

Is The Use of Low Molecular Weight Heparin Sufficient In Patients Undergoing Total Knee Arthroplasty For 15 Days?

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ABSTRACT

Venous thromboembolic events, which can occur, if necessary, precautions are not taken after total joint arthroplasty, are a significant cause of mortality. One of the medical treatments used for prevention is low molecular weight heparin. Duration of low molecular weight heparin (LMWH) is used for prophylaxis can vary among physicians. In this study, we compared the effect of the duration of LMWH use on thromboembolic complications within patients, who had total knee arthroplasty.

The study is retrospective and data is obtained from total of 224 adult patients over the age of 18. Age, gender, and thromboembolic complications were evaluated. The patients were separated into two groups as those who used LMWH for 15 days and those who used LMWH for 30 days and the development of thromboembolic complications between the two groups was compared statistically.

Of the 224 patients thrown in the study, %81.7 were women. Group 1 (those who used LMWH for 15 days) consisted of 116 patients, and group 2 (those who used LMWH for 30 days) consisted of 108 patients. The distinction between the two groups regarding deep vein thrombosis (DVT) did not display any statistically significant difference ($p=0.943$).

In DVT prophylaxis in patients undergoing total knee arthroplasty, LMWH for 15 days is as effective as LMWH for 30 days. Therefore, it is sufficient to give LMWH for a short period of time as it is an invasive procedure.

Keywords: Low molecular weight heparin, DVT prophylaxis, total knee arthroplasty

Introduction

DVT is a disease that may occur as a result of increased coagulation, stasis and endothelial damage and may cause fatal complications such as pulmonary embolism (1). Prolonged immobility of patients after arthroplasty may lead to DVT formation in the lower extremities. Therefore, it is important to apply prophylaxis in patients undergoing arthroplasty (2)

Today, many pharmacological agents have been developed to be used in DVT prophylaxis. Some guidelines have been published on which prophylaxis agent to be administered to the patient and its duration. Among these guidelines; American College of Chest Physicians (ACCP), American Academy of Orthopedic Surgeons (AAOS) and National Institutes for Health and Care Excellence (NICE) guidelines are highly accepted (3). Subcutaneous anticoagulants are the

agents generally used in DVT prophylaxis. Low molecular weight heparin (LMWH) is typically used for this purpose and offers a 68-76% decrease in the risk of thromboembolism. In the ACCP guideline, in patients undergoing significant orthopedic surgery (total hip arthroplasty, total knee arthroplasty) and using LMWH as prophylaxis, it is recommended to start LMWH 12 hours before or 12 hours after the operation and extended prophylaxis is recommended until the 35th postoperative day (4). In the NICE guideline, prophylaxis is recommended for people who have knee arthroplasty and whose risk of VTE (venous thromboembolism) is higher than the risk of bleeding, and if LMWH is to be given, it is recommended to use it for 14 days. (5).

In this study, we compared two groups that received LMWH prophylaxis for 15 days and 30 days after total knee arthroplasty (TKA) in terms of the risk of thromboembolism development and

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tried to find an answer to the question of whether we could shorten the duration of LMWH use, which is an invasive procedure, in patients who received prophylaxis for 30 days.

Materials and Methods

This is a retrospective study conducted by analyzing the files of patients treated in the Orthopedics and Traumatology clinics of the Faculty of Medicine and Training and Research Hospital and the hospital database. The research encompassed data from total of 224 adult patients aged 18 years and above who had undergone total knee arthroplasty (TKA). Patients who additionally used anticoagulants and/or antithrombotic were excluded from the study. Age, gender and thromboembolic complications of the patients were analyzed. Patients were split into two groups as those who used LMWH for 15 days and those who used LMWH for 30 days and the rate of complications between the two groups were compared statistically. In addition to the use of LMWH for thromboembolism prophylaxis, we applied anti-embolism stockings and early mobilization in both groups. Patients were informed preoperatively and a consent form was signed.

