Topic #3

Diffusing Deceptive Rhetoric from Insurance Companies

As stated in topics #1 and #2, when insurance companies are denying or settling cases, they will deploy deceptive rhetoric to either deny or reduce settlement offers based on your demand letters. Today, I will discuss topic #3 on how to rebut another one of their most utilized topics of rhetoric. This rhetoric is utilized where there is low or sometimes no damage to the target vehicle (vehicle receiving the impact) and the insurance carriers then concomitantly surmise that there can be no bodily injury to the occupant in the target vehicle (vehicle being hit). This rhetoric is based on false and misleading information and is the following:

A No or Low Damage Crash Always Equals No Injury

Unfortunately, this rhetoric is effective because it seems to be logical that if there is little damage to the target vehicle how can the occupant be injured? Also, if the insurance carrier takes this case to trial, they know that jurors will be biased against the “injured plaintiff” because it is complicated and doesn't make sense. Jurors might assume the plaintiff is “making it up” to bilk the system.

Furthermore, many attorneys are reticent to accept these cases due to the perceived biases against these plaintiffs. Also, insurance carriers know which attorneys never go to trial so they can deny or lowball these cases.

On the other hand, this deceptive rhetoric almost always flies in the face of facts and science. In our topic today (topic #3), we will submit the facts so that the injured can prevail over deception utilizing both science and physics. We will reveal the truth of the Physiology and Causality of injuries caused by low or no damage crashes.

Science of No or Low Damage Crashes

There are many factors which play a role in the dynamics of automotive collisions. These include vehicle design and type, speeds, angles of approach, kinetic and potential energy, momentum, acceleration factor, friction and many other factors. This list is very long, however there are a few constants in which we are most interested. These constants make the chaotic world of automotive collisions predictable and quantifiable.

Conservation of Momentum

Conservation of Momentum is built on Sir Isaac Newton's third law of motion which states, "for every action, there is an equal and opposite reaction." For this topic, we will focus on the conservation of momentum in relationship to crash dynamics. It is the relationship of momentum to low-speed collisions that is the causal factor of the injuries and helps enlighten those who have held tight to the deceptive argument that no damage equals no injuries.

To demonstrate this concept, we will use the example of shooting pool which hopefully you have had the opportunity to play. Imagine we are going to attempt the winning shot of the eight ball into a corner pocket. After the cue ball is struck, we now have one object in motion which will collide with another when the cue ball strikes the eight ball. When this "crash" occurs the cue ball stops moving, and the eight ball begins moving. In this scenario, the momentum of the cue ball before the collision is the same as the momentum of the eight ball after the collision. Hopefully the eight ball rolls into the corner pocket!

In this example the transfer is highly efficient due in part to the fact that neither pool balls can deform. If either pool ball could deform, some of the energy would be used to do this and less would be transferred to make the ball roll. In the sense of managing minimum performance standards for passenger vehicle bumpers there are two organizations that utilize this same concept as the pool ball.

The National Highway Transportation Highway Safety Administration (NHTSA) mandates minimum performance standards for passenger vehicle bumpers. Vehicle bumpers are tested with 2.5 mph (3.7 fps) impact equipment which has the same mass as the test vehicle (not dissimilar to the pool example above). The test vehicle that is struck has its brakes disengaged and the transmission in neutral.

Furthermore, The Insurance Institute for Highway Safety (IIHS) also conducts low speed bumper tests. The IIHS's test speeds are conducted at six mph (8.8fps) And the goal is to determine which vehicles have the least damage and therefore cost the least to repair. The vehicle ratings are inversely proportional to the estimated cost of repair. The costlier the repair, the lower the rating exclusive of safety. While the vehicles used in the IIHS testing all showed signs of contact with the barrier, none of the vehicles suffered damage which deformed the structure of the vehicle. Just as with the NHTSA, the vehicles tested by the IIHS do not have any change in their structure affecting the braking system, steering, and suspension.

Consequently, the lack of change in the structure (deformation) forces a test vehicle to accept the momentum transfer from the testing equipment. Further, the test vehicles are free to move after being struck. This testing scenario is strikingly like that of the cue ball and eight ball.

