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Title:

Investigating Markers for Intracranial Hemorrhage Severity: Insights from CBC Changes and Beyond

Introduction:

While laboratory markers such as WBC count and neutrophil-lymphocyte ratio (NLR) and their correlation with brain injury severity have been extensively studied in adult populations, there is limited literature on this relationship in pediatric patients. This study explores alternative markers, including absolute neutrophil count (ANC), and their associations with established indicators of brain injury severity.

Methods:

A retrospective chart review was conducted at a single tertiary pediatric center. Data collected by the Trauma Surgery team over two years on patients evaluated for trauma included WBC count, hemoglobin, ANC, systolic BP, GCS, level of care received, imaging results, and length of stay (LOS). Data analysis involved ANOVA and chi-square where appropriate.

Results:

Among the 211 patient charts reviewed, 155 met the criteria for analysis. The majority were male (64.5%) or <12 months old (65.8%). Intracranial hemorrhage (ICH) was diagnosed in 66.5% of patients. Patients with ICH had significantly longer LOS (M=5.6, SD=8.3) than those without ICH (M=2.4, SD=3.6),  $F(1,153)=357.7$ ,  $p<0.1$ . Additionally, patients with ICH presented with significantly lower hemoglobin (M=11.26, SD=2.3) compared to those without ICH (M=11.96, SD=1.1),  $F(1,153)=6.3$ ,  $p<.05$ . Patients >1 year old were more likely to have elevated ANC (M=7.1, SD=4.3) than those <1 year (M=4.8, SD=4),  $F(1,135)=11$ ,  $p=.001$ . No significant variation in ANC was observed between patients with ICH and those without. Patients older than 1 year had significantly higher hemoglobin (M= 12.1, SD= 1.6) compared to patients less than 1 year old (M= 11.2, SD= 2.2),  $F(1,153)= 7.4$ ,  $p < .01$ . No association was found between patients with ICH and SBP at presentation.

Conclusion:

While patients with ICH presented with significantly lower hemoglobin, this finding may not be clinically significant. The data did not demonstrate a significant relationship between ANC, WBC count, and blunt head trauma severity in pediatric patients. This inconsistency with current literature warrants further investigation. Future research should focus on assessing modifying factors in isolated ICH in children, particularly in sample groups with greater variability in injury severity.