^{10,11} Due to an orthopedic implant procedure, post-operative blood loss may last for hours and a day, which is similar to many previous studies.^{12,13}

This survey was used to compare the level of the hemoglobin, losses of blood and results, with or without the tourniquet to avoid blood transfusion during TKA. There was difference in operating time and in blood consumption with or without tourniquet according to the Abdel-Salam et al.¹⁴ But the results of our study have shown that the blood loss calculation total represented the actual blood loss fraction and the gross method for calculating it.

Gross¹⁵ included rheumatoid arthritis patients in the meta-analysis, which could lead to significant confounders. The use of a tourniquet may increase fibrinolytic activity according to Harvey's study.¹⁶ Tetro et al¹⁷ also reported that reducing blood loss from intra-operative blood loss by using the tourniquet. In the tourniquet group, total

measured blood loss was less than that shown by Tai et al.¹⁸

We found that when TKA is performed without tourniquet, the patients can participate more effectively during a relatively early period in rehabilitation practice when compared to patients who have TKA with tourniquet, which can enhance confidence in patients in recovery, decrease the incidence of immobility-related complications, and improve patient satisfaction.

CONCLUSION

The use of tourniquet is very helpful for reducing postoperative blood loss in patients undergoing TKA as compared to TKA surgery without using tourniquet. However, results showed that there were significant different in haemoglobin level at different time intervals

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