A Detailed Study of Real-World, High Tibia Impact Injury Data for Comparison with Biomechanical Research Findings

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ABSTRACT

Background: *Knee-thigh-hip (KTH) complex injuries due to frontal motor vehicle collisions (MVCs) are a major health concern. As a result, The Ohio State University Injury Biomechanics Research Laboratory (IBRL) has conducted dynamic simulated frontal impacts with cadaveric subjects in the hopes that findings will lead to safer vehicle designs capable of better protecting this region. Unfortunately, the validity of simulation-induced PCL tear/avulsion has remained in question. Limited searches of the major engineering crash-trauma databases (CIREN, NASS,CDS) and literature have yielded virtually no accounts of the real-world occurrence of such injury during a frontal crash. The objective of this study was to expand and supplement this initial search and determine whether PCL injury is occurring during frontal crashes in the real world.*
Methods: *This was a retrospective study with 3 major arms: The medical literature, OSU medical records, and engineering databases (CIREN) and literature. From the latter two arms (OSU/CIREN), twin pools of 80 frontal crash victims were created with strict inclusion criteria. Crash injury data was organized into regional/sub-regional categories. Information from both the study pools and literature sources was compared with IBRL findings.*
Results: *PCL injury occurrence during frontal crashes was well characterized in the medical literature. The OSU pool also supported these findings with 8/80 subjects having a PCL injury and 17/80 subjects having any ligament/connective tissue injury. The CIREN pool had 3/80 subjects with ligament/connective tissue injury but had no specific mention of what structure was injured. The engineering literature had virtually no mention of either the PCL or any knee ligament being injured in a frontal crash.*
Conclusion: *The results support the IBRL findings: PCL injury appears to be occurring relatively often in real-world frontal accidents. A significant lack of communication seems to be in place, however, between the medical and engineering communities as the engineering databases and literature almost completely omit mention of <u>any</u> ligament injury occurring during such a crash.*