

MOTOR VEHICLE COLLISION DYNAMICS

Factors to Consider:

- **Type of vehicle striking and struck – mass ratio:** The weight or mass of the striking and struck vehicle have significant influence on injury occurrence. For example, a large car of 4000 lb and a small car of 2000 lb hit head-on at 30 mph. Mass ration is 2:1. At collision, larger car will slow to 10 mph and the smaller car will be instantly propelled backwards at 10 mph. Larger car has a 20-mph total velocity change while smaller car has 40-mph velocity change. Smaller cars have more severe crash injuries.
- **Speed of travel:** This is of absolute importance at high speeds. At low speeds, the correlation between crash velocity and injury occurrence is less predictable.
- **Aware of impending collision:** Those occupants aware of the impending rear end crash had less severe injuries. Obviously, this is helpful up to a certain speed.
- **Injury to other passengers.**
- **Extent of damage to vehicle:** In general, there is a positive correlation between the extent of damage to the vehicle and the risk of injury. However, this is far from absolute.
- **Position of head:** Looking off to the side or down or up is more likely produce an asymmetric load to the neck. It may increase the of risk facet joint injury.
- **Seatbelt:** Use of the seatbelt decreases the incidence of head injury significantly. Most epidemiological studies have found that seatbelts increase the risk of minor and moderate neck injuries in automotive collisions. “It appears that there is a trade-off: in order to save lives, belt usage may cause some injuries.”
- **Headrest and its position:** In the proper position, this reduces injury. If the head restraint is low or absent and the occupant is able to extend backward beyond anatomic limits, the soft tissues may fail to tolerate the rate of loading.
- **Strike any surfaces within the vehicle:** Commonly head on visor, windshield, knee on dashboard, chest against steering wheel.
- **Site of impact:** Side collisions produce more severe injuries than rear crashes. No large mass elements such as engine or bumper to disperse force, side structures are usually of lighter material, involve more vehicle rotation and there is less depth between the striking vehicle and the body of the occupant.
- **Damage to the seat:** If the seat breaks off, increases risk of injury and indicative of force imparted.
- **Symptoms at the scene:** Severe symptoms at the scene are more likely to indicate a bone or joint or neurological injury. Many individuals who are suspected to have a facet joint injury are asymmetrically loaded and complain of a fairly localized burning pain on one side of the posterior neck at the scene.

If you would like additional information, please give us a call at 1(800) 363-8900.

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