



HEAD INJURIES

Concussion v. whiplash

What claims experts need to know about assessing low-speed motor vehicle impacts

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A high-speed motor vehicle collision can often come with devastating consequences. However, even an accident at a reduced speed can cause injuries with long-lasting implications. Sometimes parking lot fender benders can create problems that can't be fixed with a paint job.

Two common injuries reported after a collision (concussion and whiplash) are due to acceleration and/or deceleration. They result from either low-speed or high-speed collisions and have commonly-reported symptoms. That's why a biomechanical expert is needed to carefully evaluate the accident in order to calculate the risk to a vehicle's occupant(s).

These types of evaluations begin by identifying the extent of an injury.

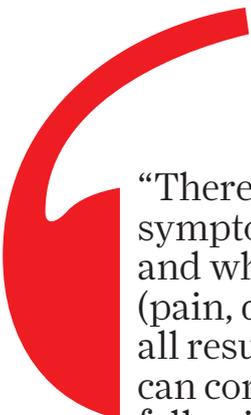
Determining diagnosis

There is a significant overlap in symptomatology between concussion and whiplash-associated disorders (pain, disorientation, and dizziness can all result from either condition). This fact can complicate diagnoses for victims of low-speed collisions. The challenge for an adjuster/claims specialist is to determine, based on the information available to them, whether the conditions of the incident were enough to have resulted in either type of injury. That is why it is important to know what differentiates one condition from the other.

Spotting the difference

Although concussion and whiplash share many of the same symptoms, key differentiators exist between the two diagnoses. Whiplash is principally a neck injury, the result of rapid back and forth movement of the neck. A concussion is a traumatic brain injury often caused by a bump, a blow, or a jolt to the head. Whiplash and concussion can, therefore, occur simultaneously (should the rapid movement of the neck cause the head to strike an object or surface), but not always.

According to *mayoclinic.org*, cognitive evaluations may determine if a concussion has occurred. Imaging tools such as CT scans and MRIs are also used to determine the extent of brain injury or



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to diagnose post-concussion complications. Whiplash injuries are not apparent in these types of tests. Whiplash injuries, by contrast, are determined by evaluating ranges of motion for the shoulders and neck, tenderness in these areas, as well as conducting reflex, strength, and sensation testing in the limbs. With testing complete, physicians can diagnose either disorder.

That leaves the biomechanics expert to analyze an accident scene for the likelihood of injury.

Biomechanics in evaluation

The biomechanics expert works closely with the accident reconstruction engineer in the analysis of an accident. Particularly relevant to the biomechanics expert is information related to the severity of the impact, location of impact, direction of impact, and post-impact movements of the vehicle.

This information allows the biomechanics expert to determine the movements and forces experienced by the vehicle's occupants during and after impact. Derived movements and forces are compared against injury thresholds to arrive at a determination of likelihood for injury in the subject's collision. With this information, the biomechanics expert factors in acceleration data to further determine the extent of the injury.

Calculating the risk

Contemporary biomechanical evidence indicates that concussion arises from the combination of linear and rotational accelerations imparted to the head. For ex-

ample, data obtained from accelerometers (instruments used to measure acceleration) embedded within football helmets have been used to develop mathematical relationships between the severity of head acceleration and the risk of concussion.

Determining the accelerations experienced by the occupant of a vehicle in a low-speed motor vehicle collision al-

lows the biomechanics expert to apply these risk curves. The result is a probability that the severity of the accident would have been sufficient to cause the occupant to sustain a concussion. The severity of the collision, then, often depends on the rate of speed of the vehicle(s) involved.

Science of speed

In a recent study using data obtained from low-speed rear impact sled tests conducted by the Insurance Institute for Highway Safety, acceleration data was obtained from crash test dummies that were used as subjects for these sled tests. Concussion risk was assessed by inputting acceleration data into relevant equations. The conclusion was that there is a negligible risk of concussion in a low-speed rear-impact collision.

The evidence presented above suggests it is more likely that symptoms reported

Increase the accuracy of your next biomechanics and accident reconstruction report.

Provide copies of:

1. Motor vehicle accident report
2. Collision reporting centre report
3. Witness statements
4. Statements of claim
5. Video footage (traffic cameras, dashboard cameras)
6. Data from vehicle download
7. Ambulance report if available
8. Medical documents from before and after the incident



severity of the collision was enough to produce concussion or whiplash. With increased speed the probabilities of both whiplash and concussion rise. However, the chances of contact between an individual's head and the vehicle's interior increases with more serious collisions, which is a major contributor to the potential for concussion.

Biomechanics determine the extent and severity of an accident and, with the help of an accident reconstruction engineer, provide complete evaluation and analysis for adjusters. These conclusions affect all stakeholders involved in a motor vehicle accident, which is why all reports must be carefully detailed — and why it is critically important for qualified personnel to assess these incidents. CU

by occupants of the struck vehicle in a low-speed rear-end collision would be related to whiplash-associated disorders and not a concussion. That said, even at

low speeds, motor vehicle collisions can have a big impact. Subsequent assessment from a biomechanical perspective would evaluate the likelihood that the

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