Importantly, if a vehicle doesn't deform during a low-speed collision, then it will experience a change in speed (or velocity) very quickly. Accordingly, the occupant(s) also experience the same change in speed**. Another words, if there is no deformation of the target vehicle, the time it takes to change the speed of the target vehicle will be less and the energy will be totally transferred to the occupant(s) just like the eight ball in the example above. The time it takes for the bullet vehicle to slow down after a crash is the arbiter of whether there will be no injury or injury and possible death.** The more time it takes to slow down= less energy transferred and thus less injury. Less or no time to stop =more energy transferred and more injury. This is why vehicles are designed with bumpers that deform and crumple zones which increase the amount of time to stop and reduce energy transfer and injury***. Unfortunately, as you will see shortly, studies show that bumpers are not deforming at the manufactures stated mandates, thus creating less time for the bullet vehicle to slow down and significantly increasing the energy imparted to the occupants causing significant injuries to these same occupants***.

Another key factor in these examples is the equal mass of the vehicles and testing equipment involved, but what happens when the masses change? Indeed, when the mass of one vehicle changes the momentum also changes, the more mass, the more momentum the vehicle can bring to the event and the greater the injury potential to the occupant. Remember as we previously said, the momentum going into a collision can be accounted for in the outcome when we discussed the concept of **conservation of momentum.** To simplify the equation of conservation of momentum we initially will utilize two vehicles with the same weight as in the example of the pool balls. We will utilize Toyota Corollas which weigh approximately 2734 lbs. The bullet Corolla (the vehicle that hits the target vehicle) is traveling at 5 mph and hits the target Corolla which is stopped at 0 mph. When the bullet Corolla hits the target Corolla it stops completely and then the target Corolla speeds up to 5mph which is equal to 7.35 feet per second, and based on the conservation of momentum the force going into the collision will equal to the force after the collision and the momentum is conserved.

Now we are going to change the bullet car to a Chevrolet Tahoe which weighs 5448 lbs. When the bullet Tahoe vehicle hits the target Corolla (which weighs 2734 lbs.) the bullet Tahoe changes speed to 0 mph and to conserve the momentum the target Corolla will now be traveling at 9.96 mph which is equal to 14.64 feet per second. The first point in this example is to note that the change in speed of the Tahoe was 5 mph. This is less than the speeds used by the IIHS which we previously discussed. We would expect the Tahoe to have no structural deformation and minimal cosmetic damage. The second point to note is the change in speed the Corolla experiences is 9.96mph (from 0- 9.96 mph). **This change in speed is four times the minimum needed to induce whiplash injury.** (1)

Indeed, there was a 1998 study by Brault, Wheeler et al, titled "Clinical Response of Human Subjects to Rear End Automobile Collisions. In an important observation, the authors stated," Analysis of the effect of a 4km/h impact (2.49 mph) severity on ROM measurements over time revealed that, at both postimpact examinations, subjects with and without symptoms had a significant decrease in cervical flexion, extension, retraction, and right lateral flexion, with left lateral flexion ROM approaching statistical significance. At the 8km/h impact severity, ROM values were significantly reduced post impact for all ranges of motion with and without symptoms They also affirmed **"the empirical findings in this study contribute to establishing a causal relationship between rear end collisions and clinical signs and symptoms."** (2)

Five MPH Bumper Damage Myth

It has been widely reported that the majority of automobiles deform or crush, as per the manufacturers rating at 5 mph, and as a result occupants cannot be hurt at such a low velocity of impact. However, The Spine Research Institute of San Diego, who crashed dozens of cars in an independent study, **found a flaw in the manufacturers rating. The car withstood multiple crashes beyond 5mph, therefore invalidating the manufacturer's report. Their research showed that "cars can withstand speeds of 8-12mph without sustaining crush damage." Richter et al. (2000) showed in their research that occupants sustained injuries beginning at 6.8 MPH proving that a large percentage of occupants get injured in no damage crashes.**

Moreover, we have already established that bumpers can sustain crash impacts greater than 5 mph and deform on the average between 8-12 mph. What is apparent, however, is in a rear end collision where there is no gross deformity of the bumper, there is usually slight damage in the form of paint chipping or a small dent. This is demonstrative evidence that cars collided, and energy was transferred from the bullet car (striking car) to the car in front.

Biomechanical engineers have concluded that in rear end collisions, pent up energy in contracted bumpers and seat back springs, being released simultaneously, as the driver in the front car reapplies the brakes and causes the occupant to be exposed to

more destructive force than the car. This is a cause for whiplash in these "slight" damage crashes. The Insurance Institute for Highway Safety concurred, when Farmer, Wells and Lund researched for them in 1999 and wrote *"when property damage was slight neck injuries could occur."*

A study by the Vasavada, Brault & Siegmund titled "Musculotendon and Fascicle Strains in Anterior and Posterior Neck Muscles during Whiplash Injury" was conducted at low velocity (8km/h= 4.96 mph) to determine whether the forces on the muscles in the front and back of the neck would exceed published thresholds for muscle injury, and contribute to the injury of capsular ligaments. **They found that the muscle injury rate calculated for the neck muscles during whiplash exposures exceeded those which have been found previously to cause injury**. As a result of the rate of injuries reported in the study, it shows that **there may be a gross underestimate of the magnitude of whiplash victims in low velocity accidents.** (3)

Additionally, there is a 2005 study by Croft & Freeman titled "Correlating Crash Severity with Injury Risk, Injury Severity, and Long-Term Symptoms in Low Velocity Motor Vehicle Collisions." In this study, after an extensive review of the literature, Croft & Freeman found only four papers that compared property damage resulting from low velocity motor vehicle crashes to any of the three injury categories including injury risk, injury severity, and duration of symptoms. According to the authors. a substantial number of injuries are reported in crashes of severities that are unlikely to result in significant property damage. They concluded that **"property damage is neither a valid predictor of acute injury risk nor of symptom duration."** (4)

One final study showed that minimal vehicle damage increased treatment duration. In a research paper published in a respected orthopedic journal, Hijioka, Narusawa & Nakamura (2001) studied data related to the duration of treatment of 400 whiplash cases. Damage to the vehicle was correlated to treatment length**.** ***Patients in vehicles with no damage and damaged that involved 1/2 of the vehicle were under treatment longer than those in the other groups***. It is a common misunderstanding to classify many whiplash victims as having injuries that are expected to make a full and complete recovery within four to six weeks. The authors of this study stated, **"our data show that only 29% of patients recovered by 4 weeks."** The authors also established preexisting injury predisposed trauma victims to increased injury and prolonged treatment time by stating degenerative changes occur more frequently with increasing age and these changes disrupt early tissue repair. (5)

Summary

We utilize the conservation of momentum, which is Sir Isaac Newton's third law of motion, which states that for “every action there is an equal and opposite reaction.” In the world of automobile crashes, in particular to no damage or low damage crashes, it is the relationship of momentum that is a causal factor of injuries Which helps enlighten those who have promoted the deceptive argument that little, or no damage equals no injuries.

Mandates for rear bumpers to be deformed at 2.5-5mph were designed to dissipate the energy of the bullet car (the car that collides with the target car), however the flaws in the manufacturer’s ratings have invalidated the manufacturer’s report. Moreover, perhaps the bumpers were manufactured not to deform, thus saving money on the repairs, but causing significantly more injuries.

The most important concept to understand is **Time**. The time it takes for the bullet car to slow down to a complete stop is the arbiter of whether or not the occupants in the target vehicle will be injured. The more time it takes to stop with the use of deforming bumpers the less energy transfer and potential energy to the occupant. On the other hand, if the bumpers do not deform, there will be decreased time for the bullet car to stop and more energy will be transferred to the occupants yielding increased injuries as shown In the above examples.

Mass of the bullet vehicle as compared to the target vehicle is also an extremely important variable to consider when determining energy transfer to the occupants. As we saw in the above example of the Tahoe colliding with the Corolla the speed of the Corolla almost doubled. My hope is that your office will understand these concepts to prevail in **just cases** where your clients have injuries but the damage to the vehicles may be minimal. If you have any questions, please do not hesitate to contact me.

References

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