METHODS: We included patients younger than 18 years with GCS score 13 to 15 that were enrolled in 1 of 25 hospitals participating in the prospective Pediatric Emergency Care Applied Research Network (PECARN) head injury study and had ICI identified on CT. We used multivariable logistic regression on 10 imputed data sets to identify independent predictors of NI, and used the model β-coefficients to develop a clinical risk score.

RESULTS: Among 42,735 children with GCS 13 to 15 head injuries, 15,162 received a head CT scan and 846 had ICI. Among these patients, 8.3% required NI and no patients died. The most common type of ICI was subdural hematoma (24% of patients). Clinical variables independently associated with NI included palpable depressed skull fracture (odds ratio [OR] = 2.3) and GCS score of 13 (OR = 2.9) or 14 (OR = 1.2); radiological predictors included midline shift (OR = 7.2), epidural hematoma (OR = 1.3), and any skull fracture on CT (OR = 2.1). The model c-statistic was 0.81. Using the model’s β-coefficients, the Children’s Intracranial Injury Decision Aid (CHIIDA) score was created, which ranged from zero (2% risk of NI) to 27 (96% risk of NI) points.

CONCLUSION: Midline shift, epidural hematoma, any radiological skull fracture, palpable depressed skull fracture, and GCS score accurately predict the risk of NI in children with GCS 13 to 15 head injury and ICI. Based on these results, the CHIIDA score is a novel clinical decision tool to aid physicians caring for these patients.

Interrelationships Among Neuroimaging Biomarkers, Neuropsychological Test Data, and Symptom Reporting in a Cohort of Retired National Football League Players

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INTRODUCTION: Repetitive brain trauma (RBT) in American football has become a topic of recent interest. The objective of this study was to assess the interrelationships among neuroimaging findings with neurocognitive test performance and symptom endorsement in a cohort of retired professional (National Football League [NFL]) football players.

METHODS: Magnetic resonance imaging (MRI) scans were performed in 45 retired NFL players. Three neuroimaging parameters were recorded by blinded, board-certified neuroradiologists: (1) the absence or presence of small or large cavum septum pellucidum; (2) a global mean score of fractional anisotropy (FA); and (3) the presence or absence of microhemorrhages (microbleeds). The subjects underwent a battery of 9 paper-and-pencil neuropsychological tests (yielding 12 separate scores), a computerized neurocognitive test, and multiple (4) symptom and depression scales. The associations among the 3 independent neuroimaging results with these outcome measures were assessed using Pearson, Spearman Rank, and Point-Biserial Correlations.

RESULTS: Data from 45 retired NFL players (average age: 46.7 years) were analyzed. The retirees reported an average of 6.9 (±6.2) concussions and 13.0 (±7.9) sport-related “dings” in the NFL. Assessment of cavum septum pellucidum yielded a negative finding in 10 subjects (22%), while 32 (71%) had a small, and 3 (7%) had a large one. Four (9%) of the subjects had microhemorrhages present and average FA mean was 0.459 (±0.035). Number of sport-related “dings” was correlated with an increased risk of microhemorrhages (r = 0.305, P = .042). The majority (50.8%) of the correlations obtained among the 3 neuroimaging parameters and the neurocognitive/symptom scores were below the threshold of a “small” effect size (r < 0.10). The remaining (49.2%) correlations fell somewhere between “small” and “medium” effect sizes (0.1 < r < 0.3). However, all correlations were statistically nonsignificant.

CONCLUSION: The current results demonstrate minimal and statistically nonsignificant correlations among neuroimaging, neurocognitive, and symptom scores in a cohort of NFL retirees. The results indicate that, in this cohort, neuroimaging findings do not relate directly to neurocognitive test performance and clinical symptom burden. Although an often-accepted paradigm, associating the severity of structural brain changes with neurocognitive performance and symptom presentation after chronic RBT is complex, may involve other moderating variables, and requires further study.

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The Utility of Thromboelastography for Predicting the Risk of Progression of Intracranial Hemorrhage in Traumatic Brain Injury Patients

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INTRODUCTION: Progression of traumatic intracranial hemorrhage (TICH) is associated with increased morbidity and mortality. Half of patients with TICH progression have normal traditional coagulation laboratory studies. We hypothesized that thromboelastography (TEG), which directly measures clot formation and strength, would predict progression of TICH, the need for neurosurgical procedure, and mortality in patients with TICH.

METHODS: A prospective observational study in patients with TICH at a level 1 trauma center was undertaken. Progression of TICH was defined as ≥30% increase in TICH volume or by radiologist interpretation. Baseline demographic and clinical data were analyzed. TEG was performed at admission and 6 hours postadmission. Regression models were developed to determine whether admission TEG, the change between admission and 6-hour TEG, and TEG dichotomized as normal vs abnormal predict each outcome, controlling for important covariates.

RESULTS: In 169 subjects, 56% developed progression of TICH between admission and 48 hours; 25% underwent a neurosurgical procedure. Overall mortality was 7%. Progressors had higher injury severity scores than nonprogressors (median = 26, interquartile range [IQR] 17-30 vs median = 17, IQR 10-26; P < .01) and were more likely to have admission Glasgow Coma Scale [GCS] < 8 (P < .01). There were no differences in international normalized ratio, partial thromboplastin time, fibrinogen, platelets, or D-dimer between progressors and nonprogressors. There were no differences in median TEG values based on progression, mortality, or receipt of neurosurgical procedure status. For every 1% increase in LY30 during the first 6 hours postadmission, the odds of receiving a neurosurgical procedure increased by 17% (P = .04). In addition, subjects with an abnormal K time had...