

Assessment of Various Hematological Complications after Orthopaedic Surgery

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ABSTRACT

Introduction: Various scoring systems have been developed to develop the diagnosis of heparin induced thrombocytopenia and it based on the timing of appearance of thrombocytopenia, magnitude of the drop in level of platelet count, and the presence of clinical signs and symptoms of thrombosis. The present study was aimed at establishing the incidence of haematological complications after lower limb orthopaedic surgery.

Material and methods: The present retrospective study was conducted in the Department of Orthopaedics at the Institute, State during a period of one year i.e. from June 20XX to August 20XX. In this all the patients who underwent hip or knee arthroplasty were identified from the hospital records. Information regarding their date of surgery, operative treatment and postoperative thromboprophylaxis was obtained from the record book of the hospital. Patients were made to fill a questionnaire for 6 weeks which was later reviewed for any changes from the baseline. All the data was recorded in a tabulated form and analysed using SPSS software.

Result: A total of 2700 patients were operated for total hip arthroplasty, compartmental knee arthroplasty or primary knee arthroplasty, all these patients were discharged with daily dosage of 5000 units of subcutaneous heparin. Out of these only 1500 responded after a 6 week follow up period. There were 2.4% (n=36) who developed thromboembolic complications. There were 51% (n=1377) cases of primary total knee arthroplasty. In 42% cases (n=1134) primary total hip arthroplasty was done. In 5% cases (n=135) uni compartmental knee arthroplasty was done

Conclusion: Heparin is mandatory after knee or hip arthroplasty. With certain advantages, the usage of heparin should be done cautiously with proper preoperative and postoperative platelet count monitoring.

Keywords: Arthroplasty, Orthopedic, Platelet, Thromboembolic,

in men.⁵ It has been seen than women have 30 times more risk of developing heparin induced thrombocytopenia.⁶ The presentation of thrombocytopenia varies from temporary physiologic alteration to disorders that are associated with life-threatening pathologies. Timely recognition and early management is necessary to prevent any serious morbidities and even death. The classic presenting features of heparin induced thrombocytopenia are ulcerating skin lesions at the site of injection along with thromboembolic complications like deep vein thrombosis (DVT), embolism, embolic Ischemia of limb, cerebrovascular accident and myocardial infarction. Although the exact incidence of postoperative thrombocytopenia is not determined in the literature but it is a frequently encountered hematologic complication after surgery.

Various scoring systems have been developed to develop the diagnosis of heparin induced thrombocytopenia and it based on the timing of appearance of thrombocytopenia, magnitude of the drop in level of platelet count, and the presence of clinical signs and symptoms of thrombosis. One such system is the 4 T's which include thrombocytopenia, timing, thrombosis or any other cause which includes either unexplained thrombocytopenia or a decrease in platelet count of more than 50% from preoperative level. Various studies done by Lo et al, Bryant et al and Cuker et al have shown that this system gives a high negative predictive value.⁷⁻⁹ There have not been any studies in the past regarding the incidence of thrombocytopenia following orthopaedic surgery. Therefore the present study was aimed at establishing the incidence of haematological complications after lower limb orthopaedic surgery.

MATERIAL AND METHODS

The present retrospective study was conducted in the Department of Orthopaedics at the Institute, State during a period of one year i.e. from June 20XX to August 20XX. In this study the ethical committee approval was obtained

INTRODUCTION

The NICE society recommend that chemical thromboprophylaxis should be given in patients after hip and knee arthroplasty.¹ For this purpose low molecular weight heparin is given, but it carries an innate and serious risk of heparin-induced thrombocytopenia (HIT). This episode was first recognised by Weismann and Tobin in 1958.² The pathophysiology behind heparin induced thrombocytopenia is that there is interaction between IgG antibody and heparin-platelet factor 4 (PF4) complexes which result in activation of platelet and release of thrombin.³ This phenomenon is very rare in younger age group especially patients younger than 40 years of age⁴ and it is more prevalent in women than

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How to cite this article: Sanjoy Chakravarty, Manjuri Kataki, Anshuman Kumar. Assessment of various hematological complications after orthopaedic surgery. International Journal of Contemporary Medical Research 2017;4(8):1772-1774.

from the institute's ethical board and all the subjects were informed about the study and a written consent was obtained from all in their vernacular language. In this all the patients who underwent hip or knee arthroplasty were identified from the hospital records. Information regarding their date of surgery, operative treatment and postoperative thromboprophylaxis was obtained from the record book of the hospital. Only patients who were prescribed with 5000 units of heparin once daily for a period of 10 days were included in the study.

Patients were considered to be at risk of heparin induced thrombocytopenia if their platelet counts illustrated either a drop in of more than 50% from preoperative baseline value between postoperative day 5 and 14 or any new occurrence of thrombocytopenia was noted between 5th and 14th postoperative days. Patients were made to fill a questionnaire for 6 weeks which was later reviewed for any changes from the baseline.

STATISTICAL ANALYSIS

All the data was recorded in a tabulated form and analysed descriptively using SPSS software.

RESULTS

A total of 2700 patients were operated for total hip arthroplasty, compartmental knee arthroplasty or primary knee arthroplasty, all these patients were discharged with daily dosage of 5000 units of subcutaneous heparin. Out of these only 1500 responded after a 6 week follow up period. There were 2.4% (n=36) who developed thromboembolic complications.

