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FORENSIC FORUM

Virtual autopsy: time for a clinical trial

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In this paper we put forward the idea that forensic pathologists need to start thinking differently about our core activity. It may now be time to move beyond the classical autopsy and embrace a new approach. However, the present discussion is only applicable to death investigation systems that have, or can develop, capacity in postmortem CT/MR imaging.

Over the last 50 years, hospital autopsy rates have declined. Although many pathologists lament this situation, the decline has had no practical adverse effect on medical education or the quality of patient care. Hospital autopsies are still performed when there is a specific clinical interest aimed at improving patient care (e.g., when death occurs after cardiovascular surgery, bone marrow transplantation, or during clinical trials). Furthermore, the targeted medical autopsy is thriving as a clinical and basic science research tool (e.g., "brain only" autopsies in neurodegenerative disease). The autopsy as a teaching tool is essentially defunct at the undergraduate level, as most medical schools have prioritized other aspects of the curriculum due to the huge increase in medical knowledge. Legal and forensic medicine is often only briefly mentioned in the medical curriculum.

In addition, there is a widespread movement in forensic pathology to embrace postmortem imaging, or virtual autopsy. There is a range of opinion on the utility of this approach, or if it is a beneficial development. However, if the history of medical technology is a guide, the net effect of the use of postmortem imaging will be to reduce the number of classical autopsies performed. Furthermore, there is a persistent societal tendency to reduce the number of autopsies. In fact, most medicolegal death investigation systems are developing policies or legislation to permit objection to autopsies by families. Cost containment is also a driver of autopsy rate reduction in many jurisdictions. Furthermore, the magnitude of problems with organ retention is increased by higher autopsy rates.

In the jurisdictions with the highest medicolegal autopsy rate, studies have shown that these autopsies are often quite poorly performed and/or reported. In addition, many jurisdictions have never had a high medicolegal autopsy rate (e.g., Netherlands and Germany) and yet have not suffered systemic ill-effects in society as a result.

Prospective audit of medicolegal autopsy quality have shown that deficiencies in autopsy results in cases of natural, accidental and suicidal death have little, if any, impact on the outcomes in the case. This seems to occur because some medicolegal autopsies are performed as a matter of policy or customary practice, rather than a way to add specific value to the death investigation. Despite these issues, it would probably be universally agreed that classical medicolegal autopsies are critically important in cases of: the unexpected death of infants and children; homicide or suspected homicide; death in police custody; sudden death in the young (e.g., possible genetic disease); and deaths related to patient safety issues and therapeutic complications. These data suggest that we need to consider re-defining the modern medicolegal autopsy as a forensic medical procedure. Perhaps this new approach should start with a new definition: the modern medicolegal autopsy is the least invasive medical examination of a dead body to answer all the relevant, reasonably foreseeable questions that derive from applicable legislation, the criminal justice system and the health care of the family.

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This implies that it now may be the time to do fewer "classical" medicolegal autopsies and instead perform more autopsies that are targeted to a particular purpose or benefit. This approach could necessitate the systematic use of postmortem CT/MR imaging. In practice, this new approach could include, for example: a classical comprehensive "3-cavity autopsy" supplemented by CT imaging, several ancillary tests and gene sequencing in a sudden death thought to be due to a channelopathy; an external examination and CT scan in the case of an apparent suicidal hanging; or a targeted examination of the heart and ascending aorta after CT imaging reveals a probable hemopericardium.

The way forward could be informed by a prospective study that compares the targeted autopsy as directed by the history and circumstances of death and the results of postmortem CT imaging with a classical complete medicolegal autopsy. The case population in the study should be sufficiently large and diverse to inform policy development. A multi-center approach would be best, particularly involving comparable institutions or departments in different countries. The results of such a large-scale study could change the methodology of medicolegal death investigation in the digital era.