G23 Sudden Cardiac Deaths Related to Ischemic Heart Disease in Postmortem MDCT and MDCT-Angiography

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After attending this presentation, attendees will learn about the utility of postmortem radiological imaging of coronary arteries in cases of ischemic heart disease, along with their possibilities and limitations.

This presentation will impact the forensic science community by showing that the interpretation of postmortem radiology, especially in the cardiovascular field, is a new field for both forensic pathologists and radiologists. Information obtained from both parties can help to further the understanding of CT and CT-angiography in postmortem examinations and enable its integration into the classical autopsy protocol.

Although postmortem radiology is very useful in demonstrating traumatic lesions, its application is still limited for deaths resulting from cardiovascular pathologies. The goal of this study was to evaluate the diagnostic potential of postmortem angiography for deaths related to ischemic heart disease by comparing findings of native postmortem cardiac multi-detector computed tomography (MDCT), multiphase postmortem CT-angiography (MPMCTA), and conventional autopsy.

Twenty three cases were selected based on clinical history, including 21 men and two women. The age of the victims ranged from 35 to 89 years (mean age 52.3 +/-12.2). All cases underwent a postmortem MDCT, MPMCTA, and complete autopsy which included histological examination of the coronary arteries and myocardium.

MDCT-angiography was carried out using the standardized protocol of MPMCTA, in which a native CT-scan was performed prior to any manipulation of the corps. Liquid samples for toxicological and biochemical analyses were collected under CT-guidance before cannulation of the femoral vessels. Radiological interpretation of all images was performed by both a board certified radiologist specialized in vascular radiology and a board certified forensic pathologist trained in forensic radiology.

Postmortem MDCT and MDCT-angiography showed calcifications of coronary arteries in 18 cases (78%). The findings could be more easily detected and documented with postmortem MDCT or MPMCTA than with classical autopsy, where the calcifications were not systematically described by the pathologist. MPMCTA allowed much better visualization of coronary arteries than MDCT and permitted the evaluation of stenoses and occlusions. In 13 cases, MDCT-angiography revealed at least one coronary artery that was not perfused or had a stenosis greater than 75%. Conventional autopsy of 11 of those 13 cases detected an acute or subacute coronary thrombosis, in one case, a postmortem clot led to a perfusion stop. From 14 cases of coronary thrombosis detected at autopsy, 11 were identified as stop of perfusion during CT-angiography, two acute thromboses related to eroded plaques and an old recannalised thrombus were visualized as partial occlusions. Some artefacts were identified using multiphase postmortem MDCT-angiography: in one case a postmortem clot was suspected in a non-perfused coronary artery and in three other cases a postmortem clot imitated pulmonary embolism. These artifacts were confirmed upon autopsy. A hemopericardium was easily identified by all techniques in one case, but the exact localization of the rupture was better visualized in MPMCTA than in MDCT.

This study shows that native postmortem MDCT has limited value for the diagnosis of ischemic heart disease as only calcifications of coronary arteries or evident cardiac pathological findings, such as cardiac tamponade, can be identified. This technique can not estimate the degree of stenosis or occlusion. Postmortem angiography enables identification of coronary occlusion and significant stenosis, and seems also to be promising to detect signs of myocardial ischemia by evaluation of myocardial enhancement.

This study finds that, coronary postmortem MDCT-angiography, if correctly interpreted, is a useful tool to view the morphology of coronary arteries, rule out coronary artery stenoses and to indicate vascular occlusions suspicious of thrombosis, thereby directing the sampling for histological examination. It is, however, too early to postulate if this technique can provide sufficient evidence to determine if the cause of death was related to an acute or chronic ischemic event.

The goal of this presentation is to present the diagnostic potential of postmortem multi-detector computed tomography and multiphase postmortem CT-angiography in cases of sudden cardiac deaths related to atherosclerotic coronary artery disease.

Sudden Cardiac Death, Ischemic Heart Disease, Postmortem Imaging

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