

Corpus callosum MRI morphology and functional outcomes following pediatric traumatic brain injury

S.M. Hilleary, S.D. Marion, W.S. Brown, T. Babikian, S.A. Copeland,
C. Giza, E. Chin & R. Asarnow

Objective

White matter damage has consistently been found in association with traumatic brain injury (TBI), yet the functional implications are not well understood. The current investigation used structural MRI to characterize corpus callosum (CC) atrophy and functional status on interhemispheric tasks subsequent to pediatric TBI.

Participants and Methods

Structural MRI and bimanual coordination performance were examined in 13 healthy controls (12.60-18.50 years, $M = 15.94$) and 17 adolescents (12.10-18.30 years, $M = 16.03$) with moderate-to-severe TBI, six of whom had identifiable CC lesions. Individuals were imaged and assessed 3-8 months post-injury and one year later in both cross-sectional and longitudinal designs.

Results

MANOVA indicated significantly reduced CC only in TBI participants with lesions and only at the chronic (vs. post-acute) period. Importantly, CC deterioration was diffuse and not explained by lesion size or location. Genu area was correlated with bimanual motor speed. Among controls, larger genu size was related to the ability to slow performance to ensure accuracy, whereas TBI participants were slow and inaccurate. Callosal deterioration predicted worse performance over time on interhemispheric aspects of bimanual coordination.

Conclusions

This is one of the first investigations showing correspondence between CC structure and interhemispheric functioning in the months immediately following moderate-to-severe closed head injury in a pediatric population. This study is consistent with recent findings showing that CC lesions are a reliable indicator of continued white matter atrophy. Assuming replication with a larger sample, CC morphology may prove to be a reliable and efficient procedure to detect diffuse axonal injury.

*Suzanne M. Hilleary, MA, Clinical Psychology,
Fuller Graduate School of Psychology
180 N. Oakland Ave, Pasadena, CA 91101, United States
E-mail: shilleary@fuller.edu*