



## ANALYSIS OF EFFECT OF PERIOPERATIVE BLOOD TRANSFUSION ON KIDNEY FUNCTIONS IN TOTAL KNEE ARTHROPLASTY

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### Abstract:

**Introduction:** A critical component of successful patient care in total knee arthroplasty (TKA) is a blood management strategy. TKA can result in substantial perioperative blood loss, rendering patients at increased risk of requiring allogenic blood transfusion. **Aims and objectives:** The main objective of the study is to analyze the effect of perioperative blood transfusion on kidney functions in total knee arthroplasty. **Material and methods:** This cross sectional study was conducted in Allama Iqbal Memorial Teaching Hospital, Gujranwala during August 2018 to January 2019. This study was basically done for the analysis of effect of blood transfusion on kidney functions in TKA. The data was collected from 100 patients of both genders. Age, gender, comorbidities like hypertension, diabetes mellitus, chronic obstructive lung disease, chronic renal disease and smoking habits as well as types of operations, anesthesia, preoperative and postoperative blood glucose levels, perioperative amounts of blood transfusion and postoperative morbidities and mortalities were recorded. **Results:** The data was collected from 100 patients of both genders. The mean age was  $73.5 \pm 13.1$  years. In terms of preoperative bloodwork, creatinine, aspartate aminotransferase (AST) and alanine aminotransferase (ALT) levels were statistically similar ( $P > 0.05$ ). However preoperative BUN level was statistically higher. When the patients were compared for blood parameters showing postoperative renal and other system functions, no statistical differences were detected ( $P > 0.05$ ). **Conclusion:** It is concluded that postoperative complication rates increase with perioperative blood transfusion. In contrast to other surgical disciplines we could not prove that blood transfusion in orthopaedic surgery had adverse effects on postoperative renal functions.

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**INTRODUCTION:**

A critical component of successful patient care in total knee arthroplasty (TKA) is a blood management strategy. TKA can result in substantial perioperative blood loss, rendering patients at increased risk of requiring allogenic blood transfusion. Total knee and hip arthroplasty and fracture surgery is the number one reason for transfusion in patients undergoing surgery and accounts for 9.8% of all transfused red blood cell units [1]. Complications of allogenic blood transfusion include the risk of disease transmission, hemolytic reaction, fluid and hemodynamic overload, acute lung injury, coagulopathy, allergic reaction and febrile non-hemolytic reaction. Allogenic transfusion is associated with immunomodulation, and an increased incidence of prosthetic infection [2]. Bierbaum et al. reported a transfusion rate of 39% following TKA, with an increased risk of fluid overload, infection rate and duration of hospitalization in the patients who received allogenic transfusion. Several studies have highlighted the disadvantages of allogenic blood including a negative effect on postoperative complications, length of hospital stay, cost and mortality [3].

Total knee arthroplasty (TKA) is currently the most cost-effective and efficacious way for treating patients with end-stage knee osteoarthritis who suffer from severe pain, activity limitation and for whom conservative treatment is unsuccessful. Based on National registries, TKA is considered to be the most common major orthopaedic surgery performed worldwide. It's really important to mention that the number of TKA surgeries performed each year increases and is projected to have a five to six-fold increase by 2030 [4].

Blood loss during TKA is putting the patient at risk for a blood transfusion. It's reported that patients undergoing TKA may result in blood loss between 1000 mL and 1500 mL which necessitates subsequent allogeneic blood transfusion (ABT) in 10%-38% of them [5]. Thus, it becomes prudent to minimize the ABTs while trying to maintain

hemoglobin (Hb) in a safe and efficient level to help patient's rehabilitation. Many strategies have been used in order to minimize blood loss including preoperative autologous blood donation (PAD), acute normovolemic haemodilution (ANH), autologous blood transfusion (ABT), intraoperative cell saver, drain clamping, pneumatic tourniquet application, and the use of tranexamic acid [6].

**Aims and objectives**

The main objective of the study is to analyze the effect of perioperative blood transfusion on kidney functions in total knee arthroplasty.

**MATERIAL AND METHODS:**

This cross sectional study was conducted in Allama Iqbal Memorial Teaching Hospital, Gujranwala during August 2018 to January 2019. This study was basically done for the analysis of effect of blood transfusion on kidney functions in TKA. The data was collected from 100 patients of both genders. Age, gender, comorbidities like hypertension, diabetes mellitus, chronic obstructive lung disease, chronic renal disease and smoking habits as well as types of operations, anesthesia, preoperative and postoperative blood glucose levels, perioperative amounts of blood transfusion and postoperative morbidities and mortalities were recorded.

**Statistical analysis**

The data was collected and analyzed using SPSS version 19.0. Categorical data between groups was compared with Pearson Chi-Square and Fisher's Exact test.

**RESULTS:**

The data was collected from 100 patients of both genders. The mean age was  $73.5 \pm 13.1$  years. In terms of preoperative bloodwork, creatinine, aspartate aminotransferase (AST) and alanine aminotransferase (ALT) levels were statistically similar ( $P > 0.05$ ). However preoperative BUN level was statistically higher. When the patients were compared for blood parameters showing postoperative renal and other system functions, no statistical differences were detected ( $P > 0.05$ ).

**Table 01:** Preoperative-postoperative differences in blood parameters.

	Mean $\pm$ SD	P
Preop. BUN	24.12 $\pm$ 11.51	0.320
Postop. BUN	22.91 $\pm$ 12.58	
Preop. Creatinine	1.26 $\pm$ 1.22	0.007
Postop. Creatinine	1.17 $\pm$ 1.25	
Preop. AST	25.84 $\pm$ 15.14	0.001
Postop. AST	38.43 $\pm$ 70.43	
Preop. ALT	17.15 $\pm$ 9.87	0.344
Postop. ALT	26.51 $\pm$ 75.9	

**DISCUSSION:**

Several studies have highlighted the significant influence of preoperative Hb on the requirement for transfusion in TKA. Salido et al. demonstrated very few patients with Hb greater than 150 g/L preoperatively required allogenic blood whilst patients with preoperative Hb level less than 110 g/L had a 100% transfusion rate. Similarly, Pierson et al. found an algorithm-based strategy aimed at improving preoperative Hb level was most effective in reducing transfusion rate [7]. By the increase of surgical procedures in current health practices, perioperative blood transfusion incidence is also increasing. Besides financial burden many studies have also reported several medical complications associated with blood transfusions [7]. Increase in postoperative complications like hemolytic and allergic reactions, transfusion-associated acute lung injury, transfusion-associated circulatory overload, graft-versus-host disease and infection as well as mortality due to blood transfusions in either orthopaedic or other fields of surgery are reported in numerous studies. Ponnusamy et al. recently published a review about effects of blood transfusion in orthopaedic surgery [8]. Most common minor and major complications in this review were respectively allergic reactions (21%) and transfusion-associated acute lung injury (27%) [9]. Among these complications most common reasons of mortality were graft-versus-host disease (85-100%), transfusion-associated circulatory overload (2-15%) and transfusion-associated acute lung injury (5-10%). Many other studies also emphasize the increase in the risk of viral transmission and immunosuppression [10,11].

**CONCLUSION:**

It is concluded that postoperative complication rates increase with perioperative blood transfusion. In contrast to other surgical disciplines we could not prove that blood transfusion in orthopaedic surgery had adverse effects on postoperative renal functions.

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