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Evaluation of various post- operative hematological complications occurring in patients undergoing orthopedic surgery

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Abstract

Background: Hematological post- operative complications in orthopedic surgery are commonly encountered phenomenons across the world. The mortality rate increases 2–3 times after infection. Hence; we planned the present study to assess various post-operative hematological complications occurring in patients undergoing orthopedic surgery.

Materials & methods: The present study included assessment of 100 patients who underwent orthopedic surgery. Data for the present study was obtained from the hospital administrative database. Complete demographic and clinical details of all the subjects were collected. All the post- operative data were separately recorded and analyzed in excel sheet. SPSS software version 17.0 was used for evaluation of results.

Results: A total of 100 subjects were included in the present study. The mean age of the subjects was 59.2 years. Spine surgery was the most commonly done surgical procedure in our study population, followed by knee and hip surgery. In total of 38 patients, post-operative hematological complications were seen.

Conclusion: Hematological complications do occur in significant proportion of subjects undergoing various types of orthopedic surgeries.

Keywords: Complications, hematological, post- operative

Introduction

Post- operative complications in orthopedic surgery are one of the commonly encountered phenomenons across the world. It is associated with prolonged morbidity, disability and increased mortality^[1-3]. Surgical site infection in clean wounds (closed uninfected wounds) includes incisional and organ space infections. Out of nearly 30 million operations in the United States each year more than 2% are complicated with surgical site infections. The mortality rate increases 2–3 times after infection^[4-6]. Hence; we planned the present study to assess various post-operative hematological complications occurring in patients undergoing orthopedic surgery.

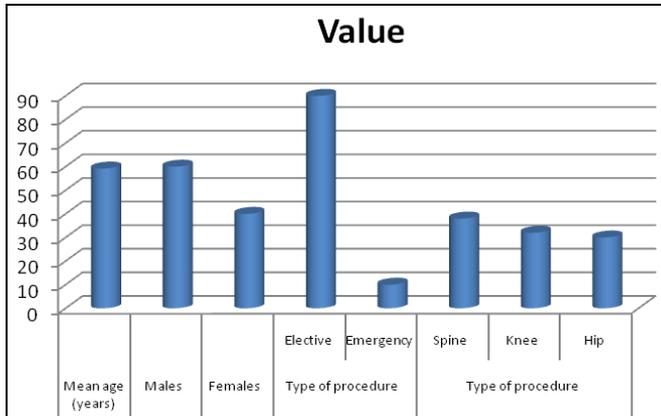
Materials & methods

The present study was conducted in the department of orthopedic surgery of the medical institute and included assessment of 100 patients who underwent orthopedic surgery. Ethical approval was taken from institutional ethical committee and written consent was obtained after explaining in detail the entire research protocol. Data for the present study was obtained from the hospital administrative database. Complete demographic and clinical details of all the subjects were collected. We performed a medical record review of all blood bank data and obtained number and date of transfusions. Troponin level was collected from laboratory data. Complete follow-up records of all the patients was done till two years' time. All the post-operative data were separately recorded and analyzed in excel sheet. SPSS software version 17.0 was used for evaluation of results. Chi- square test was used for assessment of level of significance.

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Results

A total of 100 subjects were included in the present study. The mean age of the subjects was 59.2 years. Out of 100, 60 were males and 40 were females (Graph 1). In 90 subjects, the type of orthopedic procedure was elective, while in remaining 10, the procedure was emergency type. Spine surgery was the most commonly done surgical procedure in our study population, followed by knee and hip surgery. In total of 38 patients, post-operative hematological complications were seen (Table 2). Out of these complications, transfusion occurred in 26 patients. Major bleeding occurred in 6 patients.



Graph 1: Demographic details of the subjects.

Table 1: Post-operative complications.

Complication	No. of patients
Myocardial necrosis	4
Major bleeding	6
Any transfusion	26
Coded stroke	1
Others	1
Total	38

Discussion

In the present study, we observed that post-operative hematological complications occurred in a total of 38 patients. Major bleeding occurred in 6 of our subjects. Smilowitz NR *et al* performed a retrospective comparison of adults undergoing knee, hip, or spine surgery at a tertiary care center during 2 periods between November 2008 and December 2009 (reference period) and between April 2013 and December 2013 (contemporary period). A total of 5690 participants underwent 3075 joint and spine surgeries in the reference period and 2791 surgeries in the contemporary period. Mean age was 61 ± 13 years, and 59% were female. In the overall population, incidence of myocardial injury, hemorrhage, and red blood cell transfusion were lower in the contemporary period. Among 614 participants with a preoperative diagnosis of coronary artery disease (CAD), in-hospital aspirin use was significantly higher in the contemporary period; numerically, fewer participants developed myocardial injury, had hemorrhage, and had red blood cell transfusion in the contemporary vs reference period. In a large tertiary care center, the incidence of perioperative bleeding and cardiovascular events decreased over time. In participants with CAD, perioperative aspirin use increased and appears to be safe [7]. Oberweis BS *et al* investigated the association between perioperative troponin elevation and long-term mortality in a retrospective study of consecutive subjects who underwent hip, knee, and spine surgery. A total of 3,050 subjects underwent surgery. Mean

