Heritable Thrombophilia Is Associated with Venous Thromboembolism After Pelvic and Acetabular Trauma Despite Appropriate Prophylaxis

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Purpose: Venous thromboembolism (VTE) events continue to be a significant cause of morbidity and mortality in orthopaedic trauma despite the standardized use of prophylaxis. Patients presenting with pelvic and acetabular fracture, injuries that are associated with life-threatening hemorrhage acutely and VTE subacutely, are not routinely screened for the presence of heritable coagulopathy disorders. The purpose of this study was to examine the incidence of heritable thrombophilia in the setting of acute pelvic and acetabular fracture and to determine if its presence is associated with increased risk of VTE events.

Methods: Skeletally mature patients admitted to two Level I trauma centers for isolated operative pelvic and/or acetabulum fractures were enrolled over 4 years in a prospective study. On admission, patients had blood drawn for PT (prothrombin time)/INR (international normalized ratio) in addition to markers for heritable thrombophilia (hyper-homocysteinemia, factor II and V deficiency, protein C deficiency or resistance, protein S deficiency, antithrombin III deficiency, and lupus anticoagulant). Medical records were reviewed for age, sex, smoking status, body mass index (BMI), and occurrence of VTE events. All patients were treated with 6 weeks of VTE prophylaxis using twice-daily subcutaneous enoxaparin (30 mg or 40 mg bid depending on weight) starting on admission and not held for surgery. Kruskal-Wallis with post hoc pairwise Dunn testing was used to evaluate the association of heritable thrombophilia with VTE. One-way analysis of variance and $\chi 2$ tests were used to compare the demographic variables of patients with and without markers of heritable thrombophilia.

Results: 146 patients with isolated pelvic and/or acetabular fractures were enrolled in this study. 49% of patients (n = 71) had no markers, 26% (n = 38) had one marker, and 25% of patients (n = 37) had more than one marker for heritable thrombophilia. Smoking status, age, BMI, and gender were not significantly different among the three groups. At an average of 85 weeks (range, 6-200) of follow-up VTE had occurred in 6.8% of patients (n = 10). Six of those ten patients had more than one marker for heritable thrombophilia. Patients who had more than one marker of heritable thrombophilia were associated with a higher incidence of VTE compared to patients with no markers ($P = 0.02$) and one marker ($P = 0.006$).

Conclusion: To our knowledge, this study is the first to specifically examine the incidence of heritable thrombophilia in the setting of acute trauma with pelvic and/or acetabular fracture and determine its significance on VTE. The incidence of heritable thrombophilia in this population of patients with isolated, acute pelvic and acetabular fractures is 51%. Greater than one marker of heritable thrombophilia is associated with an increased risk of VTE despite standard prophylaxis. Clinicians should consider screening patients with pelvic and/or acetabular fracture for heritable thrombophilia to mitigate the risk of VTE.