



## Pathology/Biology Section - 2015

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### H65 Impact of Postmortem Computed Tomography on the Evaluation of Strangulation Deaths

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The goal of this presentation is to aid forensic pathologists in understanding the utility of using Postmortem Computed Tomography (PMCT) as an additional tool in the evaluation of strangulation victims. Increasing reliance on technology has costs. Attendees will develop an understanding of the added benefits and inherent weaknesses of PMCT for strangulation deaths so they can determine the instances in which the use of this modality is appropriate.

This presentation will impact the forensic science community by assisting forensic pathologists in determining the settings in which PMCT is beneficial for the analysis of strangulation deaths.

**Purpose:** The value of PMCT was evaluated to augment autopsy in the evaluation of strangulation fatalities. The use of advanced radiologic imaging modalities such as PMCT may enhance the ability to detect injuries which may not be seen at autopsy.

**Methods:** This study combined a meta-analysis of strangulation (ligature and manual) deaths from other institutions with a cohort of similar deaths from New Mexico. A PubMed® literature search identified 30 studies which described autopsy findings in 576 strangulation deaths (50% ligature, 30% manual, and 20% combined or other) and two studies which described autopsy and CT findings in six strangulation deaths (33% ligature, 67% manual). In addition, 13 strangulation deaths were identified that underwent both autopsy and PMCT (46% ligature, 38% manual, and 16% other). The cases with autopsy only were compared with the cases of autopsy + PMCT for the presence of laryngochoyoid fracture and soft tissue hemorrhage.

**Results:** Fractures were detected in 53% of autopsy-only cases and only 26% of autopsy + PMCT cases. The detection rates of hyoid bone and cricoid cartilage fractures in autopsy-only and autopsy + PMCT cases were not significantly different: 27% and 11% ( $p=0.11$ ) and 11% and 11% ( $p=0.93$ ), respectively; however, the two cricoid cartilage fractures identified in the autopsy + PMCT cohort were only detected via PMCT. PMCT identified all hyoid fractures seen at autopsy, 2/3 thyroid fractures seen at autopsy, and 6/6 hemorrhages also identified at autopsy. There was a significantly lower incidence of thyroid cartilage fractures in the autopsy + PMCT cohort (45%) when compared to the autopsy-only cohort (21%), with a  $p$  value of 0.04. There was no significant difference between detection rates of hemorrhage.

**Conclusions:** No significant differences were identified between the findings described in autopsy-only strangulation deaths compared to autopsy + PMCT strangulation deaths, with the exception of the lower incidence in thyroid cartilage fractures in the autopsy + PMCT cohort. It is likely that the distribution of injuries in the autopsy-only and autopsy + PMCT groups were unequal due to the small sample size of the autopsy + PMCT group. While the frequency of cricoid cartilage fractures were similar between the cohorts, the only two cricoid fractures detected in the autopsy + PMCT group were discovered by PMCT. PMCT may have a role in detecting these subtle fractures. Additionally, the results indicate that PMCT, in most cases, is equally able to detect injuries in strangulation deaths as autopsy and may be used in place of autopsy in certain settings such as cases of accidental or suicidal strangulations.

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#### Strangulation, Postmortem Computed Tomography, Autopsy