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Research Article

Using Heparin Aspirin Protocol for Venous Thromboembolism Prevention in Knee or Hip Arthroplasty

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ABSTRACT

Background: There is much controversy about the appropriate method to prevent venous thromboembolism after Total Knee Arthroplasty or Total Hip Arthroplasty. Therefore, we designed this study to evaluate the results of using the heparin aspirin protocol to prevent deep vein thrombosis and pulmonary embolism in knee or hip arthroplasty patients from years 2019 to 2020 at Shafa Yahyaian Hospital.

Methods: We recruited patients who underwent Total Knee Arthroplasty or Total Hip Arthroplaty surgery at Shafa Yahyaian Hospital between years 2019 and 2020. Patients were enrolled in the census method after obtaining written consent. Demographic and clinical data were collected using a questionnaire or clinical file. Patients received 5000 units of Heparin per 12 hours for 5 days and after the patients received aspirin 80 mg tablets daily for one month . The duration of follow-up was 6 months after hospital discharge. Data were analyzed by SPSS 24 software. Significance level was set at 0.05.
At all stages of the project implementation, the basic principles of the Helsinki Declaration (Ethics in Medical Research on Human) and the Ethics Committee of Iran University of Medical Sciences were observed.

Results: Of the 159 participants, 34 were males (21.4%) and 125 (78.6%) females. The mean age was 62.7 years with a standard deviation of 11.21 years. The mean body mass index was 28.59 kg/m^2 with a standard deviation of 4.88. Sixteen (10.1%) reported smoking. 80 patients (50.31%) had hypertension. Mean platelet count before and 5 days after surgery was not significantly different between the two groups (p=0.327) and (p=0.160). Hyperextension in patients did not show significant changes before and 6 months after surgery. However, for the two knee flexion-contraction and knee flexion movements, these postoperative range of motion were significant (p=0.001) and (p=0.007) respectively.

Conclusion: The incidence of embolism in our study was 0.62% and the incidence of ecchymosis was 6.2%. It seems that the complication of using aspirin-heparin protocol in our study is less than similar studies in this regard.

Keywords: Total Knee Arthroplasty (TKA); Total Hip Arthroplasty (THA); Deep Vein Thrombosis (DVT); Pulmonary Embolism (PE); Aspirin

INTRODUCTION

Background

Joint Arthroplasty is one of the most common orthopedic surgeries. Venous Thromboembolism (VTE) is a remarkable side effect of arthroplasty. In VTE a blood clot obstructs the vein system and it includes: Deep Vein Thrombosis (DVT) and Pulmonary Embolism (PE) [1]. The prevalence of vein thrombosis after joint arthroplasty without medical or physical prophylactic approaches is 40-80 percent. Pulmonary embolism mortality rate among these patients is about 2 percent and 10-20 percent of PEs are without significant symptoms [1-3]. Using anticoagulants decreases the risk of venous thrombosis up to 30 percent [4]. Common prophylactic anticoagulation approaches include:

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- Low Weight Molecular Heparin (LWMH; such as Enoxaparin): It decreases risk of thrombosis about 65-93 percent, but it increases the risk of bleeding in surgical site [5].
- Oral Warfarin: It needs regular laboratory assessment and increases the risk of bleeding about 3-4 percent [6].
- Aspirin: It is a low risk, reliable and cost-effective alternative for other pharmaceutical approaches [7].
- Mechanical prophylaxis (compression stockings or intermittent pneumatic compression) [8].

Although most surgeons prescribe anticoagulants after arthroplasty, choosing the best method is controversial. Van Andrichen AM and his colleagues showed that low molecular weight Heparin can't prevent the symptomatic thromboembolism after arthroscopic knee surgery [9]. Also prescribing aspirin is controversial. Gatouski CJ and his colleagues indicated that aspirin decreases the risk of arterial thromboembolism but increases the risk of VTE in a 90 days period after surgery [10].

