



### **G64 Efficacy and Efficiency of Multi-Phase Postmortem CT Angiography (MPMCTA) on Altered Bodies**

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After attending this presentation, attendees will understand the possibilities, advantages, and pitfalls of performing a postmortem CT angiography on altered bodies.

This presentation will impact the forensic science community by demonstrating that altered bodies can undergo a Multi-Phase Postmortem CT Angiography (MPMCTA), no matter if they were victims of extensive multiple trauma or if they are altered due to putrefaction. The interpretation of the obtained images can be performed without difficulties as artifacts are easily identifiable.

Over the years, imaging techniques such as Multidetector Computed Tomography (MDCT) have become a routine in forensic investigations. In order to quantify the degree of decomposition and other forms of alteration on the radiological images, the "Radiological Alteration Index" (RAI) has recently been introduced. This index states the alteration of cadavers by quantifying the presence of gas in the body using postmortem MDCT imaging. This means that the RAI increases with growing presence of gas. High quantity of gas inside of the body can be due to multiple traumas or putrefaction.

During the last years, more sophisticated techniques of postmortem imaging have been developed. In order to assess the vascular system, postmortem CT angiography has been introduced. A recently developed technique called MPMCTA uses a standardized protocol and consists in the injection of an oily perfusate mixed with contrast agent. Consequently, the question arises if MPMCTA is still feasible on altered bodies presenting huge quantities of gas.

The goal of this study was: (1) to find out up to which RAI a body can still undergo the technique of MPMCTA; and, (2) which artifacts can be observed depending on increasing RAI.

From a database containing 270 cases on which an MPMCTA, has been performed, we selected those cases which showed an RAI  $\geq 50$  (group 1). In order to create a control group, we selected correlative cases showing same age, sex, and cause of death but with a RAI  $\leq 10$ . The quality of the native CT scan and each phase of the MPMCTA were then evaluated by a radiologist without specific forensic imaging training and a forensic pathologist with special training in forensic imaging.

In group one, 14 cases of our database could be selected. (Mean RAI = 72.5, Min RAI = 50, Max RAI = 100). The control group (n=14) showed a mean RAI of 2.30 (Min RAI of 0, Max RAI of 9).

By comparing the results, we observed that several artifacts were correlated to the RAI index. In fact, while the control group presented artifacts which are already known for the technique of MPMCTA, we observed additional artifacts in group one. In cases where the RAI was related to multiple traumatic lesions, those artifacts were partial or non-opacification of cervical and intra-cranial vessels. These artifacts were related to major arterial or venous lesions at thoracic or abdominal levels such as rupture of the aorta or the superior or inferior vena cava.

More interesting were artifacts observed in cases where the RAI was increased due to cadaveric alteration (putrefaction). In fact, artifacts which had never been described before were detected. Such artifacts were slight extravasations of contrast agent in the juxtadural space of the medulla, in the orbits, the cortex of kidneys as well as peri-splenic extravasations. Also, in glandular structures such as the thyroid, prostate, and suprarenal glands extravasations were detected. In addition, enhancement of the myocardium could be observed which would be considered as pathologic in cases of fresh cadavers. On the other hand, artifacts due to remaining blood and postmortem blood clots which are observed regularly in cases of short postmortem delay seemed to appear less frequently in decomposed bodies. However, the appearance of gas bubbles in the vascular lumen even after contrast agent injection has been noticed to increase with higher RAI.

The performance of MPMCTA in altered bodies is still possible even with a maximum RAI of 100. The diagnostic value of such an investigation remains pertinent and the exam adds further information to the result of conventional autopsy; however, there are some specific artifacts which are related to RAI, especially in decomposed bodies, which are important to know in order to interpret the radiological data correctly.

#### **Altered Bodies, Forensic Radiology, Angiography**