H109 Role of Postmortem Computed Tomography (PMCT) as a Triage Tool Between External Inspection and Full Autopsy

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Learning Overview: The goal of this presentation is to show the current advantages and weaknesses of PMCT usage in the forensic pathologist's routine. As imaging has been expanded around the world as a supplement to conventional autopsy, it is important to consider the strengths as well as the limitations and pitfalls.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by showing the strengths of PMCT regarding determining the cause and manner of death and excluding or indicating signs of violence. However, there are also limitations in PMCT usage, which may be solved by increasing the quality of image acquisition and doing more research in the field. Combining imaging with toxicological analysis and biopsies is also recommended.

Objectives: In forensic medicine, PMCT and PMCT Angiography (PMCTA) assist in determining cause and manner of death, providing significant information regarding specific forensic questions.[1-3] After the external examination of a body, PMCT appears to be a valuable tool for imaging-based decision making, whether or not conducting an autopsy is necessary. The role of PMCT has become increasingly interesting as a method to improve decision making rather than a one-stop solution for all forensic morphological postmortem issues. Its costs can be significantly lower than those of a conventional autopsy, and the information gained can be significant. Its relevance is dependent on the specific forensic question; however, that forensic question is always case dependent. With that, not all that is visually apparent on PMCT also forensically solves every case. Within that domain of application, a series of ten cases is presented to qualitatively highlight the advantages and remaining problems of the current PMCT usage.

Materials: Due to their relevance for the question of decision making, a deliberate and manually selected case series of ten PMCT examinations was selected from the Institute of Forensic Medicine Zurich's database (time range 2014 to 2017). All cases had been admitted to the Institute following a forensic death scene investigation for further examination and assistance in judicial decision making. In five of the cases, a forensic autopsy was conducted after imaging. One case underwent PMCTA in addition to unenhanced PMCT. In one case, a CT-guided lung biopsy was performed. In eight cases, toxicological analyses of body fluids (qualitative toxicological screening within PMCT triage or quantitative after collecting blood and urine during autopsy) were conducted. Time interval between death and PMCT was 14.9h±12.8h (range: 3h to 48h). All case protocols were evaluated for the final manner and cause of death.

Results-Conclusion: Five cases were released after imaging without conducting an autopsy as PMCT-PMCTA alone or combined with toxicological screening or lung biopsy confirmed a cause and manner of death and/or excluded third-party involvement/malpractice or ensured identity, answering the relevant forensic questions required. In one case, PMCT revealed a large number of tablets in the stomach, supporting the already-assumed cause and manner of death; however, toxicological analysis did not match the drug suspected according to scene inspection. In another case, PMCT failed to reveal laryngeal fractures indicating violence and possible homicide. In the other two cases, PMCT indicated infectious disease without being able to confirm a microbiological diagnosis; however, it warned the pathologists to protect their health during autopsy.

PMCT can satisfactorily answer the leading forensic questions of some cases alone, like the validation of the victim's identity, the exclusion of third party violence, and the presence of foreign bodies and determine the cause and manner of death. Thus, a conventional medicolegal autopsy can be avoided as all relevant forensic questions are answered, which is also time and cost consuming. However, reliable evaluation of relevant head and cervical trauma, strangulation, infection and sepsis, metabolic disorders, intoxication, and neuroreflex deaths keeps evading a purely PMCT-based approach.[4,5]

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