Spine Management Report

July 2022

Motor Vehicle Accidents and Brain Injury

Recent evidence has pointed to an association between motor vehicle crashes and traumatic brain injury (TBI). The understanding of exactly how these events are linked is the basis for much research and in time will become clearer.

A recent study by Baker et al (2022) stated "Each year, 1.35 million people are killed in road traffic collisions. (RTCs) globally, with at least 50 million people surviving after sustaining injuries." (pg 2) The specific discussion in this paper is related to brain injuries, with a particular focus on moderate-severe conditions.

The authors continue by reporting, "Almost 70% of all RTC fatalities involve a head injury, with 32% due to isolated head injuries. In Europe, RTCs are the most common cause of severe TBI (Traumatic Brain Injury). The majority of those injured are 'active adults' aged 16–55 years. This produces major long-term socioeconomic impacts, with TBI estimated to cost the global economy approximately $US 400 billion annually." (pg 2)

Greater Buffalo Accident Injury

1275 Main Street, Suite 110

Buffalo, NY 14209

716-200-0651

wowens@gbaic.com

www.gbaic.com

In relating vehicle dynamics to occupant injury, the paper states, "Delta-V provides an indication of the change in kinetic energy a vehicle is exposed to during a collision, some of which is transferred to the occupants, causing injury. Total delta-V takes into account both lateral (side-to-side) and longitudinal (front-to-back) delta-V, with this directionality influencing injury risk." (pg 3) ***It is important to consider delta-v in both a side impact and front/back perspective as these forces are very different.***

The authors opined, ***"We demonstrate for the first time that increasing delta-V had a distinct effect on the risk of different TBI pathologies for car occupants…" (pg 16) This is important since many clinicians focus on the spine and surrounding connective tissue and often overlook brain pathology.***

The paper sought to evaluate four key pathologies, skull fracture, subarachnoid hemorrhage, focal brain injury and subdural hematoma. They stated, "Traumatic brain injury risk depended on road user type, delta-V and impact direction. Accounting for delta-V, pedestrians/cyclists had a 6-times higher likelihood of moderate–severe brain injury than car occupants." (pg 1) The authors reported in this study, "We observed no moderate–severe TBI below a delta-V of 19 km/h (11 mph) for car occupants and 8 km/h (5 mph) for VRUs (Vulnerable Road User/Pedestrian). Delta-V for VRUs is heavily dependent on the speed of the impacting vehicle." (pg 16) ***This means that at speeds as little as 11 mph you can have a moderate-severe brain injury, mild-moderate brain injury would therefore occur at lower speeds than that.***

NATIONAL SPINE MANAGEMENT GROUP

LEADERS IN ACADEMIC SPINE CARE

Working with a clinician that understands delta-v and the need to evaluate the entire patient post trauma is critically important to successful diagnosis and management of injuries.

REFRENCE:

1: Baker, C. E., Martin, P., Wilson, M. H., Ghajari, M., & Sharp, D. J. (2022). The relationship between road traffic collision dynamics and traumatic brain injury pathology. Brain communications, 4(2), fcac033.