G25 Evaluation of Myocardium Damage at the Right Ventricle Compared to the Left One — Improvement of a Diagnostic Tool for the Diagnosis of Fatal Pulmonary Fat Embolism?

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After attending this presentation, attendees will improve their knowledge of the physiopathology and pathology of cardiac damage after pulmonary fat embolism. They will learn how immunohistochemistry can be helpful in the diagnosis of fresh ischemic cardiac changes and how to interpet right ventricular ischemia in cases of pulmonary fat emboism.

This presentation will impact the forensic science community by providing useful tools for better understanding the phenomenon of fatal pulmonary fat embolism and its cardiac effects.

Fat Embolism (FE) is a common complication of blunt force injuries occurring in major trauma, especially if fractures of long bones are present. In cases of fulminating FE, the sudden massive obstruction of the pulmonary circulation results in rapid and often lethal increase in the impendence to right ventricular ejection with subsequent right heart ischemia and failure.

A method to evaluate the occurrence of right ventricular ischemia resulting in acute right heart failure in cases of severe pulmonary FE has been proposed. This method allows for the morphological diagnosis of primary right heart failure due to acute persistent pulmonary obstruction. The major limits of this work are bound to its retrospective character in that immunohistochemical analyses were performed on relatively few cases of pulmonary FE on available paraffin-embedded blocks of cardiac tissue, collected at autopsy on the basis of a routine sampling protocol without an extensive systematic investigation of different anatomical regions of the heart. The study presented here has different goals. First, it proposed to validate the preliminary study by investigating a more consistent number of cases included in a prospective protocol. Furthermore, there was interest in studying whether right ventricular damage is homogeneously distributed in the different regions of the right ventricle in cases of severe fatal FE. Finally, the question of the role of this method as a potential tool in the improvement of the medicolegal diagnosis of fatal pulmonary embolism was addressed during this study.

In a prospective study, 220 consecutive autopsy cases performed at the University Center of Legal Medicine in Geneva, Switzerland between July 2010 and March 2012 were investigated. In each case, eight cardiac regions (anterior, lateral and posterior wall of the right and the left ventricle, and anterior and posterior part of the interventricular septum) were sampled and standard histology staining (Hematoxylin-Eosin, Masson's trichrome) was performed. Immunohistochemical reactions with the antibodies against Fibronectin and the terminal complement complex C5b-9 were performed. FE was determined by means of frozen sections of the lungs (one sample from each lobe was collected and investigated), the central nervous system (one sample from the cerebral and cerebellar cortex and from the pituitary gland was collected and investigated), and the kidneys (one sample from each kidney). The frozen sections were stained with oil red O.

The slides were investigated by two different observers with final consensual evaluation. In cases of discord, a third forensic pathologist gave his advice and allowed final decision. Classical histology signs of fresh cardiac damage such as hypereosinophilia, presence of contraction bands, myocytolysis, fragmentation of the cardiomyocytes, interstitial hemorrhage, and inflammatory infiltrates were systematically searched and classified into four degree categories: absent, weak, moderate, and severe. Similarly, the immunohistochemical reactions against the antibodies Fibronectin and C5b-9 were classified into four degree categories: negative reaction, single cell reaction, group cell reaction, and diffuse reaction. The degree of FE was determined following the method proposed by Falzi.

In this presentation, the results of this study will be presented and the implications for routine medicolegal investigation of FE will be discussed.

Fat Embolism, Right Ventricular Damage, Ischemia

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