

## Forensic Biomechanics Analyses in Civil Cases: A Defense Perspective

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### Editorial

The following case is one in which I was retained by the defense attorney. This case also serves as an example as to why plaintiff's counsel should be very careful when they commit to taking on a client.

Initially, this case (DOI: 11/2004) was dismissed following my report in 2009 and the reports of the defense neuropsychology and neurology experts. However, the plaintiff, a lady in her mid-50s was persistent and pursued her matter to trial with a new attorney in 2012. This matter involved a single bottle of champagne which was in a light weight metal stand which fell some 10 inches from a ledge on the seat back support of a hotel restaurant booth. Hotel restaurant staff reported that the bottle was empty. However, the plaintiff reported a full bottle (750 ml). The woman claimed that the bottle struck the right side back of her head and then continued downward to impact her right upper back finally ending up on the booth seat. No one saw the bottle strike the plaintiff and there was no reported loss of consciousness from an alleged head strike. However, the bottle and display holder did fall to the booth seat. The initial claim was for transient upper back injury, right arm injury, right lower extremity injury and most importantly an alleged significant brain injury due to the head strike. Interestingly, this alleged brain injury instead of improving over time allegedly continued to progress and this woman became less and less functional during her eight years involved in this litigation to the point where she claimed she was no longer able to live independently. Some evidence supported the notion that over the months and years she had become much less mentally functional.

In discussing the sequence of events, the plaintiff indicated that "when it hit my head, I don't remember it hitting my head right away because the impact was so hard that when it hit my back that it knocked all the breath out of me". The plaintiff indicated that much of the evening was not well remembered although she did remember being given a free night's lodging at the hotel by a staff member.

The plaintiff did indicate that her head was not bleeding, but she alleged that there was a huge lump in the spot where she was struck on the back of her head and someone brought her a cloth and some ice. The plaintiff also contended that a significant horizontal force (i.e. a push) must have occurred to the bottle for it to have hit so hard on her back to take her breath away. She thought that the bottle may have been thrown or bumped by a staff person in back of her booth. She sought medical attention two days after the incident and all objective findings at that point were absent. Her head was atraumatic. The ER physician made the statement after running his examination that: "I did not appreciate evidence of her trauma". Nevertheless, a CT scan was administered (without contrast) which was negative.

I accomplished a site visit in early 2009 in this matter and took measurements at the hotel with a exemplar female subject in the seat booth. An exemplar full bottle of champagne was weighed (worst case scenario) and the drop displacement was measured. Furthermore, the vertical velocity equation was employed to determine the downward velocity at head impact. This vertical velocity was multiplied times the mass of the bottle/bottle holder to calculate the linear momentum. An intentional push or throw of the bottle was ruled out. My calculations

assumed a direct head strike in which all of the linear momentum of the bottle/bottleholder was brought to zero during the head impact. This worst case scenario was nevertheless inconsistent with the plaintiff's contention that she was hit on the back of her head first (i.e. a glancing blow) and then, as the bottle continued downward, an impact to her upper back occurred which was sufficient to knock the breath out of her. The final worst case scenario result would have produced an average acceleration to her head link of approximately 2.7 gs over the impact time duration. My view was that this was a gross overestimate of the acceleration that was imparted to her head. However, such a head impact by a bottle edge during the fall could have produced a SCALP swelling (never objectively observed) due to the compressive stress applied. However, clearly this low level of linear acceleration applied to plaintiff's head could not have been responsible for any resulting brain injury.

Plaintiff's attorney did retain one neuropsychologist who indicated brain dysfunction of the plaintiff in some areas. However, no prior incident baseline existed in terms of her mental performance. Furthermore, in spite of ongoing objective medical tests which were all negative, the plaintiff appeared to become less and less functional as she aged into her sixties.

This case also illustrates the importance of the plaintiff's attorney contacting a biomechanist early on in addition to neuropsychologist, vocational or even medical experts in a case of this magnitude. An injury causation analysis (ICA) demands more than simply temporal correctness in terms of symptom presentation. Certainly biological individuality must be considered in every case. However, the loading must be a reasonable match to the trauma (alleged TBI in this case). This is how science works.

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