Another Report Fails to Show a Correlation Between Vehicle Delta V and Outcome in Acute Whiplash Injuries

A recent study by Kasch et al. (1) looked at, among other things, the relationship between speed change in patients who suffered an acute whiplash injury and neck mobility, neck pain, or headache. These researchers followed a group of 141 patients for six months in a prospective manner, primarily to compare neck mobility in patients with acute whiplash injury to a control group with acute ankle sprain. They wanted to see if they could relate any loss of neck mobility to headache, neck pain, and speed of the car at the time of collision. They indicated that a major problem after whiplash injury is restriction of neck mobility immediately subsequent to trauma, however, it is unclear whether the neck mobility changes after the acute injury are related to the associated headache and neck pain. They assessed the 141 patients’ cervical range of neck motion, neck pain, and headache after 1 week, then 1, 3, and 6 months after acute whiplash injury, and 40 patients with acute non-sport ankle sprain. They found that patients with whiplash injury had significantly reduced flexion, extension, lateral flexion, and rotation of the neck immediately after injury, as compared with patients with ankle sprain. However, neck mobility was similar in the two groups after 3 months. They concluded that in patients with whiplash injury, neck pain and neck mobility were found to be related inversely to reported headache and neck mobility during the first 6 months after acute whiplash injury. They also found that neck mobility was not significantly related to a difference in car speed at the time of collision.

Critique

This study, comparing differences between a CAD (Cervical Acceleration/Deceleration) group and a control group, consisting of persons with sprained ankles (referred to as ankle distortions in the paper), was one of the more important papers of the year 2001. The authors’ primary interest was in cervical range of motion (CROM) as it relates to neck pain and headaches. Secondary issues were vehicle property damage, speed differences (which I interpret as meaning speed changes or delta Vs), body mass index (BMI), and age. These were all rear impact motor vehicle collisions (MVCs), but they were not categorized in terms of grades of severity. The median reported speed change was 40 km/h (24.8 mph). However this figure is unlikely since most injuries occur between 6-12 mph delta V in rear impact collisions (2). If true, it would also suggest a highly selected group. Moreover, spinal cord injuries become more likely beyond 15 mph delta V and 85% of the subjects in this study self-rated their condition as minor.

To determine speed changes, participants were asked to estimate their speed and that of their crash partner by selecting the number from among 5 km/h increments. This, of course, has the potential to introduce a rather frightening degree of uncertainty. On the other hand, the tendency to overestimate the crash speed is probably going to be fairly consistent from one subject to the
next, so if we are looking at variations of speed change, it may be less of a problem than if we were concerned with absolute values. The vehicle masses were likewise estimated from three categories: 0-999 kg, 1,000-1,999 kg, and over 2,000 kg. The potential error in this estimation might have been reduced by attempting to determine the makes and models of the involved cars and actually looking them up.

The method used to determine or estimate property damage was not described. The authors only informed us that “No significant differences in neck mobility was found between participants with whiplash injury exposed to various degrees of car damage (0% to 100% total damage).” There was no mention of pain in this context, but the authors did associate pain with restricted ROM. Here again more effort could have been expended in collecting this information. As is, it is relatively meaningless to us since even relatively minor structural damage might be considered a total loss in an older, less valuable car.

The chief findings in the work were that there was a linear inverse association between CROM and neck pain as we would expect, but not with ankle sprain. At six months, however, there was no significant difference between the groups with regard to CROM. Perhaps the biggest question left unanswered here was how this related to symptoms. Although the mean total CROM and specific ranges were not statistically different at six months, we don’t know whether there was any relationship between neck pain and symptoms. We don’t even know how many of these subjects were symptomatic at six months.

There was also no dose-response relation between speed change and neck mobility, neck pain, or headache on day 90, meaning that the speed change did not allow prediction of outcome. So we can add this report to the others that have failed to show a correlation between speed change and outcome (3,4,5,6), an important piece of knowledge in this litigious field. The same was true for the weight of the cars and property damage in both the early phase of recovery and after three months. The findings suggest, the authors point out, that CROM is a valuable measure in the assessment of neck pain in whiplash.

References:


