An Algorithm Can Predict Blood Product Transfusion Requirements in First 24 Hours and 30-day Survival After Pelvic Fracture: 5-year Series of 589 Patients

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Purpose: Patients with pelvic fractures are at high risk of mortality and long-term morbidity. The fracture is just part of the injury profile. Our purpose is to identify specific factors, investigate their relative contributions and propose a "red alert" algorithm to predict mortality and blood transfusion requirements.

Method: All pelvis fractures in our center from 2012 to 2017 were investigated. Data included ISS, GCS, injury mechanism, other injuries, 30-day survival and blood product use. Fractures were classified by two fellowship-trained surgeons. Regression models investigated predictors of 30-day survival and blood product usage.

Results: 589 patients had pelvic fractures, male 57% female 43%; median age 48(5-100). Injury mechanism was RTA 52%, fall>2m 28%, fall<2m 16%, other 4%. Fracture type was A(15%), B1(6%), B2(65%), B3(7%) and C(7%). Mean ISS was 23(+/-15, range 4-75) and varied with fracture type: ISS was significantly higher in C than non-C fractures (p=0.000). Mean GCS did not differ between C and non-C fractures (p=0.197). Overall 30-day survival was 95% and was worse in C (86%) than non-C fractures(93-97%), p=0.001. Multivariate logistic regression showed that 30-day survival is associated with increasing age, higher GCS, having a non-C fracture and absence of haemothorax (p=0.000). Abdominal or vessel injury, open pelvis fracture, longbone fracture, gender and injury mechanism were not significant. Linear regression showed that blood product requirement is associated with lower GCS and presence of: C-type fracture, abdominal organ injury, haemothorax, vessel injury, longbone fracture and open pelvic fracture (p <0.001). Age, gender and mechanism of injury were not significant. 30-day survival was 86% in C type and 95% in non-C fractures. This compared favorably to published results in other centers and highlighted the importance of vertically displaced injuries. The proposed algorithm for predicting 30-day survival and blood product usage in this dataset of 589 patients uses regression constants from the logistic and linear regression models.

Conclusion: The algorithm may be a valuable tool for clinicians managing pelvis trauma patients by identify high-risk patients. It may help define standards for trauma center practice. The influence of non-orthopaedic injuries on mortality and transfusion requirements highlights the benefits of multidisciplinary care.