

MEDICAL-LEGAL FLIER BI-MONTHLY

Trauma Series #147

Out of Position Head Increased Tissue Damage in Rear Impacts

Rear-end accidents and ensuing whiplash disorders (WAD) have been evidenced to cause long-term aberrant sequella that range from headaches to persistent brain and biomechanical failures leading to certain arthritic premature arthritic changes. In a recent paper by Shateri and Cronin (2015) the authors presented the **FIRST EVER DEFINITIVE MODEL ON HEAD POSITIONING IN REAR END ACCIDENTS VERIFYING CAUSALITY.**



The authors used ligamentous laxity in the upper cervical spine to predict ranges of motion and traumatic responses. They compared neutral positioning to axial rotations to identify a higher potential for injuries in out-of-position rear end collisions.

They stated “A higher potential for ligament injuries was identified for out-of-position rear impact scenarios compared to the same impact scenarios with an initial neutral position. There was more than **a 50% increase** in the upper cervical spine and the C6-C7 capsular ligaments...during rear impact.”

The authors continued “In the middle of the cervical spine region, the C2-C3 posterior longitudinal ligament and the ligamentum flavum were predicted to exhibit **a 30% increase** in strain (ligament failure) and showed potential for failure with initial axial rotation of the head.) pg. 706

The authors utilized ligamentous laxity as a demonstrative model for analyzing biomechanical failure in rear end accidents. Currently there are accepted diagnostic tools available to “trauma trained doctors” that allow them to conclusively diagnose these injuries. The authors concluded “Importantly, this study demonstrated that the location of injury or pain depends on the initial occupant posture, so that both the location of injury and kinematic threshold may change when considering common head positions while driving.” Pg. 706

Reference:

1. Shateri H., Cronin D. (2015 *Out-of-Position Rear Impact Tissue-Level Investigation Using Detailed Finite Element Neck Models*, Traffic injury Prevention 16, 698-708