



### G45 Massive Systemic Fat Embolism Detected by Postmortem Imaging and Biopsy

Patricia M. Flach, MD; Steffen G. Ross, MD; Garyfalia Ampanozi, MD; Stephan A. Boliger, MD; Gary M. Hatch, MD; Michael Thali, MD; and Tanja Germerott, MD, Institute of Forensic Medicine, University of Bern- Virtopsy, Buehlstrasse 20, Bern 3012 SWITZERLAND

After attending this presentation the participants will learn about systemic fat embolism and the characteristic image features of systemic fat embolism on pre-autopsy computed tomography compared to autopsy and histopathological findings.

This presentation will impact the forensic science community by raising awareness of the feasibility to detect systemic fat embolism on postmortem computed tomography prior to autopsy. Findings on computed tomography were significant and serve as quality improvement to forensic procedures.

**Purpose:** The purpose of our case study is to describe the findings of lethal systemic fat embolism (FE) on postmortem unenhanced computed tomography (PMCT), PMCT-Angiography (PMCTA), and image-guided lung biopsy, with correlation to conventional autopsy and histopathology.

**Materials and methods:** An 89-year-old woman with traumatic femoral neck fracture died due to cardiac arrest during implantation of a cemented total hip prosthesis. The patient was under long-term anticoagulation for atrial arrhythmia. In the course of the hip trauma, anticoagulation had to be stopped and antidote (vitamin K) was

administered. No disorder of lipid metabolism or transport or renal failure was known. The body underwent whole-body PMCT (Somatom Emotion 6, Siemens, Erlangen, Germany) with subsequent cannulation via an unilateral inguinal incision and contrast application by a modified heart-lung machine. PMCTA was then performed with an arterial and venous injection. The body was moved from the supine to prone position to improve filling of nondependent vessels. After PMCT and PMCTA, image-guided biopsy of the lung was obtained. The harvested specimens were stained to detect fat embolism.

**Results:** Unenhanced PMCT revealed a distinct fat level on top of sedimented layers of corpuscular blood particles and serum in the systemic arterial system and the pulmonary trunk. This finding was measured (Hounsfield Unit) and compared to possible small position-dependent air embolism and evaluated as negative. PMCTA showed no clotting suggesting pulmonary thromboembolism. The triple layered intravascular finding was reproducible after PMCTA and after turning of the corpse. Autopsy showed no evidence of patency of the foramen ovale that would account for paradoxical embolism. In addition, there were no autopsy findings other than fatal fat embolism that were relevant to the cause of death. There were no petechial rash or kidney changes visible. There was no evidence for cholesterol embolism, e.g. triggered by anticoagulation. Both image-guided biopsy and histopathological specimens confirmed the findings of PMCT/PMCTA demonstrating severe FE (Grade IV).

**Conclusion:** PMCT/PMCTA established the cause of death as systemic fatal FE. It is believed that this is the first description of these unusual systemic imaging findings in the postmortem setting. Autopsy and histopathological specimens validated imaging and biopsy findings. **Fat Embolism, Postmortem Computed Tomography, CT**