Does Reduction Technique for Pelvic and Acetabular Injuries Affect Trauma-Induced Coagulopathy? A Prospective Cohort Study

Zackary O. Byrd, MD[1]*; Elizabeth Davis, MD*[1]*; Prism S. Schneider, MD, PhD*[2]*; Anabel Acuna, BS*[1]*; April Vanderslice*[1]*; Bryan A. Cotton, MD MPh*[1]*; Milton L. Routt, MD*[1]*; Joshua Gary, MD*

[1]*University of Texas, Houston, Texas, USA*

[2]*University of Calgary, Calgary, Alberta, CANADA*

Purpose: Pelvic and acetabular injuries are associated with venous thrombotic events (VTEs). Operative reduction may be achieved with closed or open techniques. The effect that magnitude of surgical approach has on trauma-induced coagulopathy (TIC) is unknown. Coagulopathy can be assessed with rapid thrombelastography (r-TEG), specifically the maximal amplitude (mA). The null hypothesis was no difference in mA 24 hours after surgery between patients treated with closed versus open reduction techniques for pelvic and acetabular injuries.

Methods: After obtaining IRB approval, patients 18-65 years of age with operative pelvis or acetabular injuries (OTA/AO 61-A,B,C and 62-A,B,C) were screened for enrollment and excluded for existing coagulopathic states, severe burns, failure to consent for the study, and delayed presentation. 51 patients, 23 in the closed reduction group (CR group) and 28 in the open reduction group (OR group), were enrolled. r-TEG was performed on admission, 1 hour preoperatively, 1 hour postoperatively, and at 24 hours postoperatively and used to evaluate changes in mA. Statistical comparisons were performed using the Student t test.

Results: No difference in age, sex, body mass index, Glasgow Coma Scale, ISS, or time from admission to surgery between the CR and OR groups (all $P > 0.23$) existed. A significant increase in hypercoagulability from preop (mA 67.26 ± 6.4) to 24 hours postop (mA 71.04 ± 5.7) ($P = 0.04$) was seen in the CR group. An insignificant decrease in mA from preop (mA 70.64 ± 5.4) to 24 hours postop (mA 70.04 ± 4.4) ($P = 0.65$) was observed for the OR group. The difference between the ΔmA (+3.78) at 24 hours of the CR group and OR group (-0.60) was statistically significant ($P < 0.01$). One hour preoperatively the OR group was more hypercoagulable (CR = 67.26 vs OR = 70.64, $P = 0.049$). No significant differences existed at the other time points in either group.

Conclusion: Counterintuitively, patients treated with closed reduction became more hypercoagulable 24 hours postoperatively than those treated with open reduction. Increased blood loss with open techniques may induce transient hypocoagulability. The relationship with venous thromboembolic disease awaits further investigation.