

H141 The Evaluation of the Routine Use of Postmortem Computed Tomography (PMCT) In a High-Volume United States Medical Examiner's Office

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Learning Overview: The goal of this presentation is to provide data regarding the effectiveness of integrating PMCT into routine death investigation in a high-volume United States medical examiner's office.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by demonstrating the degree to which PMCT imaging findings were appropriately identified and incorporated into the death investigation report and the cause and manner of death through a retrospective radiology audit of 10% of cases over a nine-month period.

This study used a high-volume United States medical examiner's office that routinely performs pathologist-interpreted PMCT on nearly all cases brought in for autopsy or external exam to determine whether significant imaging findings were appropriately identified and incorporated into the death investigation report and the cause and manner of death. A retrospective audit of 10% of cases receiving PMCT over a nine-month period was performed.

A total of 200 cases from four categories were reviewed: (1) autopsy without a Radiology Consult (RC) ($n=77$); (2) external exam or partial autopsy without RC ($n=79$); (3) autopsy with RC ($n=26$); and (4) external exam with RC ($n=18$). Due to the limited number of RC cases, all available RC cases were included, while categories 1 and 2 were sampled randomly.

A forensic radiologist with ten years' experience (who did not consult previously on the cases) reported the PMCT findings. The radiologist and a pathologist (not the case pathologist) reviewed the death investigation report in tandem to document any PMCT findings omitted from the report. Omitted findings were categorized into seven error types according to a modified Goldman classification: Major 1—Unrecognized fatal injury or pathology that would change Cause of Death (COD) and/or Manner of Death (MOD). Major 2—Unrecognized fatal injury or pathology that would not change COD and/or MOD. Minor 3.1—Incidental finding unrelated to COD, but potentially important (e.g., for public health). Minor 3.2—Additional finding related to the mechanism of a recognized COD. Minor 4.1—Incidental finding unrelated to COD and not important. Minor 4.2—Additional findings related to recognized COD but not important. Minor 5—Anatomic error (e.g., rib number). Errors that were difficult to classify were reviewed by four people to reach a consensus.

A total of 13 Major errors (four Major 1 and nine Major 2) were identified (6.5%). In all cases where Major errors were identified, the MOD was certified as either accident or natural. The four Major 1 errors were found in cases that received external examinations without RC. Of nine Major 2 errors, two occurred in cases receiving full autopsies without RC, and six occurred in cases receiving external examinations without RC. Only one Major error was found in an RC case (Major 2, external examination). The data is summarized in the table below. In only one case did the Major error suggest a possible change in the MOD (a missed humerus fracture in a decomposed, non-suspicious death certified as natural). In none of the 200 cases did a missed PMCT finding definitively change the MOD.

Three of four Major 1 and two of nine Major 2 errors in external examinations were fatal abdominal pathologies (e.g., pancreatitis). Six of nine Major 2 errors, including one RC case, were fatal injuries (e.g., cervical spine injury) missed in cases with other multiple fatal injuries. The RC was requested specifically for evaluation of a fetus found in a female motor vehicle accident victim.

Minor unrecognized (or undocumented) PMCT findings were extremely common, occurring in 95% of cases overall. Little difference was observed in minor errors frequency between the four case categories. Of the minor error types, Minor 4.1 (unrelated to COD and not important) was the dominant type, occurring in 83.5% of cases.

In conclusion, pathologists reliably interpret PMCT scans, avoid major errors, and accurately certify deaths in the vast majority of cases. As major errors occur more frequently in external examinations (which are primarily natural and accidents), some educational interventions, such as increased training for pathologists in the radiological appearance of abdominal pathologies and trauma, should be considered. The data suggest that RCs may reduce major errors, although RC efficacy cannot be determined from this study due to the small number of these cases. Here is a summary of results:

Modified Goldman Classification	Total (%) $n=200$	Autopsy (%) $n=77$	External or Partial Autopsy (%) $n=79$	Autopsy with RC (%) $n=26$	External with RC (%) $n=18$
Major (total)	13 (6.5%)	2 (2.6%)	10 (12.7%)	0 (0%)	1 (5.6%)
Major 1	4 (2%)	0 (0%)	4 (2%)	0 (0%)	0 (0%)
Major 2	9 (4.5%)	2 (2.6%)	6 (8.3%)	0 (0%)	1 (5.6%)
Minor (total)	191 (95.5%)	72 (93.5%)	78 (98.7%)	23 (88.5%)	18 (100%)
Minor 3-1	25 (12.5%)	5 (6.5%)	10 (13.9%)	5 (19.2%)	3 (16.7%)
Minor 3-2	34 (17%)	12 (15.6%)	18 (22.8%)	2 (7.7%)	2 (11.1%)
Minor 4-1	167 (83.5%)	64 (83.1%)	66 (83.5%)	22 (84.6%)	15 (83.3%)
Minor 4-2	136 (68%)	41 (53.2%)	68 (86.1%)	12 (46.2%)	15 (83.3%)
Minor 5	19 (9.5%)	7 (9.1%)	19 (9.5%)	4 (15.4%)	0 (0%)

Forensic Pathology, Postmortem Computed Tomography, Death Certification