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Anti-Xa Level Monitoring in Elderly Trauma Patients Receiving Enoxaparin Prophylaxis

Introduction: Initiation of timely and appropriately dosed prophylaxis with enoxaparin, a low molecular weight heparin (LMWH), has been shown to reduce venous thromboembolism (VTE) in trauma patients. Lower enoxaparin doses are recommended in neurotrauma, renal insufficiency, low weight, pregnancy, and geriatric trauma patients. This study evaluated the appropriateness of serum anti-Xa levels for monitoring the effectiveness of VTE prophylaxis with enoxaparin in elderly trauma patients.

Methods: This single-centered, retrospective study analyzed data from geriatric trauma patients (aged 65 or older) who presented to a Level I trauma center between January 2020 and July 2024. All patients meeting inclusion criteria received enoxaparin 30 mg subcutaneously (SQ) twice daily for VTE prophylaxis and had a peak anti-Xa level drawn after 3 consecutive doses. The primary outcome evaluated peak serum anti-Xa levels for therapeutic appropriateness of VTE prophylaxis in elderly trauma patients. Secondary outcomes included time to VTE prophylaxis initiation and incidence of VTE prophylaxis complications, including clinically significant bleeding or VTE. Univariate analysis was performed.

Results: A total of 104 elderly patients met inclusion criteria. Baseline demographics found 59.6% male patients (62), with a mean age of 74.4 ± 7.3 years, mean ISS score of 18 ± 9.3, and a median BMI of 26.1 mg/m2. One hundred two patients (98.1%) had a blunt mechanism of injury, and 76.9% of patients (80) presented with a traumatic brain or spinal cord injury. Median time to VTE prophylaxis initiation from admission was 2 days. The mean anti-Xa peak level was 0.25 ± 0.12 IU/mL. Anti-Xa levels were therapeutic in 61 patients (58.7%), subtherapeutic in 37 patients (35.6%), and supratherapeutic in 6 patients (5.8%). Clinically significant bleeding after enoxaparin initiation was seen in 4 patients (3.8%) and VTE occurred in 7 patients (6.7%). Of the 7 patients who developed a VTE, 4 patients (57%) had subtherapeutic anti-Xa levels. The median hospital length of stay was 17 days.

Conclusion: This study found that subtherapeutic anti-Xa levels were measured in over one-third of elderly trauma patients who were initiated on enoxaparin 30 mg SQ twice daily for VTE prophylaxis. While anti-Xa levels were found to be therapeutic in only 58.7% of patients, complications of prophylactic therapy, including clinically significant bleeding or VTE, developed in a small proportion of patients. Initial enoxaparin doses greater than 30 mg SQ twice daily may be limited in elderly patients due to a higher rate of blunt trauma mechanism with brain or spinal cord injury. Further research is needed to evaluate dose adjustments using anti-Xa monitoring in geriatric trauma patients.