

## Cardiothoracic Ratio in Postmortem Computed Tomography: A Tool for the Diagnosis of Cardiomegaly

**Authors :** Alex Eldo Simon, Abhishek Yadav

**Abstract :** This study aimed to evaluate the utility of postmortem computed tomography (CT) and heart weight measurements in the assessment of cardiomegaly in cases of sudden death due to cardiac origin by comparing the results of these two diagnostic methods. The study retrospectively analyzed postmortem computed tomography (PMCT) data from 54 cases of sudden natural death and compared the findings with those of the autopsy. The study involved measuring the cardiothoracic ratio (CTR) from coronal computed tomography (CT) images and determining the actual cardiac weight by weighing the heart during the autopsy. The inclusion criteria for the study were cases of sudden death suspected to be caused by cardiac pathology, while exclusion criteria included death due to unnatural causes such as trauma or poisoning, diagnosed natural causes of death related to organs other than the heart, and cases of decomposition. Sensitivity, specificity, and diagnostic accuracy were calculated, and to evaluate the accuracy of using the cardiothoracic ratio (CTR) to detect an enlarged heart, the study generated receiver operating characteristic (ROC) curves. The cardiothoracic ratio (CTR) is a radiological tool used to assess cardiomegaly by measuring the maximum cardiac diameter in relation to the maximum transverse diameter of the chest wall. The clinically used criteria for CTR have been modified from 0.50 to 0.57 for use in postmortem settings, where abnormalities can be detected by comparing CTR values to this threshold. A CTR value of 0.57 or higher is suggestive of hypertrophy but not conclusive. Similarly, heart weight is measured during the traditional autopsy, and a cardiac weight greater than 450 grams is defined as hypertrophy. Of the 54 cases evaluated, 22 (40.7%) had a cardiothoracic ratio (CTR) ranging from  $> 0.50$  to equal 0.57, and 12 cases (22.2%) had a CTR greater than 0.57, which was defined as hypertrophy. The mean CTR was calculated as  $0.52 \pm 0.06$ . Among the 54 cases evaluated, the weight of the heart was measured, and the mean was calculated as  $369.4 \pm 99.9$  grams. Out of the 54 cases evaluated, 12 were found to have hypertrophy as defined by PMCT, while only 9 cases were identified with hypertrophy in traditional autopsy. The sensitivity and specificity of the test were calculated as 55.56% and 84.44%, respectively. The sensitivity of the hypertrophy test was found to be 55.56% (95% CI: 26.66, 81.12<sup>1</sup>), the specificity was 84.44% (95% CI: 71.22, 92.25<sup>1</sup>), and the diagnostic accuracy was 79.63% (95% CI: 67.1, 88.23<sup>1</sup>). The limitation of the study was a low sample size of only 54 cases, which may limit the generalizability of the findings. The comparison of the cardiothoracic ratio with heart weight in this study suggests that PMCT may serve as a screening tool for medico-legal autopsies when performed by forensic pathologists. However, it should be noted that the low sensitivity of the test (55.5%) may limit its diagnostic accuracy, and therefore, further studies with larger sample sizes and more diverse populations are needed to validate these findings.

**Keywords :** PMCT, virtopsy, CTR, cardiothoracic ratio

**Conference Title :** ICFMFP 2023 : International Conference on Forensic Medicine and Forensic Psychology

**Conference Location :** Vienna, Austria

**Conference Dates :** July 24-25, 2023