



G24 Sudden Cardiac Testosterone-Related Death in a Young Bodybuilder

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The goal of this presentation is to examine the cardiovascular effects of AAS chronic abuse. In all cases of sudden death in apparently healthy bodybuilder an accurate circumstantial investigation is necessary to confirm the AAS abuse and then the autopsic, histological, and toxicological investigation can ascertain the cardiac pathological features correlated to the abuse of these various substances.

This presentation will impact the forensic science community by communicating the pathological relationship between androgenic-anabolic steroids and sudden cardiac death, underlying the necessity of an accurate anamnestic, circumstantial, histological, and toxicological investigation in cases of unjustified death involving apparently healthy young man to ascertain AAS abuse.

Androgenic anabolic steroids (AAS) are synthetic derivatives of testosterone used in therapeutic dosages in medical practice. In addition, AAS are used worldwide to help athletes gain muscle mass and strength, although the prohormones of testosterone and nandrolone are on the list of forbidden substances of the International Olympic Committee (IOC). To minimize the risk of developing tolerance to any particular agent, AAS are taken as a cocktail of different agents taken at one time. There are several reports in the literature regarding the adverse effects of AAS on various organ systems including endocrine, cardiovascular, and hepatic pathologies. The heart is one of the most frequently affected organs by the chronic and acute administration of AAS. Although the topic is still being debated, and most of the evidence is anecdotal, a consensus is beginning to emerge that chronic AAS abuse may be associated with an increased risk of sudden cardiac death (SCD), myocardial infarction, altered serum lipoproteins, and cardiac hypertrophy.

A case of sudden cardiac death is reported in an apparently healthy bodybuilder who was chronic androgenic-anabolic steroids abuser.

A 28-year-old male was found collapsed in his bedroom early in the morning and he was pronounced dead by an emergency physician called by his father few minutes later. He was an amateur but he had weight lifting workouts at the gymnasium for few hours each day. According to father of the deceased he had been taking anabolic steroids parenterally for several years mainly in an effort to improve his appearance. His room contained a veritable arsenal of drugs, in particular several glass vials, most of which fell into the AAS category, and seven used 2.5-ml syringes.

The body was that of a well-built man (weight 87kg, length 176cm). External examination revealed needle marks on the upper external part of the right buttock and on the anterior part of the left forearm. The autopsy revealed abnormal muscle development and hepatomegaly. The heart had a normal shape and was normal in size (13cm x 11.5cm x 3.5cm) but it weighed 470g. The left and right coronaries showed 75-80% lumen reduction. At the section the left ventricular wall was moderately increased.

Histologically, the myocardial samples showed wide fields of myocardial necrosis characterized by hypercontraction of the myocell with a breakdown of the whole contractile apparatus with markedly thickened Z-lines and extremely short sarcomeres. Foci of disarray with star-like disposition of adjacent myocytes, aligned obliquely or perpendicular to one another, and joined together by short, generally hypertrophic myobridges, with interconnecting myofibrils were observed. Small groups of disappearance of myofibrils with intramyocardial oedema resulting in empty sarcolemmal tube and with any type of reaction (colliquative myocytolysis grade 1) were also observed.

Histological examination of coronary arteries confirmed 80% lumen reduction in anterior descending branch, left circumflex, and right coronary artery sections, characterized by nodular hyperplasia of smooth muscle cells and elastic tissue with progressive fibrous replacement, associated with calcium salts accumulation. Both gross and histological examinations of other organs did not reveal any pathology, except for pulmonary oedema and polyvisceral stasis.

Complete toxicological examination was negative for drugs of abuse, including ethanol, but positive results for testosterone and metabolites in blood, liver, and kidney were confirmed. The examination of content in six syringes confirmed the presence of testosterone.

In conclusion, in this case the combined effects of vigorous training and the i.m. administration of testosterone led to a stimulation of the sympathetic nervous system and predisposed the young man to myocardial injury and subsequent sudden cardiac death.

Anabolic Steroids, Sudden Death, Toxicological Findings