



H121 Biochemical and Histopathological Findings in Sudden Unexpected Death in Epilepsy

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Learning Overview: After attending this presentation, attendees will understand the biochemical and histopathological changes in the body of the deceased in cases of sudden and unwitnessed death in epilepsy.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by showing various biochemical and histopathological changes occurring in various organs in cases of epileptic death and deciding the cause of death when the epilepsy seizure at the time of death is not witnessed.

One of the causes of death in epilepsy is the Sudden Unexpected Death in Epilepsy (SUDEP). It can occur without being in a status epilepticus or even without a typical seizure. It is estimated to cause nearly 2,000 deaths per year in the United States alone and accounts for as many as 15% of all epilepsy-related deaths. The most consistent risk factor across multiple studies is an increased frequency of Generalized Tonic-Clonic Seizures (GTCS). In a developing country like India, with a huge burden of epileptic patients, sudden unwitnessed deaths are on the rise. These deaths are deemed to become a medicolegal case and autopsy are warranted to establish the cause of death.

Based on these facts, this study was undertaken to have a comprehensive examination of each case of sudden death in epilepsy, including gross findings, histopathology, toxicological, and biochemical analysis. Toxicological screening for alcohol and common antiepileptic drugs was conducted on the femoral blood sample. Biochemical analyses for electrolytes, viz, sodium, potassium, calcium, glucose, and cardiac biomarkers (CPK-MB, CPK-NAC) was done on femoral blood, vitreous, Cerebrospinal Fluid (CSF), and pericardial fluid. The findings were compared with those of non-epileptic cases. Sections for histopathology were obtained from different areas of the brain (cerebral cortex, cerebellum, hippocampus, and any grossly visible pathological lesions), lung (hilar and peripheral region, and any grossly visible pathological lesions), and heart (coronary artery, myocardium any grossly visible pathological lesions) in epileptic and non-epileptic deaths.

Most of the cases of epilepsy were of the generalized tonic-clonic variety and some cases were of partial seizure. Duration of disease was between 1 to 12 years. A history of regular medication use was seen in only a few cases; most were either taking the medicine irregularly or not at all. Seizure attack at the time of death was seen in only some cases and most of the deaths were unwitnessed. No history of epilepsy was found in non-epileptic deaths.

On external examination of epilepsy cases, tongue bite, gingival hyperplasia, and features of aspiration were seen. Internally, non-specific congestion of the internal organs was present. Pulmonary edema was found in all cases of either mild/moderate/marked and coronary artery atherosclerosis. Among the non-epileptic cases, external examination show ligature marks, diffuse burn injury, and electrocution marks. Internally, pulmonary consolidation, subarachnoid hemorrhages, and non-specific organ congestion was seen, which were the cause of death in respective cases.

This study has found a lower potassium level, higher sodium level, and higher CK-NAC and CK-MB levels among epileptic deaths in comparison to non-epileptic deaths. There was no significant difference in the level of calcium and glucose between the two groups. On histopathology of various organs in epileptic deaths, the cerebral cortex shows ischemic changes in five cases, meningeal inflammation in one case, inflammation in the cerebellum in one case, and ischemia and calcification of the hippocampus in one case. The findings in the sections of the lung were pulmonary edema of various grades, pulmonary congestion in 12 cases, bacterial colonization in two cases vegetative matter in two cases and autolysis in one case. Sections of coronary showed fibro-atheromatous plaque in four cases and ischemic changes and replacement fibrosis in five cases. Histopathological examination in non-epileptic cases show no significant findings in the cerebral cortex, cerebellum, hippocampus, the sections of lung, coronary artery, and the myocardium in most of the cases, except fibro-atheromatous plaque in four cases, and pulmonary consolidation in one case.

This study concludes that biochemical and histopathology of the organs contain some specific changes in epileptic deaths, such as lower potassium levels, higher sodium, CPK-MB and CPK-NAC levels, ischemic changes of the cerebral cortex, inflammation of the meninges and the cerebellum, calcification of hippocampus, and focal replacement fibrosis of the myocardium.

Sudden Death in Epilepsy, Cause of Death, Biochemical Marker