In this study, we evaluate the effectiveness of heparin- aspirin prophylactic method in preventing VTE in our patients after total knee or hip arthroplasty and we compare it with the results of other methods in several studies.

MATERIALS AND METHODS

This quasi-experimental interventional study has been conducted in patients who underwent Total Knee Arthroplasty or Total Hip Arthroplasty at Shafa Yahyaian Hospital between years 2019 and 2020. The inclusion criteria consisted of "age>18 years old" and "mild or moderate risk according to Caprini risk category" (Figure 1). The following were the exclusion criteria: The surgical site becoming infected which leads to reoperation, dismissing follow-up, having history of cardiovascular disease or thromboembolism and deducting high incidence risk of thromboembolism or being in the high risk group according to Caprini risk category.

A physician observed patients regularly about extensive hematoma, surgical site infection, diffuse ecchymosis and bleeding. Patients received 5000 units of Heparin per 12 hours for 5 days and after the patients received Aspirin 80 mg tablets daily for one month. The duration of follow-up was 6 months after hospital discharge. The surgeon, method of surgery and the prosthesis were similar for all patients. All of them underwent spinal anesthesia. The post-operative care was similar for all patients (starting to walk 24 hours after surgery under supervision of a physiotherapist, starting active knee movement after 5 days and reaching to 90 degree flexion of knee before hospital discharge). If there had been any suspicion to thrombosis after surgery, the patient underwent Doppler ultrasonography.

Our data has been extracted from medical records of patients and after surgery the data has been documented by researcher or orthopedic residents with emphasis on side effects of surgery. At last we analyzed our data with the 24th edition of SPSS software. The quantitative variables have been presented as mean ± standard deviation and categorical variables have been presented as percentage. T test has been used for comparison between quantitative variables; for non-normal distribution, Mann-Whitney test has been used. The qualitative variables have been compared by Chi-squared test or Fisher's exact test. The statistical significance and confidence interval have been considered 0/05 and 95%, respectively.

Researchers have respected the principles of Helsinki declaration and the regulations of Iran University of Medical Sciences Ethical Committee. All data are anonymous and informed consent have been gotten from all patients.

