H108 Death by Hanging: The High Prevalence of Intervertebral Disc Vacuum Phenomenon in Thoracic and Lumbar Spine in Postmortem Computed Tomography (PMCT)

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The goal of this presentation is to suggest that death by hanging, under various mechanisms, may be associated with the origin of gas collection in the intervertebral discs that is revealed in postmortem imaging, especially by cadavers of a young age.

This presentation will impact the forensic science community by indicating that intervertebral vacuum phenomenon may be an additional finding in hanging cases that have undergone postmortem imaging.

Introduction: Postmortem imaging, in addition to PACT, has become the most frequently applied method in routine investigations.[1] CT provides high sensitivity in gas detection and the assessment of the condition of intervertebral discs.[2,3] Vacuum Phenomenon (VP) describes the gas collection in the intervertebral joint spaces and is associated with various pathologies, including Degenerative (DG) skeletal changes and trauma. Increased volume space of a joint through traction causes intra-articular gas collection.[4] In hanging, gravity pulling the body weight downward will affect the spine.[5] It was hypothesized that the expansion of the spine during hanging may cause gas accumulations in the discs. Also investigated was if Simon's bleedings could be predicted from the presence of VP in PMCT due to a similar origin (i.e., traction of the body and the spine).[6]

Materials and Methods: A group of 36 hanged bodies with PMCT was studied retrospectively. For each hanged case, a control case with another manner of death was chosen of the same sex and age (maximum of differences +/-2 years) and a matching degree of DG conditions. Each group was split into two equal age groups (n=18), one group of ≤43 years of age and one group >43 years of age. Cases with signs of putrefaction, those having undergone resuscitation, and those with trauma were excluded. Gas accumulations of the intervertebral discs and DG skeletal changes were evaluated in PMCT. Then, autopsy reports of the hanging cases were reviewed for the assessment of the presence of Simon's bleedings.

Results: The preliminary results revealed a significant association between hanging and VP in PMCT in the group ≤43 years old in the sample of the hanged group. The proportion of the hanged cases ≤43 years old that exhibited VP in PMCT is statistically different from the proportion of the control cases with other manners of death and VP in PMCT in the same age group. In the sample of the >43 age group, there was no significant association between manner of death and VP. There was no significant association between Simon's bleedings and VP. Simon's bleedings were significantly associated with complete rather than incomplete hanging.

Discussion: In people who died by hanging in the age group under 43 years, VP is to be expected more frequently than in people in the same age group with a different manner of death. This association does not occur in the age group below 43 years. The small number of cases is a limitation. DG skeletal changes and low bone mineral density are already associated with VP.[4,7] Intervertebral VP is also associated with increasing age and the elderly.[7] By hanging, the traction of the intervertebral joint spaces, especially in complete hangings, can play an additional role, among others, for the pathogenesis of vertebral VP. Simon's bleedings cannot be predicted in PMCT, as they are not associated with increasing age and DG skeletal changes because of decreased spinal mobilization.[6]

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