

Morphology and pathoanatomy of the cervical spine facet joints in road traffic crash fatalities with emphasis on whiplash

A pathoanatomical and diagnostic imaging study

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ABSTRACT

This summary of the above standing PhD dissertation refers to the work conducted at the Institute of Forensic Medicine, University of Aarhus, in collaboration with the Department of Neuroradiology, Aarhus Sygehus (NBG), the Research Unit of Rheumatology and Bone Biology, University of Aarhus, and the Nordic Institute of Chiropractic and Clinical Biomechanics, Part of Clinical Locomotion Science, Odense.

A considerable problem with neck pain after road traffic crashes, including whiplash injury, is the lack of identifiable tissue damage in the majority of patients. A number of studies have concluded that the lower cervical spine facet joints play a central role in patients with chronic neck pain after a whiplash injury. Due to these reasons a detailed description of potential tissue lesions in the cervical spine is necessary in order to improve diagnostic and therapeutic possibilities.

The aim of this study was to investigate, whether discrete lesions in the lower cervical spine facet joints could be identified in people killed in passenger car road traffic crashes in comparison to non-traumatised control subjects, examined by conventional X-rays, CT- and MRI-scanning and histological methods. Furthermore, it was the aim to conduct a histomorphological investigation (qualitatively and quantitatively) of the facet joints based on microscopical observations.

The study was designed as a cross-section autopsy study in which the lower cervical spines from 19 road traffic crash fatalities and 21 non-traumatised control subject were included, all in the age range 20-49 years.

A number of non-lethal osseous and soft tissue lesions were identified

in the cervical spine facet joints of the traumatised subject, including fractures, cartilage lesions and bleeding in the synovial folds and joint spaces (haemarthrosis). The lesions were best identified with microscopy whereas diagnostic imaging procedures were not capable of identifying all injuries, including both the soft tissue injuries and the fractures. A number of age- and gender related changes in the articular cartilage and the underlying subchondral bone were described in detail based on the histomorphological evaluation. Age related changes were observed from the age of 20 years and males were more affected than females.

This study has described pathology in people killed in road traffic crashes and therefore not by definition injuries after whiplash trauma or other types of trauma. For this reason the results cannot uncritically be extrapolated to clinical settings. The investigation does, however, raise the possibility that discrete lesions are present in some people exposed to a survivable road traffic crash. This is supported by the lack of sensitivity of the diagnostic imaging procedures and the fact that injury threshold for the respective lesion types identified are unknown. The potential clinical implications of the lesions identified are unknown and further investigations are needed.