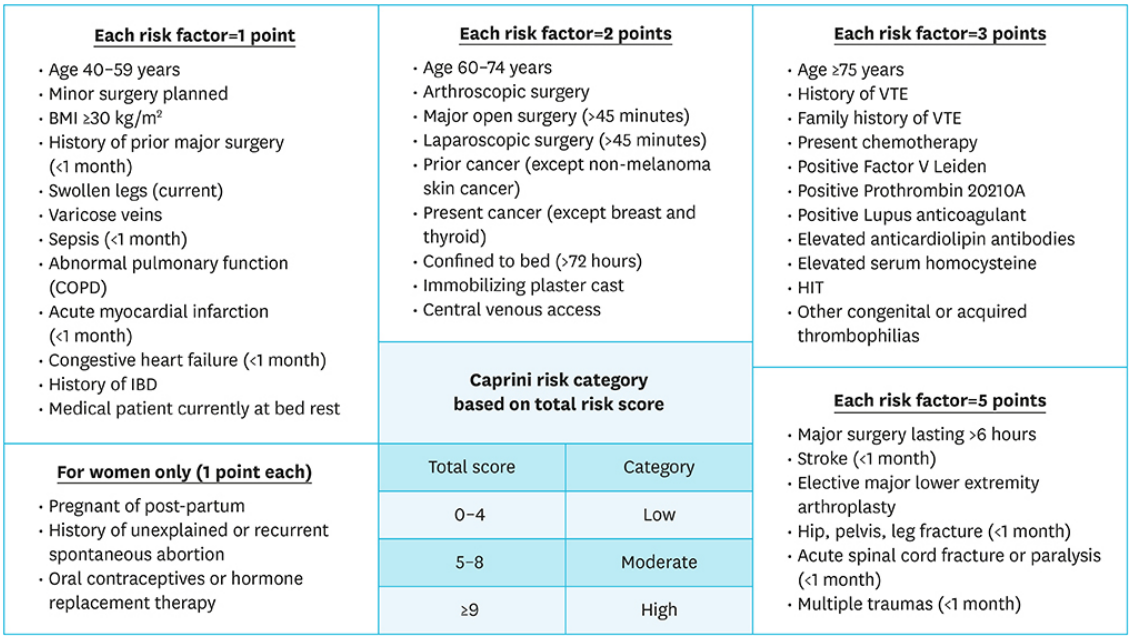

Figure 1: Caprini risk factors and score risk category association. **Note**: BMI: Body Mass Index; COPD: Chronic Obstruction Pulmonary Disease; IBD: Inflammatory Bowel Disease; VTE: Venous Thromboembolism.

RESULTS

During our study, 48 and 220 patients underwent Total Hip Arthroplasty (THA) and Total Knee Arthroplasty (TKA), respectively. From these numbers, 26 cases of THA and 133 cases of TKA analyzed in the study (Figure 2).

We evaluated several variables (Table 1). The number of female participants was 4 times more than male, although this proportion in THA was equal. The mean age of participants was 62.7 years and the mean age of TKA cases was about 20 years higher than THA cases. The mean of platelet cells count was significantly different before and 5 days after surgery in each group (P-value=0.0001 for both) but there we didn't detect a significant difference between two groups. The mean body mass index was 28.59. We found a significant difference in number of smokers between THA and TKA groups (P-value=0.027).

In TKA group, from 133 cases, 19 (14.28%) experienced the complications of surgery. 10 cases of ecchymosis, 6 cases of swelling and one case of embolism. The other 2 cases suffered from other complications which were irrelevant to VTE. In THA group, we didn't find symptoms of VTE except one case of swelling which was normal in Doppler ultrasonography imaging.

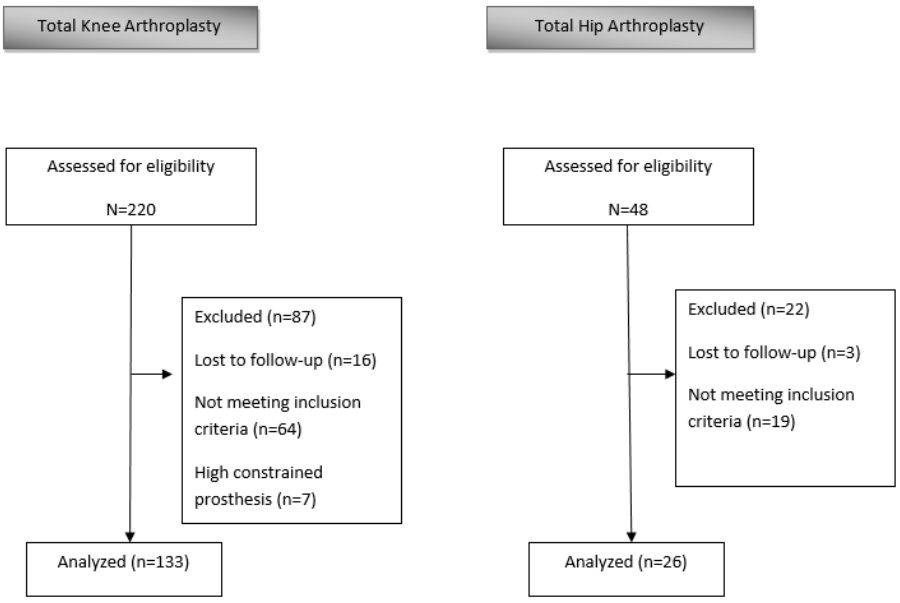

Figure 2: Enrollment in the study.

Table 1: Demographic variables in Total Hip Arthroplasty (THA) and Total Knee Arthroplasty (TKA).