Statistical Method: In determining the sample size for this study, we aimed for a power (power of the test) of at least 80% and set the significance level (1st type error) at 5%. To assess whether the continuous measurements in the study followed a normal distribution, we conducted Kolmogorov-Smirnov ($n > 50$) and Skewness-Kurtosis tests. Based on the results, we applied parametric tests as the measurements were found to be normally distributed. Descriptive statistics, including mean, standard deviation, number, and percentage, were used to summarize the variables in our study. We employed the Independent T-test to compare continuous measurements between groups, and the Chi-square test to determine the relationship between groups and categorical variables. The statistical significance level (α) was set at 5%, and calculations were performed using the SPSS (ver.26) statistical package program.

Findings: Out of the 224 patients considered in the study, 183 (81.7%) were female (Figure 1). The mean age of the patients was 65.76 ± 8.76 years. All patients had undergone TKA. Patients were categorized into two groups: one group received LMWH for a duration of 15 days (group 1), while the other group received LMWH for a duration of 30 days (group 2). Group 1 consisted of 116

patients and group 2 consisted of 108 patients. There were 92 (79.3%) women in group 1 and 91 (84.2%) women in group 2 (Figure 1). In terms of gender, there was no significant difference observed between the groups ($p = 0.513$). Regarding complications, DVT developed in only 2 patients in both group 1 and group 2 and the difference between the two groups was not statistically significant ($p = 0.943$). The number of patients who developed pulmonary embolism was 6 in group 1 and 2 in group 2, which was not statistically significant ($p = 0.181$). (Table 1)

Discussion

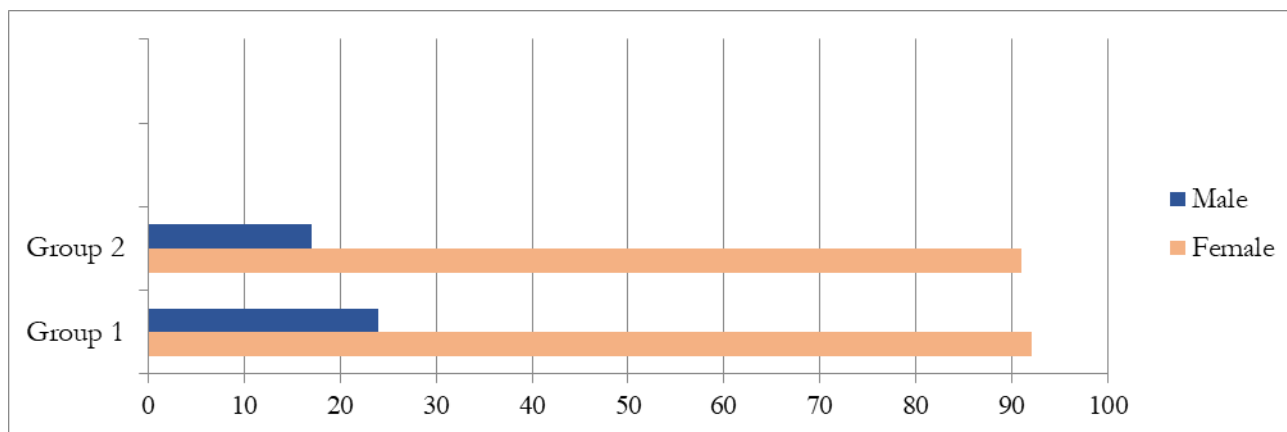
Total knee arthroplasty is a treatment method applied to relieve pain and limitation of movement due to causes such as gonarthrosis. The number of patients undergoing total knee arthroplasty is on the rise because people are living longer and the rates of elderly population is growing. As the number of arthroplasties increases, there is an increase in the complications that may occur and the chance of surgical success may decrease (6). Venous thromboembolism is an important and potentially fatal complication that can occur early after total knee arthroplasty. Today, it is possible to reduce the risk of DVT with thromboprophylaxis, use of mechanical compression devices (intermittent pneumatic compression device and anti-embolic stockings) and early mobilization. For a considerable period, low molecular weight heparin has been utilized as a preventive measure against venous thromboembolism. The advantages are that it is a standardized dose administration and routine laboratory tests are not required, whereas subcutaneous administration is a disadvantage (7). Some guidelines have been published considering information such as the prophylaxis to be given to the patient in the postoperative period and its duration. The American College of Chest Physicians (ACCP), American Academy of Orthopedic Surgeons (AAOS) and National Institutes for Health and Care Excellence (NICE) guidelines are the most commonly used ones (4,8,12). Both AACCP and AAOS guidelines recommend the combined use of mechanical and pharmacologic prophylaxis. For patients undergoing TKA, current ACCP guidelines recommend the use of LMWH for at least 10 to 14 days and up to 35 days. According to the AAOS guidelines, it is not clear which prophylactic

