Evaluation and Effects of Perioperative Low Molecular-Weight Heparin Administration in Patients Treated with ORIF of the Acetabulum: Are Patients Getting Their Medicine?

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Purpose: The purpose of this study is to review the details and complications of enoxaparin administration for patients with acetabular fractures before undergoing surgical repair.

Methods: This is a large, retrospective multicenter study of consecutive patients at two large urban trauma centers. Patient data, injury data extracted from electronic medical records, and radiographs were reviewed. Patients were split into two groups depending on whether or not they received enoxaparin greater than or less than 12 hours before surgery order preoperatively. Data of primary interest included timing of enoxaparin administration, timing of surgery, operative blood loss, and complications related to both bleeding and early thromboembolic events. Patients studied included all adult patients with operative acetabular fractures at our trauma centers. Exclusion criteria included patients who had contraindications to enoxaparin and patients with other significant injuries treated in the same operative setting. We evaluated patient demographics, injury pattern, surgical approach, blood loss, thromboembolism (deep venous thrombosis [DVT] and pulmonary embolism [PE]), bleeding complications including secondary surgeries for hematoma evacuation or infection, and transfusion requirement.

Results: Of 336 patients included in the study, 316 (94%) received enoxaparin preoperatively. Only 43 (13.6%) of patients received enoxaparin within 12 hours of surgery, and the average time from prior enoxaparin dose to incision in all patients was 20.4 hours (range, 4.2 to 45.8 hours). In the group of patients who did not receive enoxaparin within 12 hours of surgery, 29 of 265 (15%) developed a DVT compared to 1 of 51 (0.5%) in those receiving the drug less than 12 hours before surgery ($P < 0.01$). There was no increased risk of blood loss, transfusion, or bleeding complications for those patients receiving enoxaparin less than 12 hours before surgery. Of the 267 (84.4%) acetabular fracture patients taking enoxaparin preceding open reduction and internal fixation (ORIF) surgery who did not receive their immediate preoperative dose, it was ceased via a physician "stop" order (orthopaedic resident or other service) in 154 patients (56.9%, including 130 at the academic institution and 24 at the nonacademic center) or the medication was otherwise held (ie, last scheduled dose before surgery was not provided (by nursing and/or pharmacy without a physician order) in 113 patients (42.3%, including 70 at the nonacademic institution and 33 at the academic center).

Conclusion: We found that the vast majority of patients evaluated in this study received their last preoperative dose of enoxaparin between 8 and 36 hours before surgery. Patients who had effective enoxaparin up to the time of surgery (12 hours or less) experienced no DVTs or PEs, and did not appear at increased risk for bleeding or bleeding complications. Patients who had a gap in perioperative enoxaparin treatment did so apparently without

The FDA has stated that it is the responsibility of the physician to determine the FDA clearance status of each drug or medical device he or she wishes to use in clinical practice.

direction from the acetabular surgeon; either other medical staff wrote a "stop" order or nursing and/ or pharmacy staff held the medication. The resulting variability in the timing of enoxaparin administration was not planned and appears to have left some patients untreated during this at-risk period.

See pages 47 - 108 for financial disclosure information.