H55 A Tell-Tale Heart: A Case of Takotsubo Cardiomyopathy at Autopsy

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Learning Overview: After attending this presentation, attendees will recognize the clinical history of Takotsubo Cardiomyopathy (TCM) and be familiar with its pathological findings.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by bringing attention to a rare cardiomyopathy that, while pertinent to a medicolegal investigation, may go unrecognized outside of a hospital setting.

Background: TCM, also known as stress cardiomyopathy, is an acute and transient left ventricular wall-motion abnormality involving the apex and mid portions of the ventricle while sparing the base, which can simulate acute coronary syndrome in the absence of significant coronary artery stenosis.[1,2] It is often preceded by emotional or physical stress.[1,3] Although the precise mechanism behind this contractile dysfunction remains elusive, it is thought to be due to a catecholamine excess resulting in microcirculatory dysfunction and direct myocardial toxicity.[1,4]

Case Report: A 51-year-old female with Type 2 diabetes mellitus, end-stage renal disease on hemodialysis, and severe peripheral arterial disease was admitted with a gangrenous wound of the hand and concern for osteomyelitis, as well as altered mental status and septic shock. Despite amputation of the hand and broad-spectrum antimicrobial treatment, she became increasingly hypotensive, with rising lactate. High-sensitivity Troponin T was 173ng/L on hospital day three, eventually peaking at 328ng/L on hospital day four before trending downward over the course of hospital day five (reference range: <14ng/L). Serial electrocardiograms demonstrated ST abnormality and inverted T waves, concerning for ischemia. An echocardiogram on hospital day four demonstrated a significant large apical wall motion abnormality of the left ventricle, extending to mid segments, with hyperkinesis of the basal segments. These findings differed dramatically from the previous day's echocardiogram, and were suspicious for TCM. The patient's condition worsened, and she developed unstable ventricular arrhythmias, which progressed into Pulseless Electrical Activity (PEA) arrest. Per her code status, no aggressive resuscitation was initiated, and she expired on hospital day five.

Pathological Findings: At autopsy, the heart weighed 269g, with a moderate amount of epicardial fat. The coronary arteries demonstrated minimal to mild atherosclerosis, with up to 40% stenosis in the left anterior descending artery. There was no hemorrhage, fibrosis, or other evidence of infarct. The mitral valve was modestly dilated at 11.5cm (average: 8–10.5cm). Histologically, the myocardium demonstrated striking myocyte hypertrophy with "boxcar nuclei," present throughout the bilateral atrial and ventricular free walls and interventricular septum. Interstitial fibrosis was also present, with scattered mononuclear cell infiltrates and contraction bands. Immunohistochemical staining demonstrated these mononuclear cells to be largely CD68 positive macrophages, with scattered single CD3 or CD20 positive lymphocytes. Staining with C4d demonstrated scattered foci of myocyte necrosis. The left ventricular free wall demonstrated fibrinous pericarditis with a CD3 positive lymphocytic infiltrate. Geographically, the left ventricle was the most severely affected, with the base more involved than the apex. The right atrium was more involved than the left atrium.

Discussion: In this case, TCM was preceded by significant physiologic stress (infection, septic shock, amputation). The patient's Electrocardiogram (ECG) findings were non-specific, as is usual in 85% of TCM cases.[2] Troponin T was markedly elevated, which, while not typical for TCM, has been reported.[3-5] The clinical and radiological features of TCM are well-documented, but the pathological findings are less so, as TCM is largely a clinical diagnosis.[1,2] Described microscopic findings include myocyte hypertrophy, C4d positive myocyte necrosis, interstitial fibrosis, mononuclear cell infiltrate, and contraction bands with or without necrosis, the likes of which are present in the current case.[1,2,4,5] Despite the generally good prognosis, complications of TCM include heart failure, thromboembolism, ventricular arrhythmia, and ventricular free wall rupture.[2]

Conclusion: TCM is a left ventricular wall-motion abnormality often precipitated by emotional or physical stress, and thought to be due to an excess of catecholamines resulting in myocyte toxicity and microcirculatory dysfunction. In spite of an overall good prognosis, TCM is not a harmless entity. Recognition of the clinical presentation, complications, and pathologic findings is important for death investigation.

Reference(s):

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