Complications of Enoxaparin use in Orthopaedic Trauma Patients

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Background/Purpose: Orthopaedic trauma patients are susceptible to developing venous thromboembolic (VTE) complications. While VTE prophylaxis using low molecular-weight heparin (LMWH) such as enoxaparin has been shown to be effective, it is relatively costly compared to other chemoprophylactic agents, and the incidence of related wound and bleeding complications in this population is unknown. In arthoplasty literature, prolonged wound drainage associated with an increased risk of surgical site infection and hematoma have been identified as a reason to seek alternatives to these agents. Our hypothesis was that LMWH would be highly efficacious at preventing proximal deep vein thrombosis (DVT) and pulmonary embolism (PE) in orthopaedic trauma patients and have a low rate of bleeding complications.

Methods: A prospective trauma database was searched for all adult orthopaedic trauma patients presenting to a Level I urban trauma center over a 6-month period. CPT and ICD codes were used to identify all pelvic, acetabular and hip fractures, as well as all operatively treated upper and lower extremity fractures in adult patients (>18 years) with a minimum of 6-month follow-up. Only those patients receiving enoxaparin for VTE prophylaxis were included for analysis. Patients were excluded if they had a preexisting history of coagulopathy, had received confounding anticoagulation, or had isolated hand or foot injuries. Outcomes included the 6-month incidence of VTE events as well as major bleeding complications. VTE was defined as all confirmed proximal DVT and central and subsegmental PE). Based on cardiac and anticoagulation literature, major bleeding complications were defined as fatal bleeding into a critical organ, clinically overt bleed requiring >2 u transfusion following administration of LMWH. Additional wound complications including wound drainage or hematoma requiring reoperation, and the diagnosis of deep surgical site infection were also recorded. 832 orthopaedic trauma patients were identified for inclusion (mean age = 46.5 years, mean body mass index [BMI] = 28.3, mean ISS = 15.4). Of the 832 patients, 320 (38.5%) had upper extremity injuries, 672 (80.8%) had lower extremity injuries, and 116 (13.9%) had multiple extremity fractures. Acetabular, pelvic, and hip fractures were present in 315 patients, of whom 202 (64.1%) required operative treatment.

Results: The incidence of major bleeding complications following LMWH administration for VTE prophylaxis was 15.3% (95% confidence interval [CI] 12.8%-17.7%, n = 2 fatal bleeding into a critical organ, n = 88 clinically overt bleeds, n = 13 requiring reoperation for evacuation of hematoma, n = 48 deep surgical site infection). The incidence of VTE events was 3.6% (95% CI 2.3%-4.9%; n = 7 distal DVT, n = 10 proximal DVT, n = 5 subsegmental PE, n = 11 central PE). Independent risk factors associated with VTE events include serum lactate >5 within 6 hours of presentation, as well as lower extremity fractures at or proximal to the knee. Independent risk factors associated with major bleeding complications include increased patient age, elevated BMI, ISS >18, open fractures, and multiple extremity fractures.

Conclusion: We observed a low overall incidence of VTE and a particularly low rate of central PE (1.3%). Additionally, we observed a significant number of bleeding and wound complications associated with LMWH in this population. These data can be used to plan future randomized trials assessing alternative anticoagulants. Patient and injury characteristics associated with VTE and bleeding complications can give clinicians rough estimates of the complication profile in these patients when considering the use of these agents in orthopaedic trauma patients.

See pages 47 - 108 for financial disclosure information.