Table 1 shows the characteristics of study population. The mean age of the subjects was 68.2 years. There were 37% males (n=999) and 63% females (n=1701) who were enrolled in this study. Majority of the population resided in urban areas (90.4%). There were only 258 subjects (9.6%) who were from rural population.

Table 2 and Figure 1 shows the type and percentage of surgical procedures performed. There were 51% (n=1377) cases of primary total knee arthroplasty. In 42% cases (n=1134) primary total hip arthroplasty was done. In 5% cases (n=135) uni compartmental knee arthroplasty was done. There were 54 cases of hip resurfacing.

DISCUSSION

One of the most serious complications among the list of postoperative thrombocytopenia is heparin-induced thrombocytopenia, it not only causes bleeding but also dangerous and life threatening thrombotic episodes.^{10,11} In addition though it is not uncommon but it generally goes unrecognized in typical clinic setup, the reason behind this being that there is a false perception that more heparin is required for propagation for thrombotic disease. Heparin is generally given as a preventive measure for thromboembolic episode before and after major orthopedic operations like as hip replacement. According to Martel et al, the risk of development of heparin induced thrombocytopenia after

Characteristic		Study group
Mean age		68.2 years
Males		999/37%
Females		1701/63%
Residence	Urban	2442/90.4%
	Rural	258/9.6%

Table-1: Characteristics of study population

Type of surgery	Frequency	%
Primary total knee arthroplasty	1377	51
Primary total hip arthroplasty	1134	42
Uni-compartmental knee arthroplasty	135	5
Hip resurfacing	54	2

Table-2: Surgical operation done in the subjects

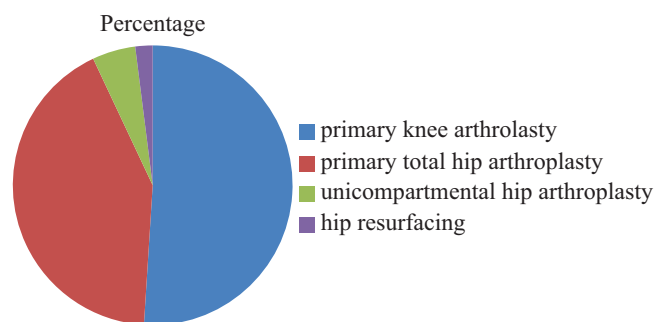


Figure-1: Percentage of type of surgery

exposure to unfractionated heparin has been estimated to be 2.6% as compared 0.2% with low molecular weight heparin.¹² The risk of development of heparin induced thrombocytopenia in postoperative orthopaedic patients who received low molecular weight heparin has been estimated to be 0.15% and 0.9% by Linkins and Warkentin.¹³ Thrombocytopenia generally occurs 7-14 days after heparin treatment is started. The onset of this thrombocytopenia is insidious with gradual decrease in the count of platelets. There has been a wide variation in the incidence of heparin-induced thrombocytopenia according to various studies. It varies between 1% to 30% of patients who received heparin.¹⁴⁻¹⁶

In a study conducted by Stein et al in the year 2009, they found that the incidence of heparin induced thrombocytopenia is dependent on the duration of exposure rather than dose of heparin.¹⁷ In a study conducted by Warkentin et al (2000) they evaluate the occurrence of thrombocytopenia amongst 439 patients who received low molecular weight heparin after hip arthroplasty and found the incidence to be 0.9%, and 3.2% of patients in his study developed anti-PF4/heparin antibodies.¹⁸ On the contrary in the study conducted by Greinacher et al¹⁹ in 2005 amongst 271 cases of hip and knee arthroplasty, they did not find any cases of heparin induced thrombocytopenia. From this we can conclude that occurrence of heparin induced thrombocytopenia is rare and studies that involve a lower sample size there are lesser chances of encountering heparin induced thrombocytopenia. It has an immune-mediated path physiology. Administration of heparin leads to the formation of multimolecular platelet

factor 4 and heparin complexes which act as a chief antigen in heparin-induced thrombocytopenia. They further induce the production of heparin-dependent platelet antibody that starts acting like a platelet aggregating factor.^{20,21} These antibodies are usually immunoglobulin G and occasionally Ig M are also formed. These antibodies react with the platelet factor 4 and heparin complex which is present on the surface of the endothelial cell, which reaction leads to initiation of in vivo aggregation and subsequent formation of platelet thrombus.²² The thrombi that are formed in heparin-induced Thrombocytopenia are grossly white in color and rubbery in texture. There are many rare forms of heparin induced thrombocytopenia that have not been identified yet. A form called rapid onset form develops within 4 days of initiation of Heparin therapy and is usually a result of heparin exposure within the past 100 d. In addition, there is a delayed onset variety in which the thromboembolic complications occur after stoppage of heparin therapy. In all the patients receiving heparin postoperatively, there should be mandatory platelet monitoring till the cessation or even few months after the cessation of heparin.

CONCLUSION

Heparin is mandatory after knee or hip arthroplasty. With certain advantages, the usage of heparin should be done cautiously with proper preoperative and postoperative platelet count monitoring. In our study there were 4.5% subjects who developed heparin induced thrombocytopenia.

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Source of Support: Nil; **Conflict of Interest:** None

Submitted: 25-07-2017; **Accepted:** 30-08-2017; **Published:** 10-09-2017