G99 Exotic Aortic Dissection Treated With Formalin: Macroscopic and Microscopic Findings — A Case Report

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After attending this presentation, attendees will have a better understanding of macroscopic and microscopic aspects of acute aortic dissection.

This presentation will impact the forensic science community by providing an example of sudden death with poisoning suspicion from which a medicolegal autopsy was performed 15 days after death and after embalming.

Aortic diseases contribute to the high overall cardio-vascular mortality. The prevalence of aortic dissection is 0.5 to 2.95/100,000/yr. The diagnosis of aortic dissection has been missed in up to 38% of patients on initial evaluation. In up to 28% of patients, the diagnosis has been first established at the postmortem examination. The mechanisms of disease have been well established. Aortic dissection can result from intimal rupture followed by cleavage formation and propagation of the dissection into the media, or from intramural hemorrhage and hematoma formation in the media subsequently followed by perforation of the intima. Men are more frequently affected and chronic systemic hypertension is the most common predisposing factor. Cocaine use has been suggested as a possible cause of aortic dissection. The classifications classically used were Stanford and De Bakey classifications, which respectively subdivided aortic dissection in two (A and B) and three (I, II and III) groups according to the dissection location (ascending or descending aorta). Svensson *et al*. proposed a new classification in five classes in 1999 according to the intramural hemorrhage, intramural hematoma, aortic ulcers, or iatrogenic and traumatic dissection. Reported is a case of unexpected death of a man in a suspicious context of poisoning and discuss the autopsy and histopathological findings.

A 58-year-old French man died suddenly in Madagascar. He had lived in Madagascar for six years and, according to the police officers in charge of investigation, his wife could have poisoned him. His past medical history was not known but he had consulted a doctor who had performed an Electrocardiogram (ECG) and laboratory tests a few times before the death. The ECG showed a sinusal rhythm with no abnormality and the results of the laboratory tests were in normal range. The public prosecutor of Toulouse, France, ordered a medicolegal autopsy. The body had been embalmed and placed in a hermetic coffin during the flight from Madagascar to Toulouse. Two board-certified forensic pathologists performed an autopsy fifteen days after the death. All three body cavities (cranium, thorax, and abdomen) were examined. Pathological examination was performed after fixation in 10% formalin.

The body was of strong build, length 170cm and weight 85kg. Two bleus hematomas were visible on the anterior face of the left forearm and on the posterior face of the left hand. No other external traumatic injuries were noted.

All the organs were well conserved because of formalin conservation. Examination of the thoracic cavity revealed a haemopericardium with 214cc of blood clot with formalin. The heart was enlarged and heavy (566g) with the appearance of dilated cardiomyopathy. An important aortic dissection was noted from the aortic root to the right and left common iliac artery. The intimal tear was found on the ascending aorta under the aortic arch. A widely intramural hemorrhage was also noted at the right coronary artery attesting to a retrograde dissection. These findings corresponded to a Stanford class A or De Bakey type I.

Microscopic studies confirmed the existence of aortic dissection with a widely intramural hemorrhage. The large false lumen affected the ascending aorta, aortic arch, right common carotid artery and subclavian artery, descending aorta, and both common iliac arteries. Histopathological examination also confirmed the existence of retrograde dissection to the right coronary artery. The dissection reduced 90% of the true lumen of the right coronary artery due to the compressive false lumen. The intimal tear was located 2cm above the aortic cusps. Examination of the kidneys revealed nephroangiosclerosis lesions due to a medical history of chronic systemic hypertension. Microscopic studies found signs of prolonged circulatory failure like acute cardiac liver, renal ischemia, and a fibrin clot formation. The forensic experts concluded that the cardiac tamponade was sufficient to explain the cardiovascular arrest and death of the man.

Cardiovascular diseases are the major cause of death in the majority of the developed countries and in many developing countries. Furthermore, due to the high mortality of aortic dissection in the acute stage, the survival rate is very low. Up to 20% of patients die before reaching the hospital. Thus, aortic dissection was the subject of many of necropsy studies. In a series of 150 postmortem tomographic examinations of non-traumatic death, Shiotani *et al*. noted 23 cases of aortic dissection. At the institute of Legal Medicine of the Hanover Medical School, 30 cases of aortic dissecting aneurysms were examined histologically between 2006 and 2009. The cause of death was a rupture into the pericardial sac in 28 cases (93%). The forensic experts performed an autopsy fifteen days after death and after embalming. They found the cause of death and excluded the suspicion of homicide. Some authors studied cases of autopsies realized with delay. Karger *et al*. retrospectively analyzed

155 forensic exhumations. In this study, postmortem interval ranged from eight days to eight years. Major discrepancies between cause of death as stated on death certificate and as diagnosed after autopsy existed in 57 cases (37%). The large majority of exhumation autopsies were successful and the cause of death was clearly determined in 66.5% of cases. One case was reported of an autopsy realized nine days after the death and after burial and exhumation. The circumstances of death were unclear but, at the autopsy, forensic experts noted a massive hemoperitoneum secondary to hepatic artery rupture due to infectious arteritis. Classically, aortic dissection occurs in individuals with hypertension and individuals with genetic disorders of collagen formation such as Marfan's and Ehlers-Danlos syndrome. Men are more frequently affected, and the peak age for the occurrence of proximal dissection is between 50 and 55 years of age. Many studies have been reported of aortic dissection associated with cocaine or methamphetamine use. Cases of dissecting aneurysm or aneurysm rupture have also been reported in pregnancy and the postpartum period. In this case, the toxicological analyses were not performed, but according to sex, age, and nephroangiosclerosis, it was a classic case of sudden natural death in a 58-year-old man with cardiovascular risk factors. The medicolegal autopsy was necessary to find the precise cause of death and exclude homicide. Obviously, in cases where the cause of death is unclear, its determination by autopsy even some time after the death, can remove suspicion and allow the family of the deceased to mourn.

Aortic Dissection, Embalming, Medicolegal Autopsy

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