



Pathology/Biology Section - 2014

G58 Sudden Cardiac Death: Integrating New Technologies Into Forensic Practice

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After attending this presentation, attendees will learn about modern technologies introduced recently in evaluation of Sudden Cardiac Death (SCD) cases, i.e., postmortem genetic testing, also called molecular autopsy, and postmortem radiological examination by Computed Tomography (CT), CT-angiography, and Magnetic Resonance Imaging (MRI). Attendees will better understand the possibilities and limitations about the new role of forensic pathologists considering the genetic origin of pathologies resulting in sudden cardiac death.

This presentation will impact the forensic science community by improving understanding of the advantages and limitations of new technologies introduced in forensic pathology.

The goal of this presentation is to present the current approach for investigating cases of SCD, especially in the young, after the introduction of new technologies into forensic practice. Some practical cases will be presented.

Any sudden, unexpected, or unexplained death is a reason for medicolegal investigation. The underlying cause of sudden death is most frequently cardiovascular, with ischemic heart disease being most common in the general population. Many studies have shown that in victims ≥ 35 years of age, atherosclerotic coronary artery disease is the leading cause of death, whereas in those < 35 years of age, the leading cause of death is sudden unexplained death. Progress made in the fields of molecular biology and human genetics have identified the genetic origin of many cardiac diseases, which can lead to both structural (e.g., hypertrophic cardiomyopathy) and arrhythmogenic abnormalities (e.g., Long QT syndrome, Brugada syndrome) and result in SCD, especially of young victims. Autopsy-negative SCD is most often thought to be the consequence of sudden arrhythmic death syndrome and molecular autopsy is recommended. The potential genetic origin of cardiac pathologies involves the forensic pathologist in the multidisciplinary management of surviving family members. The role of the forensic pathologist is to perform and store the postmortem samples according to legal and ethical guidelines and to direct the relatives of SCD victims to genetic counseling.

Radiological imaging plays a very important role in the diagnosis of cardiac pathologies in the living patient. In recent years, the use of Multidetector Computed Tomography (MDCT), CT-angiography, and cardiac MRI has also been introduced in postmortem investigations of cardiovascular pathologies, mostly related to atherosclerotic coronary artery disease. According to this study's research, the postmortem radiological examination is most often not sufficient to establish the exact cause of cardiac death and at present the autopsy remains the gold standard. More studies are needed in order to validate the postmortem radiological assessment of cardiovascular pathologies, mainly because of the postmortem artifacts, which can mislead the interpreting physician. It is thought by some that in the near future, the combination of postmortem imaging with autopsy will become a new gold standard.

In conclusion, molecular autopsy and postmortem radiology represent very attractive new tools in the evaluation of SCD cases. The role of the forensic pathologist has changed over time considering that autopsy diagnosis has profound implications for families of the victims and forensic investigations can lead to improvements in the health of the community. The limitations of interpretation of the molecular autopsy and of the radiological postmortem examination should be highlighted, especially in cases involving legal or ethical responsibilities. Over-interpretation of complementary examinations may contribute to an incorrect clinical approach to families of SCD victims and, in some cases, to a miscarriage of justice.

Criteria for performing molecular autopsies and postmortem radiological examinations as well as guidelines for the management and interpretation of postmortem results currently do not exist but should be proposed by teams of international experts. Integration of the new technologies could lead to a better understanding of cardiac pathologies resulting in SCD and, therefore, to a better clinical approach of the living.

Molecular Autopsy, Postmortem Imaging, Sudden Cardiac Death