Application of Postmortem CT (PMCT) Scan in Forensic Death Investigations : A Case Series

衞生署
Department of Health

KC Chan, TP Kwan, PK Yeung, HN Cheung, CM Lau, KC Foo

New Territories (Shatin) Forensic Medicine Centre, Forensic Pathology Service, Department of Health
The Government of the Hong Kong Special Administrative Region

Introduction

Postmortem CT scan is a useful tool to investigate cause of death in the practice of forensic medicine. It is useful to identify the cause of the death and it can also guide the subsequent autopsy.

Objective

To illustrate the use of PMCT in a series of cases of death investigations.

Materials and Methods

Illustrative cases in our database of PMCT scan done between 1st February 2023 to 29th August 2025 are identified. Imaging findings of the cases were correlation with the subsequent autopsy findings. Three cases have been

Case 1

- A 66-year-old woman developed fever she was then found unresponsive. She was pronounced dead at scene upon ambulance crew arrival.
- Plain PMCT showed accumulation of large amount of intermediate density fluid in the pericardial sac and a heterogeneous hypodense lesion is also detected in segment II/III of the left lobe of the liver.
- Subsequent autopsy showed pericardial sac being distended by purulent fluid and an abscess cavity in the left lobe of the liver with a connecting fistula. The cause of death was established to be pyopericardium and liver abscess.

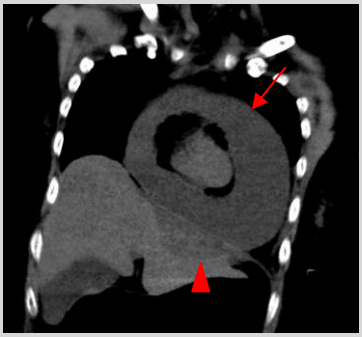

Figure 1a. Coronal plane PMCT showed pericardial cavity distended by intermediate density fluid (arrow) and hypodense lesion in the left lobe of liver (arrowhead)

Figure 1b. Pericardial sac filled with purulent fluid upon opening

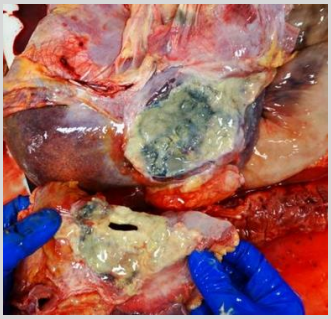

Figure 1c: Autopsy revealed a fistula between pericardium and liver abscess at left lobe of liver

Case 2

- A 67-year-old woman with history of polycythemia rubra vera developed syncope during hospital admission followed by cardiac arrest.
- Plain PMCT showed large amount of haemoperitoneum and splenomegely. Contrast PMCT venogram showed one unruptured aneurysm in distal part of splenic artery and another closely related ruptured aneurysm in superior polar / superior terminal artery of splenic artery with contrast extravasation observed.
- Subsequent autopsy showed haemoperitoneum and two aneurysms in the distal splenic artery (one has ruptured and the another one was intact). The cause of death was established spontaneous rupture of splenic artery aneurysm.

Figure 2a. Coronal plane PMCT (plain) showed large amount of haemoperitoneum (arrows) and splenomegaly (arrowhead)

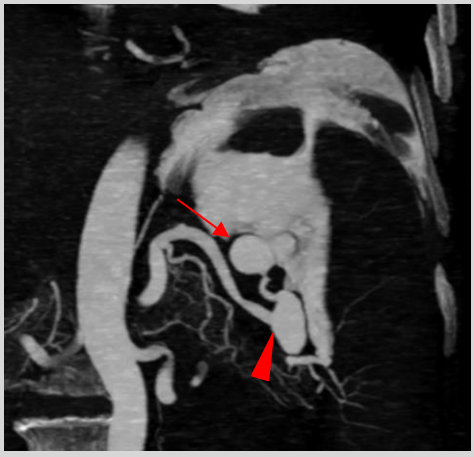

Figure 2b. Coronal plane PMCT venogram (maximal intensity projection) showed ruptured aneurysm with contrast extravasation (arrow) and unruptured aneurysm (arrowhead)

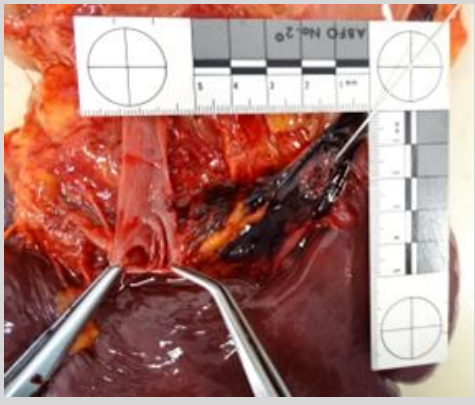

Figure 2c. Autopsy revealed ruptured aneurysm with haemorrhage adjacent to the perforation (next to needle tip), and another unruptured aneurysm (between forceps)

Case 3

- A 41-year-old woman who is on oral-contraceptive was found collapsed and she complained of headache and vomiting before.
- Plain PMCT showed acute intratentorial subarachnoid haemorrhage, predominately over the left cerebellar hemisphere.
- Contrast PMCT arteriogram did not reveal any aneurysm in the circle of Willis or arteriovenous malformation, while contrast PMCT venogram revealed filling defect in the left sigmoid sinus (empty delta sign) with contrast extravasation observed in adjacent region.
- Subsequent autopsy showed oedematous brain and occlusion of the left sigmoid sinus by thrombus. The cause of death was established to be cerebral venous sinus thrombosis and acute subarachnoid haemorrhage.

Figure 3a. Axial plain PMCT showed acute infratentorial subarachnoid haemorrhage (arrow), predominately over the left cerebellum

Figure 3b Contrast PMCT venogram revealed filling defect in the left sigmoid sinus with empty delta sign (arrow)

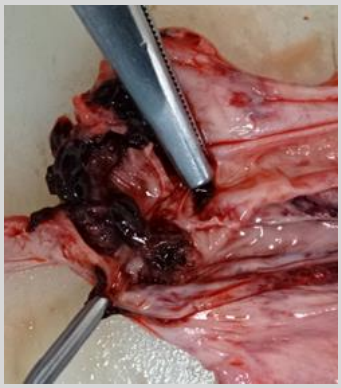

Figure 3c Autopsy revealed occlusion of the left sigmoid sinus by thrombus

Conclusion

PMCT, both plain CT and CT angiogram, can help to localize the location and suggest the nature of the pathology leading to death. Although PMCT alone without correlation of autopsy may not be able to directly confirm the cause of death in every case of death, it is useful to aid forensic pathologists to plan the approach of subsequent autopsy and specific areas that need to be focused during autopsy and it can also supplement autopsy findings. It is therefore considered that PMCT and autopsy complement each other.