G17 Fibrosis of the Cardiac Conduction System as a Possible Cause of Death in Chronic Cocaine Addicts

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The goal of this presentation is to present a study of the fibrosis of the cardiac conduction system in chronic cocaine addicts.

This presentation will impact the forensic community and/or humanity by demonstrating and emphasizing that the early onset of fibrosis in the cardiac conduction system may explain sudden death in chronic cocaine users and especially whose measured drug levels are relatively low It is well known that the results of toxicological analyses can be difficult to interpret in drug addicts because of their increased drug tolerance. Thus, the forensic pathologist is occasionally faced with death cases in chronic drug addicts that demonstrate relatively low drug concentrations in their blood. In some cases, autopsy does reveal the anatomic/pathological cause of death, but in other cases no lesion can be found at the macroscopic
or microscopic levels.

The goal of the present work is to study fibrosis of the cardiac conduction system in chronic cocaine addicts. Myocardial fibrosis may provide the morphological substrate in certain arrhythmias and may even explain a sudden death. At the same time, a review of the literature shows that the cardiac conduction system is rarely examined in drug addicts, including individuals whose drug consumption is chronic, as revealed by hair analysis.

Materials: The group of cocaine addicts was comprised of 33 cases all known by the police to involve chronic substance abusers. In each case, cocaine was detected in the hair. Hair analysis also revealed that for all cases, cocaine was associated with other illicit drugs, such as opiates, methadone, and amphetamines. In the majority of cases (27), the cause of death was attributed to an overdose. The control group was comprised of 31 cases where death was attributed to trauma, hanging, or a natural cause. No illicit substance was detected in the blood, urine, or hair of the control cases. The age ranged from 21 to 45 years in the drug addict group (average of 31.6 years) and from 21 to 50 years in the control group (average of 31.7 years).

Methods: Samples were collected at the level of the atrioventricular junction. Slides were stained with haematoxylin-eosin and Masson's trichrome. The extent of fibrosis was determined using a 4-point semiquantitative scale. Fibrosis assessment was carried out in the following regions of the atrioventricular junction: the atrioventricular node, the penetrating part of the node, the branching bundle and the left and the right bundle branches. In addition, the superior septum was also analysed.

Results: The mean values obtained from the different structures of the conduction system and the superior septum were higher for the group of drug addicts than for the control group.

Statistical analysis: The pair wise comparison population test showed significant differences ($p<0.01$) in the atrioventricular node, in the left bundle branch and in the myocardium of the superior septum.

Conclusion: Fibrosis of the different structures of the conduction system and of the superior septum is a degenerative lesion whose severity increases with age. Early occurrence of fibrosis in drug addicts appears to be linked primarily to chronic cocaine consumption. This is not surprising, as cocaine cardiotoxicity has been known for a number of years. At the same time, the hair analyses conducted in this study show that repetitive cocaine consumption is almost always associated with chronic abuse of other illicit drugs. Thus, one cannot exclude the role played by these other substances in the appearance of fibrosis in the studied cases.

Myocardial fibrosis may cause problems in the cardiac rhythm and even lead to sudden death. Thus, in the context of this study, the early onset of fibrosis in the cardiac conduction system and the superior septum may explain sudden death in chronic drug users whose measured drug levels in the bloodstream are relatively low.

Conduction System, Hair Analysis, Drug Abuse

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