Table 1. The Relationship Between Complications and Group

		LMWH				*p.
		Group 1		Group 2		
		Count	Row N %	Count	Row N %	
DVT	Negative	114	51,8%	106	48,2%	,943
	Positive	2	50,0%	2	50,0%	
Pulmonary Embolism	Negative	110	50,9%	106	49,1%	,181
	Positive	6	75,0%	2	25,0%	

*Significance level according to chi-square test results

Figure 1. Gender Distribution of Patient Groups



approach (or approaches) is considered the best or not as effective. There is also no consensus on the duration of prophylaxis (11). Currently, the latest evidence indicates that there is uncertainty regarding the optimal compression devices, the most effective pharmacologic agents, and the ideal duration of treatment. There are various thromboprophylaxis practices for TKA in Brazil. Surgeons use a combination of pharmacological and mechanical methods, but in different ways. Some follow hospital guidelines, while others do not. The use of mechanical prophylaxis methods and the limited use of Acetylsalicylic Acid differ from guidelines and practices in other countries. (12).

As seen, there is no clear opinion on the duration of prophylactic treatment. In this study, we planned to compare the duration of LMWH prophylaxis. We compared two groups of patients who received prophylaxis for 15 and 30 days and found no difference in the increase in DVT and thromboembolic events.

In a study by White et al. (13) to identify cases diagnosed with DVT or pulmonary embolism within 3 months after unilateral total hip or knee arthroplasty, the incidence of DVT or pulmonary

embolism was 2.8% after hip arthroplasty and 2.1% after knee arthroplasty. The diagnosis of thromboembolism was determined after patients were discharged from the hospital in 76% and 47% of cases involving total hip and total knee arthroplasty, respectively. The median time from surgery to diagnosis was 17 days for total hip arthroplasty and 7 days for total knee arthroplasty. The findings suggest that earlier, more intensive prophylaxis may be required for total knee arthroplasty and longer prophylaxis may be required for total hip arthroplasty to further reduce thromboembolic complications. In other words, the fact that DVT occurs in the early period after knee replacement supports that short-term prophylaxis may be sufficient in a way. However, in this study population, not only LMWH but also warfarin or pneumatic compression or their combination was used.

It has been mentioned that additional work is required before any suggestion can be provided regarding long-term prophylaxis in orthopedic surgery (14). Firstly, there is limited data in the literature concerning the occurrence of post-discharge DVT in patients who have undergone TKA and its magnitude as a problem. Second, if

prophylaxis is deemed necessary, patient compliance with self-injection should be examined to reduce the incidence of DVT after discharge. Finally, it is important to analyze the cost of such a prophylaxis program.

In conclusion, our study showed that short-term use of LMWH is effective in DVT prophylaxis in patients undergoing TKA. It is obvious that short-term prophylaxis will increase patient comfort and be cost-effective. However, since the retrospective nature of our study is a limitation, we believe that prospective studies are needed.

Ethical Consent: The study was approved by Van Yuzuncu Yil University Non-Interventional Clinical Research Ethics Committee (decision number 2023/06-10 dated 16.06.2023).

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