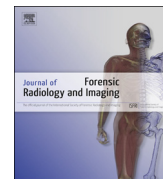




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Case report

Science into practice: Post-mortem imaging provides conclusive evidence in a non-suspicious death



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ABSTRACT

Here we describe the first documented case of suspected sudden cardiac death within our jurisdiction where both the forensic pathologists in charge of the case and the office of the public prosecutor considered the evidence provided by death scene investigations and post-mortem magnetic resonance of the heart sufficient to conclude a case without autopsy. This single case sets a precedent in the investigation of non-suspicious deaths in our jurisdiction.

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1. Introduction

It is more than possible, it is probable [1]

This quotation from Sir Arthur Conan Doyle's Sherlock Holmes Story *Silver Blaze* captures an elementary aspect of forensic death investigations where the determination of the cause of death often hinges on probabilities [2]. In cases of suspected cardiac death, for example, post-mortem examinations may be unable to provide conclusive evidence of fatal myocardial injury [3–5]. If so, the cause of death statement is based on the presence of supportive findings (e.g. non-suspicious case circumstances, supportive autopsy findings such as coronary artery disease, cardiomegaly, pulmonary edema or pleural effusions) and the absence of clearly conflicting findings (e.g. acute traumatic injury or poisoning) [6].

The advent of post-mortem cross-sectional imaging [7] added a new twist to the question of probability in establishing a cause of death. In cases of suspected sudden cardiac death, imaging and autopsy are able to both reveal the presence of findings which are consistent with cardiac death and determine the absence of certain conflicting findings. Post-mortem computed tomography

(PMCT), for example, allows for the detection of coronary artery calcification or pulmonary edema and allows one to quantify heart weight and pleural effusions [8–11]. PMCT is also suitable to determine the presence or absence of skeletal injury and may even feature findings to suggest intoxication [12,13]. Post-mortem magnetic resonance (PMMR) may visualize signs of ischemic or hemorrhagic myocardial injury and assess coronary artery disease [14–17]. The key question is whether the information provided by imaging is sufficient to abstain from autopsy in cases of suspected cardiac death [18].

Here we describe the first documented case within our jurisdiction where both the forensic pathologists in charge of the case and the office of the public prosecutor considered the evidence provided by death scene investigations and PMMR of the heart sufficient to conclude a case of suspected sudden cardiac death without autopsy. This single case sets a precedent in the investigation of non-suspicious deaths in our jurisdiction.

2. Case history

A 67-year-old male helped a family member move furniture to a new apartment. Hours later, he experienced chest pain and called an ambulance. He collapsed shortly after the arrival of the paramedics and died in spite of immediate cardio-pulmonary resuscitation (CPR) efforts in the ambulance en route to the emergency room. The family member of the decedent reportedly witnessed

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the entire course of events. Neither police investigations nor external examination of the corpse at the scene revealed any findings suggestive of drugs, alcohol or other substance use or of violence.

The medical record revealed a history of non-insulin-dependent diabetes. The reported time interval between the onset of chest pain and death (including CPR) was reported to be less than 90 min.



Fig. 1. PMCT image showing fissural fluid, bilateral peribronchovascular consolidation and increased bilateral parenchymal ground glass opacity (consistent with cardiogenic pulmonary edema) and bilateral pleural effusions.

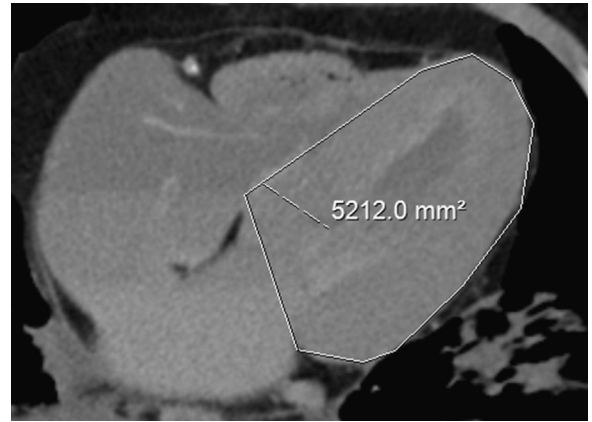


Fig. 4. The left ventricular circumferential area on an axial cross-section PMCT image of the heart may be used to calculate heart weight; in this case heart weight is approximately 555 g.

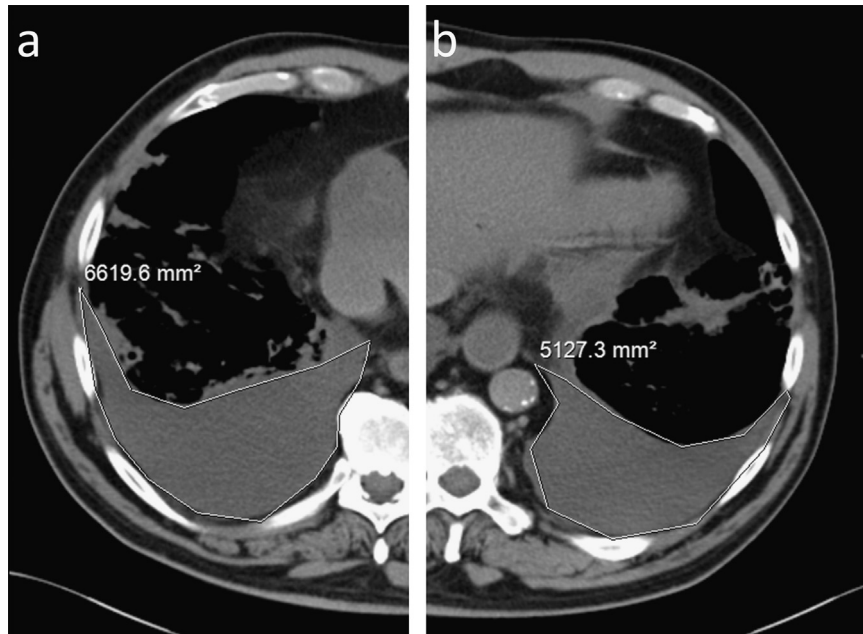


Fig. 2. PMCT images at the level of the tip of the right (a) and left (b) diaphragm. The circumferential area of the pleural effusion on this level can be used to estimate the volume of pleural effusions (662 ml on the right, and 513 ml on the left).

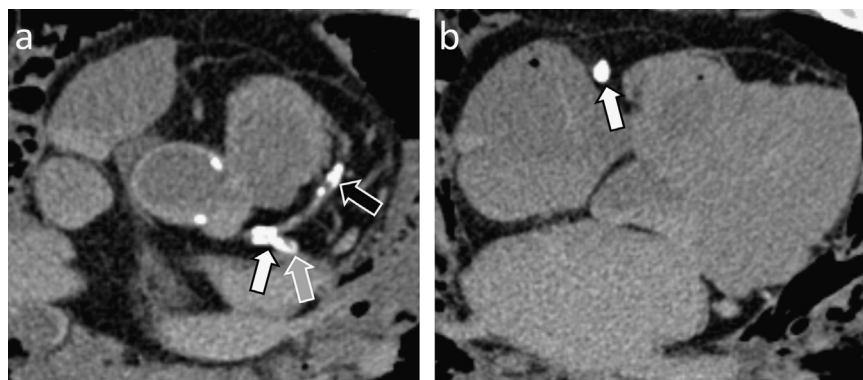


Fig. 3. PMCT image of the heart revealing extensive calcification of the left coronary artery (white arrow on (a)), left anterior descending (black arrow on (a)), left circumflex (gray arrow on (a)), and right coronary artery (white arrow on (b)).

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