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THE SURGICAL PREDICTIVE GAP: DIFFERENTIAL UTILITY OF THE SHOCK INDEX IN BLUNT VS. PENETRATING ABDOMINAL TRAUMA

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Relevance. In trauma surgery, the "golden hour" requires rapid triage. The Shock Index (SI) is a widely used bedside tool for predicting hemorrhage; however, its reliability across different injury mechanisms, specifically blunt vs. penetrating trauma, remains debated. For the general surgeon, understanding when a normal SI might be misleading is critical to preventing delayed laparotomies and improving survival in penetrating injuries.

Aim: to evaluate the predictive accuracy of the admission shock index for emergency abdominal surgery and to determine if this predictive value is consistent across blunt and penetrating trauma mechanisms within a global cohort.

Materials and Methods. A secondary analysis of the CRASH-2 dataset (n=20,207) was performed. After excluding missing data and physiological outliers, 17,164 patients were analyzed. The primary outcome was abdominal surgery. Multivariable logistic regression was used to model the probability of surgery against the admission shock index (heart rate/systolic blood pressure), stratified by injury mechanism (blunt vs. penetrating) and adjusted for age.

Results and their discussion. In a multivariable analysis of 17,299 patients, the Shock Index (SI) was a powerful predictor of surgery in blunt trauma (OR 3.76; $p < 0.001$), with each 1-unit SI increase raising surgical odds by 276%. Conversely, SI had no predictive value in penetrating trauma (OR 0.99; $p = 0.818$). Age showed a marginal inverse correlation with surgical intervention (OR 0.988; $p < 0.001$), likely reflecting conservative triage in older patients.

The results reveal a surgical predictive gap. In blunt trauma, surgeons rely on physiological decompensation (rising SI) to identify hidden internal bleeding. In penetrating trauma, however, the decision to operate is driven by anatomy (wound trajectory and clinical signs) rather than physiology. A patient with a penetrating abdominal wound may require urgent surgery even while maintaining stable vitals, rendering the Shock Index an unreliable screening tool in this subgroup.

Conclusions. The Shock Index is a robust predictor for abdominal surgery in blunt trauma but lacks any predictive utility in penetrating trauma. General surgeons should not use a "normal" Shock Index to rule out the need for operative intervention in penetrating injuries, where anatomical suspicion must take precedence over physiological markers.