Variable	THA+TKA	THA	TKA	P-value
Age (year) (mean ± SD)	60.70 ± 11.21	46.69 ± 12.66	65.83 ± 7.73	0.001
Platelet count before surgery (× 1000 per mm^3) (mean ± SD)	252.44 ± 59.05	256 ± 37.22	251.74 ± 62.52	0.327
Platelet count after surgery (× 1000 per mm^3) (mean ± SD)	211.62 ± 51.20	200.11 ± 38.16	213.87 ± 53.21	0.160
BMI (mean ± SD)	28.59 ± 4.88	24.89 ± 3.66	29.30 ± 4.77	0.001
Gender (n (%))				
Male	34 (21.4)	12 (46.2)	12 (46.2)	0.001
Female	125 (78.6)	14 (53.8)	111 (83.5)	
Positive smoking history (n (%))	16 (10.1)	6 (23.1)	10 (7.5)	0.027
Complications (n (%))				
Thromboembolism	1 (0.62)	0 (0)	1 (5.3)	-
Wound infection	3 (1.88)	1 (0.5)	2 (10.5)	-
Limb swelling	7 (4.4)	1 (0.5)	6 (31.6)	-
Ecchymosis	10 (6.2)	0 (0)	10 (52.6)	-
history (n (%))	history (n (%))	history (n (%))	history (n (%))	history (n (%))

Note: SD: Standard Deviation; BMI: Body Mass Index.

DISCUSSION

We found that aspirin-heparin protocol decreases the risk of Venous Thromboembolism after Total Knee or Hip Arthroplasty. The incidence rate of VTE after total knee arthroplasty without anticoagulation prophylaxis admission is about 40 to 84 percent; otherwise, by applying aspirin-heparin protocol the incidence rate of this complication in our TKA group was 0.75 percent.

Totally the sex ratio (male/female) was ¼ and the proportion of female to male patients in TKA group was even higher (male/female=1/5), but in THA group the numbers of male and female patients were approximately equal. Perhaps it indicates that women need more TKA than men but the indication of THA is similar for men and women. The mean age of TKA cases was about 20 years higher than THA cases. This may show that old age is one of the main risk factors that leads to TKA but about THA other risk factors are more important. In both groups the mean of platelet cells count before and after surgery were different. It seems that it regards to bleeding during surgery. The mean of Body Mass Index (BMI) was 28.59, but this variable was significantly higher in TKA group (P=0.001). In other words, the BMI is a more important risk factor for indication of TKA than THA. Anderson DR and his colleagues compared the efficacy of rivaroxaban with aspirin in their study. The incidence rate of embolism in their aspirin consuming group was 0.64% which is approximately similar with the result of our study (0.62%) [11]. In another study at 2019, Warren JA. And his colleagues analyzed the data of 363530 patients who had undergone THA and/or TKA surgery from year 2008 to 2016. They found that on average 1 of 71(1.4%) patients who undergo TKA and 1 of 167 (0.5%) patients who undergo THA will experience VTE in a period of 30 days after surgery; while this proportion for TKA group in our study was 1 to 133 [12]. One of our limitations was small sample size. Some cases didn't consent to participate in the study and some others discontinued their follow-up process after surgery. In addition, we just assessed patients which had clinical symptoms of Venous Thromboembolism. We didn't assess our patients with venography or Doppler ultrasonography except in symptomatic cases. Thus we may miss the non-symptomatic cases of VTE. At last, confirmation of these results would require more studies with longer follow-up duration, bigger sample size and more accurate and precise laboratory and imaging evaluation.

CONCLUSION

The incidence rate of embolism and ecchymosis in this study was 0.62% and 6.2%, respectively and they are lower than similar studies. This shows that aspirin-heparin protocol is a good option for preventing Venous Thromboembolism after Total Knee Arthroplasty and/or Total Hip Arthroplasty.

CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest.

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