CQ27 Is it possible to diagnose acute coronary syndrome as the cause of death on unenhanced postmortem CT?

Grade of recommendations: D

Since postmortem CT without contrast enhancement basically cannot delineate either coronary arterial thromboembolism or ischemic myocardium, a definitive diagnosis of acute myocardial infarction or ischemic sudden cardiac death is not possible with unenhanced postmortem CT.

Explanation----------

Acute coronary syndrome [1]

The acute coronary syndrome is a comprehensive pathological condition including three cardiac diseases caused by sudden coronary stenosis: unstable angina, acute myocardial infarction, and ischemic sudden cardiac death. Sudden cardiac death refers to sudden death due to heart diseases, including acute myocardial infarction, lethal arrhythmia, cardiomyopathy, cardiac sarcoidosis, and myocarditis.

Non-enhanced postmortem CT

Modalities for a clinical diagnosis of angina or myocardial infarction include electrocardiography (ECG), blood test, coronary angiography, contrast-enhanced coronary CT, non-contrast or contrast-enhanced cardiac MRI, and a cardiac nuclear medicine examination. However, it is impossible or uncommon to perform these examinations after death. Unenhanced postmortem CT has been widely used as a screening method for unusual death cases in Japan [2-4]. Unenhanced postmortem CT allow detection of lethal hemorrhagic lesions (cerebral hemorrhage, subarachnoid hemorrhage, aortic dissection, or aortic aneurysm rupture). However, direct findings of coronary arterial thromboembolism and ischemic myocardium in cases of acute myocardial infarction or ischemic sudden cardiac death cannot be identified [2-4].

Pulmonary edema on postmortem CT

The presence of ischemic heart disease is suggested in patients who were sent to an emergency hospital with cardiopulmonary arrest on arrival and confirmed dead despite cardiopulmonary resuscitation efforts, based on comprehensive information regarding the following: current medical history (sudden chest pain), past medical history (angina pectoris or previous myocardial infarction), laboratory examination (abnormal findings on ECG), and indirect findings on postmortem CT (pulmonary edema, calcification of the coronary artery, marked dilation, or hypertrophy of the heart) [2, 3]. In cases where the course of death is rapid and clinical information is clear, the presence of

pulmonary edema due to acute left heart failure on postmortem CT may be an indirect finding of ischemic heart disease. However, pulmonary edema has the following characteristics: non-specific findings that may occur due to exogenous factors such as drugs or suffocation, difficulty in differentiating pulmonary edema from conditions other than pulmonary edema such as infiltrative shadows due to pneumonia, and pulmonary edema may appear in the time course after death; thus, the presence of pulmonary edema immediately before death may become unclear [5-9]. Therefore, a diagnosis of ischemic heart disease should not be made based solely on a finding of pulmonary edema, but should carefully perform the diagnosis in view of the circumstances when the patient was found dead along with the course leading to the death.

A band-like shadow along the pleura is often found on the dependent portion of the lung on postmortem CT. This shadow is due to hypostasis after death [2, 7] (CQ2). It appears dorsally when the corpse has in a supine position for a long period since death, while it appears ventrally if in a prone position.

Literature search formula and literature selection (2019/6/18)

PubMed

#	Search formula	Number of documents
1	Search(((((("postmortem CT")OR "postmortem MRI")OR "postmortem imaging")OR "postmortem CT")OR "postmortem MRI")OR "postmortem imaging"	22,668
2	Search(#1)AND "pulmonary edema"	166

References

[1] Saukko P et al: The pathology of sudden death. In: Saukko P, Knight B, eds. Knight's Forensic Pathology 3rd ed, p492-526, Hodder Arnold, 2004

[2] Shiotani S et al: Non-traumatic post-mortem computed tomographic (PMCT) findings of the lung. Forensic Sci Int 2004; 139: 39-48 (Level 4b)

[3] Takahashi N et al: The effectiveness of post-mortem multidetector computed tomography in the detection of fatal findings related to cause of non-traumatic death in the emergency department. Eur Radiol 2012; 22: 152-160 (Level 4b)

[4] Kasahara S et al: Diagnosable and non-diagnosable causes of death by post-mortem computed tomography: a review of 339 forensic cases. Leg Med 2012; 14: 239-245 (Level 4b)

[5] Shiotani S et al: Postmortem pulmonary edema: a comparison between immediate and delayed postmortem computed tomography. Legal Med 2011; 13: 151-155 (Level 5)

[6] Michiue T et al: Quantitative analysis of pulmonary pathophysiology using post-mortem computed

tomography with regard to the cause of death. Forensic Sci Int 2012; 220: 232-238 (Level 4b)

[7] Michiue T et al: Forensic pathological evaluation of post-mortem pulmonary CT high-density areas in serial autopsy cases of sudden cardiac death. Forensic Sci Int 2013; 232: 199-205 (Level 4b)

[8] Winklhofer S et al: Postmortem whole body computed tomography of opioid (heroin and methadone) fatalities: frequent findings and comparison to autopsy. Eur Radiol 2014; 24: 1276-1282 (Level 4b)

[9] Hyodoh H et al: Time-related course of pleural space fluid collection and pulmonary aeration on post-mortem computed tomography (PMCT). Leg Med 2015; 17: 221-225 (Level 4b)