

UNIVERSITY OF MEDICINE AND PHARMACY

TÎRGU MUREȘ

Sudden cardiac death in forensic pathology

ABSTRACT

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This thesis contains a general part and a special part. The **general part** comprises data published in the speciality literature on sudden death, pathophysiology of sudden cardiac death, heart anatomy, and common risk factors of sudden coronary deaths: obesity, excessive fat, diabetes mellitus, infection, lack of physical activity, hypertension, smoking, testosterone level. Furthermore the general part presents acute myocardial infarction and as its direct complications interventricular septal rupture, left ventricular free wall rupture and complications that lead to sudden death. Related to myocardial infarction, this thesis was also meant to present post mortem diagnostic methods thereof, methods as different histological stains, such as haematoxylin and eosin staining and Lie staining, staining that is detailed in the second part, namely the **special part**, of the thesis. This section actually is the own contribution part of the thesis starting with the chapter *Objectives* and continuing with the description of the used *Material and Methods* for the analysis of sudden deaths recorded at the Institution of Forensic Medicine, Tirgu Mures during 2001-2010 as well as statistical calculations and achieved results.

Introduction. Sudden death can be defined as a death case that occurs suddenly and unexpectedly at some stage of an apparent health condition, and that is why it can raise the suspicion of a violent unnatural death, especially of poisoning.

Aim. To determine the incidence of cardiovascular death by retrospective analysis of sudden death cases recorded and archived at the Institution of Forensic Medicine, Tirgu Mures during 2001-2010 and the evaluation of the efficiency of Lie staining compared to Haematoxylin & Eosin and van Gieson staining used in cardiac pathology.

Material and method. In order to achieve the proposed goal it seemed reasonable to realize two studies. The first one is a retrospective observational study for a period of 10 years, which comprises 860 cases of sudden death and their aetiology, as well as the most common pathologies in the field of cardiovascular diseases revealed during autopsy, which were coronary atherosclerosis, either acute or chronic myocardial infarction, cardiosclerosis and cardiomegaly. The possible correlation between blood alcohol concentration (where it was sampled) and its role in causing death was also examined, especially in cardiac pathology.

In the second study there were 83 macroscopically confirmed sudden cardiac death cases recorded in the period of 2005-2007. During autopsy, myocardial tissue samples were collected, which were stained with Haematoxylin & Eosin (HE), than Van Gieson (VG) and hematoxylin-basic fuchsin-picric acid (HBFP) Lie staining.

The **statistical analysis** of the processed data was performed aided by Epi Info and Excel computer programs. Chi square, Fisher and Mann Whitney tests were used for calculations, with 95% confidence interval.

Results and discussions. Study 1.

The mean age of the 1860 cases was 50 ± 19.7 years old, with a minimum of 0 days (death cases at birth) and a maximum of 96 years old. 73.7% of the studied group were male and 50.5% came from rural areas. 60.43% of deaths cases were of cardiovascular origin, followed by respiratory origin in 16.34% of the cases, 7.41% were of gastrointestinal, 6% of CNS (Central Nervous System) origin and about 4% occurred due to the syndrome of sudden infant death. Out of the total 1124 sudden cardiovascular death cases 60.2% occurred due to coronary atherosclerotic stenosis, 14.9% due to arrhythmias, which were the first two most common causes. Average blood alcohol concentration of the 1860 patients in the studied group was 0.787 ± 0.873 ‰, with a minimum of 0.3 ‰ and 3.6 ‰ maximum alcohol concentration.

Results and discussions. Study 2.

The mean age of the 83 studied death cases was 48.3 ± 19.3 years, according to gender distribution in 17 cases the deceased were female and in 66 cases male persons. Cardiosclerosis was highlighted by HE staining in 55 cases, by the van Gieson staining in 49 cases, and none of the 83 cases could be identify with certainty by applying the Lie staining. Regarding the diagnosis of acute myocardial ischemia, this could be established by applying hematoxylin-eosin staining in 10 cases, van Gieson staining in one case, and Lie staining diagnosed 56 cases. Statistical analysis revealed a statistically significant correlation between the diagnosis of acute myocardial ischemia and Lie staining ($p = 0.0275$). According to this study, this type of staining is the most appropriate procedure to highlight acute ischemia.

Conclusions. The most common cause of sudden death cases was of cardiovascular origin, which peaked in 2009, the second most frequent cause of sudden death occurred due to respiratory diseases, with peak incidence in 2002. Stenosing coronary atherosclerosis was the most common cause of cardiovascular death. Compared with Haematoxylin & Eosin and van Gieson staining, Lie staining proved a clear superiority with statistical significance in highlighting myocardial hypoxia.

Key words: sudden cardiac death, Haematoxylin & Eosin staining, van Gieson staining, Lie staining.