Postmortem CT as an alternative to conventional autopsy?
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Objective: Postmortem research is an important condition to deliver high quality care. Non- or minimally invasive techniques are being investigated because conventional autopsy (CA) rates have decreased worldwide to 0-10% nowadays. The aim of this study is to explore the diagnostic performance of postmortem CT (PMCT) in identifying the causes of death.

Material and methods: 73 Patients (41 men, 32 women, age range 1-91 years (mean 57)) underwent PMCT before CA. Clinical patients, but also first aid patients were included. From each patient, a thorax/abdomen, a cerebrum and a cervical spine scan were performed before CA. The images were reviewed by three radiologists (neuro-radiologist, cardiovascular radiologist and abdomen-radiologist), all inexperienced with postmortem diagnostics. CA's were performed by pathology residents, which were blinded for the imaging results and vice versa. Sensitivity, agreement and corresponding 95%-confidence intervals of PMCT and clinical causes of death were calculated, with CA as the reference standard.

Results: In 65 patients (89%) CA was able to identify a cause of death. Sensitivity of PMCT and clinically identified causes of death were 45% (95%-CI: 32-57%) and 40% (95%-CI: 28-53%). Agreement was respectively 47% (95%-CI: 35-59%) and 42% (95%-CI: 31-55%). PMCT failed to identify myocardial infarction as the cause of death. Due to resuscitation artifacts or normal postmortem changes respiratory causes of death were also hard to diagnose on imaging. Sensitivity of PMCT identified causes of death in the category bleeding was 6/9=67% (95%-CI: 30-93%). Despite a bleeding was diagnosed in the other 3 cases, an incorrect cause of death was given.

Conclusion: Overall the diagnostic performance of PMCT is insufficient to fully replace conventional autopsy. Nevertheless, its performance in identifying bleedings or air accumulations is high. We believe PMCT will be a valuable screening examination to point (minimally invasive) autopsy in the right direction.

O.2.02
Virtual animation of victim-specific 3D models obtained from CT scans for forensic crime scene reconstruction: living and dead subjects
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Virtual reconstructions of the probable peri-mortem postures of the victims in actual crime scenes are important for better understanding the sequence of events during a crime or an accident. Victim-specific 3D models reflecting the individual physiognomics can be created from CT scans, both for dead and living subjects. 3D models of bones, skin and internal organs can be easily generated using post-processing imaging software. These 3D models can be virtually animated and made to interact in the virtually reconstructed crime scene, obtained using photogrammetry techniques.

A case with two victims of gunshot injuries is presented. Victim #1 was a man with three perforating gunshot wounds, one in the thorax and two in the abdomen. This victim died due to the lesions. Whole-body CT scans were performed before the autopsy and 3D reconstruction of bones, skin and relevant internal organs were generated. Using 3ds Max software, a virtual animated body was built and probable peri-mortem posture visualized. Victim #2 was a man, who survived the shooting, with three perforating gunshot wounds, one in the left arm and two in the thorax. Only CT scans of the thorax, abdomen and the injured arm were provided by the hospital. Therefore, the full body model reflecting the anatomical proportions of the patient was made using the Poser software. A combination of 3D models obtained from Poser and from the CT scans was used for the animation process.

A virtual reconstruction of the chain of events was performed combining medical information, crime scene evidence and witness testimonies. In such way, it was possible to more precisely evaluate the probable peri-mortem postures of the two victims, reconciling bullets trajectories, internal lesions with crime scene evidence and witness testimonies. Importantly, a permanent data set of all the information was created, allowing reviews of the scene at any time if new evidence comes to light.

O.2.03
A view from the cutting edge - the application of microCT in the differentiation between serrated and non-serrated blades in the infliction of stab wounds in skin
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Background: Knife crime has consistently been one of the most common forms of assault and homicide in the UK. Between April 2014 and March 2015, there were 182 homicides involving sharp instruments, this accounts for 36% of all homicides recorded during this time. Currently, there is no evidence-based protocol for distinguishing between serrated and non-serrated blades in stab wounds. Recent research has shown that striation patterns are present in stab wounds in cartilage caused by serrated blades. This was predominantly done using micro-computed Tomography (microCT). However, the application of this has led to conflicting results when used in a forensic case. This study aims to provide a repeatable, standardised protocol for the use of microCT in the visualisation of striations in skin.
**Methods:** Porcine skin was stabbed with a coarsely serrated, a finely serrated, and a non-serrated kitchen knife using a drop-tower method. Wounds were excised and prepared for imaging with a Nikon Metrology XT 225 microCT scanner. Different preparation techniques were trialled. These included: presentation of the wound (open, partially open or closed), preservation of the wound (no preservation or formaldehyde for 3 days or 6 days) technique specific settings (current and exposure on microCT) and the use of contrast agents (iodine and osmium tetroxide). The images were reconstructed and analysed using CT Pro 3D and VGStudio Max software packages.

**Results:** On analysis, the microCT images from the wounds caused by a serrated blade produced a visible striation pattern, whereas the wounds caused by a non-serrated blade did not. With regards to preparation of the samples, opening the wound and preservation were identified as key techniques to generate the optimum images using microCT. Through the use of volume rendering software, we were also able to produce 'virtual casts' of the air within partially opened wounds. The casts from wounds caused by a serrated blade also showed striation patterns. This is a less destructive method than the use of dental impression materials that has been used in other research.

**Conclusion:** This study to assess the viability microCT in the identification of striation patterns causing by serrated blades in skin provides evidence for the establishment of a protocol for use in forensic cases. Further work would look into the repeatability of this method in human skin, alongside the use of different tissue types e.g. heart and liver, and a wider variety of knives.