## H49 An Evaluation of Sudden Deaths Due to Myocarditis: A Study of Autopsy Cases

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**Learning Overview:** After attending this presentation, attendees will better understand the characteristic features of acute myocarditis as a cause of death.

**Impact on the Forensic Science Community:** This presentation will impact the forensic science community by highlighting the importance of forensic autopsy examination with thorough histological study on all sudden unexpected deaths and by understanding the challenges to forensic pathologists when diagnosing acute myocarditis.

Causes of sudden cardiac deaths have been widely reported with limited data focused specifically on myocarditis. Myocarditis is an inflammatory disease of the heart that can cause sudden and unexpected deaths in otherwise healthy individuals. Cases were selected for this study with the following criteria: (1) sudden and unexpected deaths; (2) autopsied cases with complete records, including death scene investigation report and available medical records, autopsy report, toxicology report, and (3) myocarditis was the primary cause of death. The following information was extracted for each case: (1) demographic data, including age, race, and gender; (2) investigation report, including the circumstances of death and known medical history prior to death; (3) autopsy findings; and (4) toxicology report.

This retrospective review of cases from a statewide Office of the Chief Medical Examiner (OCME), MD, yielded a total of 103 sudden unexpected deaths due to myocarditis (1.7% of all natural deaths) in the past ten years. Of the 103 cases, 58 were male and 45 were female (male:female=1.3:1); 37 were African American and 51 were Caucasian. The mean age at death was 31±17 years, with a median age of 30 years. Of the 103 cases, 45 (43.7%) patients were witnessed collapsed. Conditions surrounding death were recorded in 66 cases, with 34 deaths occurring during sleeping or resting. Twenty-six deaths occurred during normal daily activity, such as walking, working, or watching television. Four deaths occurred during exertion, such as exercising at the gym or heavy physical work, and 2 deaths were associated with emotional stress. Eight-six (83.5%) individuals reported chest pain, nausea, or palpitations during a time period less than one day to more than two weeks prior to their deaths. None of the patients sought medical attention. Common cardiac macroscopic findings included ventricular dilatation (39.8%), mild coronary stenosis (17.5%), mottled myocardial appearance (15.5%), and myocardial fibrosis (10.7%). The histological classification of myocarditis was based on the predominant type of inflammatory cell infiltration. In this study group, lymphocytic myocarditis was most common, accounting for 56 cases (54.4%), followed by neutrophilic (32 cases, 31.7%), eosinophilic (13 cases, 12.6%), and giant cell type (2 cases, 1.9%). Microscopic examination revealed myocyte necrosis in 69 cases (67.0%) and interstitial or perivascular fibrosis in 48 cases (46.6%). The percentage of myocyte necrosis was 75.0% (42/58 cases) in lymphocytic, 65.6% (21/31 cases) in neutrophilic, 30.8% (4/13 cases) in eosinophilic, and 100% (2/2 cases) in giant cell myocarditis.

Determination of myocarditis as the cause of death continues to present a major challenge to forensic pathologists because histopathologic findings can be subtle and the diagnosis of myocarditis remains difficult. In cases of sudden unexpected death, especially sudden death in young people, forensic pathologists should consider myocarditis as possible cause. Representative sections from the anterior, lateral, and posterior wall of the atria and ventricles and sections from the ventricular septum should be submitted for microscopic examination.

**Acute Myocarditis, Sudden Death, Forensic Autopsy**