Post-Mortem Imaging

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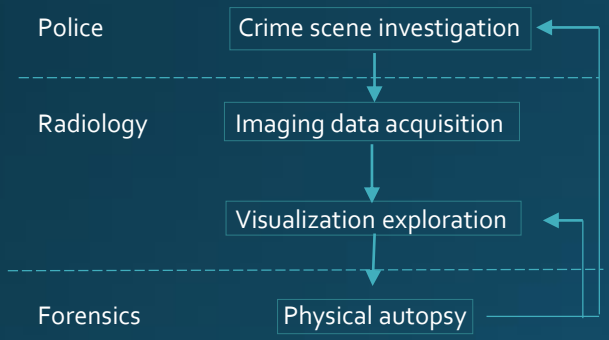
Introduction: Forensic radiology is a branch of forensic science that involves post-mortem imaging to provide information, evidence, and interpretation of facts to pathologists on injuries and causes of death; particularly when they are unknown.[1] Imaging techniques can assist and supplement conventional autopsies providing improvements to general post-mortem examinations and offer an alternative option to families that have religious, cultural, and social objections to an invasive autopsy.[6] As we have all heard before, "a picture is worth a thousand words."



Uses:

- Trauma, fatalities, disasters[3]
- Assess bony injuries[3]
- Identify time and cause of death[3]
- Assess organ damage[1]
- Safety Screening for Pathologist[3]
- Characterize and reconstruct stab and gunshot wounds[1]
- Study of areas not routinely dissected[3]
- Foreign Body Localization[3]
- Child abuse[3]
- Advanced body decomposition[3]
- Assess organ damage[1]
- Personal identification[3]

Image 1. Bullet identification in cadaver throughout 3D-VR reconstructions.[1]

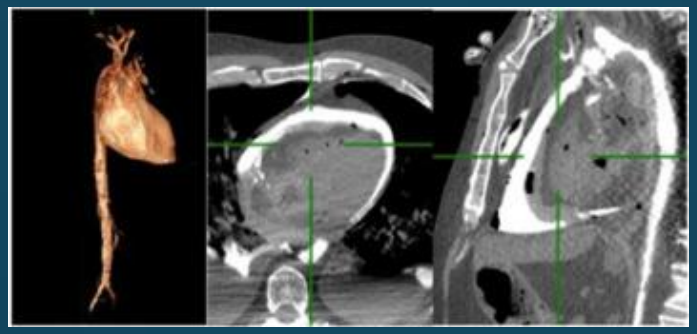


Image 2: In this particular case of a car accident victim, the presence of the contrast in the pericardial sac can be highlighted to demonstrate an important aortic rupture with fatal cardiac tamponade.[1]

Benefits:

- Non-invasive[6]
- Supplemental information to conventional autopsy[6]
- Reduces necessity of invasive autopsy[6]
- Eliminates cultural and religious objections to invasive autopsy[1,6]
- Reproducibility of exams[6]
- Digital storage; increased accessibility[4,6]
- Time efficient[6]
- Permanent Record creation[6]
- Valuable in civil litigation.[4]

Modalities
Conventional X-ray
CT (PMCT)
CT Angiogram (PMCTA)
MRI (PMMRI)
Ultrasound (less frequent)

Image 3. Multiplanar oblique-coronal reconstruction of the case in this image allows to verify the course of the bullet with entry hole in the skull and exit in the left maxilla.[1]

Controversies or Concerns:

- Cost[6]
- Erroneous interpretation[6]
- Quality Assurance[6]
- Training on imaging post-mortem patients[1]
- Facility availability and Infrastructure[6]
- Large data set sizes; up to 30,000 images[4]

Conclusion:

At this time; post-mortem imaging has not been proven to provide superior information over conventional autopsies. However, with the increased decline in conventional autopsies it has led to an increased desire for alternative methods of investigation, that increases both sensitivity, and specificity and is also more acceptable to the family of the deceased.[2] With that being said; medical imaging is becoming increasingly common for the investigations of deaths.[5] Postmortem imaging can provide pathologists with pertinent information regarding the patient's cause of death and help guide and improve sampling during the conventional autopsy.[1]

References:

1. Cafarelli, F., Grilli, G., Zizzo, G., & Bertozzi, G. (2018). Postmortem Imaging: An Update. Seminars in Ultrasound, CT and MRI. Retrieved December 21, 2018, from https://www-sciencedirect-com.unk.idm.oclc.org/science/article/pii/S0887217118300957.
2. Higginbotham-Jones, J., & Ward, A. (2014). Forensic radiology: The role of cross-sectional imaging in virtual post-mortem examinations. Radiography, 20(1), 87-90. Retrieved October 28, 2018, from https://www-sciencedirect-com.unk.idm.oclc.org/science/article/pii/S1078817413001181.
3. Lo Re, G., S. S., & Terranova, M. (2018). Virtopsy and Living Individuals Evaluation using Computed Tomography in Forensic Diagnostic Imaging. Seminars in Ultrasound, CT and MRI. Retrieved December 21, 2018, from https://www-sciencedirect-com.unk.idm.oclc.org/science/article/pii/S0887217118300969.
4. Lundstrom, C., Persson, A., Ross, S., & Ljung, P. (n.d.). State-of-the-art-visualization in post-mortem imaging. APMIS,316-326. doi:DOI 10.1111/j.1600-0463.2011.02857.x
5. Morgan, B., & Rutty, G. N. (2016). How Does Post-Mortem Imaging Compare to Autopsy, Is This A Relevant Question? Journal of Forensic Radiology and Imaging, 4, 2-6. Retrieved November 16, 2018, from https://www-sciencedirect-com.unk.idm.oclc.org/science/article/pii/S2212478015300277.
6. Smith, A. P., Traill, Z. C., & Roberts, I. S. (2018). Mini-symposium: Autopsy pathology Post-mortem imaging in adults. Diagnostic Histopathology, 24(9), 365-371. Retrieved October 28, 2018, from https://www-sciencedirect-com.unk.idm.oclc.org/science/article/pii/S1756231718301208.