Cervical spine injury etiology

The most common causes of cervical spine injury are automobile accidents, followed by diving into shallow water, firearm injuries, and sports activities [1) 2)].

see Trampoline injury.

Cervical spine injuries can occur in military scenarios from events such as underbody blast events. Such scenarios impart inferior-to-superior loads to the spine. The objective of this study is to develop human injury risk curves (IRCs) under this loading mode using Post Mortem Human Surrogates (PMHS). Twenty-five PMHS head-neck complexes were obtained, screened for pre-existing trauma, bone densities were determined, pre-tests radiological images were taken, fixed in polymethylmethacrylate at the T2-T3 level, a load cell was attached to the distal end of the preparation, positioned end on custom vertical accelerator device based on the military-seating posture, donned with a combat helmet, and impacted at the base. Posttest images were obtained, and gross dissection was done to confirm injuries to all specimens. Axial and resultant forces at the cervico-thoracic joint was used to develop the IRCs using survival analysis. Data were censored into left, interval, and uncensored observations. The Brier score metric was used to rank the variables. The optimal metric describing the underlying response to injury was associated with the axial force, ranking slightly greater than the resultant force, both with BMD covariates. The results from the survival analysis indicated all IRCs are in the “fair” to “good” category, at all risk levels. The BMD was found to be a significant covariate that best describes the response of the helmeted head-neck specimens to injury. The present experimental protocol and IRCs can be used to conduct additional tests, matched-pair tests with the WIAMan and/or other devices to obtain injury assessment risk curves (IARCs) and injury assessment risk values (IARVs) to predict injury in crash environments, and these data can also be used for validating component-based head-neck and human body computational models [3)].

Fall-Related Cervical Spine Injury

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1)
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2)
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3)
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