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Title: Absence of evidence is not evidence of absence: Perimortem skeletal sharp force trauma on postmortem CT

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Responding to both modern research sharing requirements and ethical concerns, digital osteological databases are increasingly implemented across the world. Of these, postmortem CT (PMCT) datasets stand as a relevant source of information, especially for forensically oriented research. However, the potential error affecting conclusions based on PMCT observations by anthropologists devoid of a radiological background has not yet been clarified. Here, we address this issue by focusing on the detection of sharp force bone lesions on PMCT images.

We screened the database of the Institut für Rechtsmedizin (IRM), Bern, and selected 41 cases involving inflicted and self-inflicted sharp force trauma. We blindly studied each PMCT dataset and then compared our results with those from the original autopsy and radiology reports. We observed each case by means of both 2D transverse slices and 3D reconstructions. We investigated any association between the manner of death with demographic and injury-related parameters. Moreover, we analyzed the relationship between soft- and hard-tissue lesions caused by sharp force.

Only 11.4% of all sharp force injuries penetrated to the bone, differing between the manners of death (3% in suicides, 15.3% in homicides). Overall, bone lesions were most frequent on the thorax. The obtained results were significant (P -value <0.05) for the manner of death correlating with age-at-death, and with the number of soft- and hard-tissue injuries.

The low ratio between soft-tissue and bone lesions call for caution when inferring violent events from osteological analyses. Our results strongly suggest the potential benefits from the inclusion of virtual observations and virtual protocols into both forensic anthropological and osteoarchaeological curricula.