age was 60.8 years, and 59% were women. Postoperative troponin was measured in 1,055 subjects (34.6%). Myocardial necrosis occurred in 179 cases (5.9%), and MI was coded in 20 (0.7%). Over 9,015 patient-years of follow-up, 111 deaths (3.6%) occurred. Long-term mortality was 16.8% in subjects with myocardial necrosis and 5.8% with a troponin in the normal range. Perioperative troponin elevation (hazard ratio 2.33, 95% confidence interval 1.33 to 4.10) and coded postoperative MI (adjusted hazard ratio 3.51, 95% confidence interval 1.44 to 8.53) were significantly associated with long-term mortality after multivariable adjustment. After excluding patients with coronary artery disease and renal dysfunction, myocardial necrosis remained associated with long-term mortality. In conclusion, postoperative myocardial necrosis is common after orthopedic surgery. Myocardial necrosis is independently associated with long-term mortality at 3 years and may be used to identify patients at higher risk for events who may benefit from aggressive management of cardiovascular risk factors [8].

Smilowitz NR *et al* determined long-term outcomes associated with anemia, hemorrhage, and red blood cell transfusion in patients undergoing noncardiac surgery. They performed a long-term follow-up study of consecutive subjects undergoing hip, knee, and spine surgery between November 1, 2008 and December 31, 2009. Clinical data were obtained from administrative and laboratory databases, and retrospective record review. Preoperative anemia was defined as baseline hemoglobin < 13 g/dL for men and < 12 g/dL for women. Hemorrhage was defined by International Classification of Diseases, Ninth Revision coding. Data on long-term survival were collected from the Social Security Death Index database. Logistic regression models were used to identify factors associated with long-term mortality. There were 3050 subjects who underwent orthopedic surgery. Preoperative anemia was present in 17.6% (537) of subjects, hemorrhage occurred in 33 (1%), and 766 (25%) received at least one red blood cell transfusion. Over 9015 patient-years of follow-up, 111 deaths occurred. Anemia (hazard ratio [HR] 3.91; confidence interval [CI], 2.49-6.15) and hemorrhage (HR 5.28; 95% CI, 2.20-12.67) were independently associated with long-term mortality after multivariable adjustment. Red blood cell transfusion during the surgical hospitalization was associated with long-term mortality (HR 3.96; 95% CI, 2.47-6.34), which was attenuated by severity of anemia (no anemia [HR 4.39], mild anemia [HR 2.27], and moderate/severe anemia [9]). Acedillo RR *et al* screened 9376 citations from multiple databases for cohort studies published between 1990 and 2011. Studies that met our inclusion criteria included patients undergoing any major surgery, with a sample size of at least 100 patients with chronic kidney disease (as defined by the primary study authors with an elevated preoperative serum creatinine value or a low estimated glomerular filtration rate). Their outcomes had to be compared with a reference group of at least 100 patients without chronic kidney disease. Our primary outcomes were (1) receipt of perioperative blood transfusions and (2) need for reoperation for reasons of bleeding. Twenty-three studies met our criteria for review (20 cardiac surgery, 3 non-cardiac surgery). Chronic kidney disease was associated with a greater risk of requiring blood transfusion (7 studies in cardiac surgery, totaling 22,718 patients) and weighted incidence in patients with normal kidney function was 53% and in chronic kidney disease was 73%; pooled odds ratio, 2.7 (95% confidence interval, 2.1-3.4). After adjustment for relevant factors, the association remained statistically significant in 4 studies.

Chronic kidney disease was associated with more reoperation for reasons of bleeding (14 studies in cardiac surgery, totaling 569,715 patients) and weighted incidence in patients with normal kidney function was 2.4% and in chronic kidney disease was 2.7%; pooled odds ratio, 1.6 (95% confidence interval, 1.3-1.8). However, after adjustment for relevant factors (as done in 5 studies), the association was no longer statistically significant. Chronic kidney disease is associated with perioperative bleeding but not bleeding that required reoperation. Further studies should stage chronic kidney disease with the modern system, better define bleeding outcomes, and guide intervention to improve the safety of surgery in this at-risk population ^[10].

Conclusion

From the above results, the authors concluded that hematological complications do occur in significant proportion of subjects undergoing various types of orthopedic surgeries. However, future studies with larger study group are recommended for assessing the correlation of hematological complications and prognosis of patients.

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