
RSNA Press Release

'Virtual Autopsy' Helps Identify Drowning as Cause of Death

Released: May 31, 2007

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OAK BROOK, Ill. - "Virtual autopsy" performed with multidetector computed tomography (MDCT) can aid forensics teams in determining if a person has drowned, according to a study published in the June issue of *Radiology*.

MDCT is comparable to conventional autopsy in demonstrating airway froth and sediment that are indicative of drowning.

"Our findings show that MDCT can be used either to facilitate or reduce the need for conventional autopsy when drowning is the suspected cause of death," said lead author Angela D. Levy, M.D., from the Department of Radiology, Uniformed Services University of the Health Sciences in Bethesda, Md.

The determination of drowning as a cause of death for a body that is found in water is imperative in forensic investigation because becoming submerged in water may be a secondary rather than primary event. Autopsy findings that support the diagnosis of drowning include but are not limited to frothy fluid in the airways or lungs, hyperinflated and congested lungs, and fluid in the paranasal sinuses or stomach.

There are some advantages to virtual autopsy compared to conventional autopsy. In cases of suspicious death, the procedure does not damage or destroy key forensic evidence, as can happen during a conventional autopsy. In addition, MDCT can be used in situations where autopsy may not be feasible or is prohibited by religious beliefs. However, in most cases, MDCT would best be employed as an adjunct to routine autopsy.

Dr. Levy and colleagues performed total-body MDCT exams on 28 consecutive male drowning victims and a control group of 12 men who were victims of sudden death from coronary artery disease. Following MDCT, routine autopsies were performed.

MDCT images were evaluated for the presence of fluid and sediment in the paranasal sinuses and airways, fluid in the ear, frothy fluid in the airways, obscured "ground-glass"

At A Glance

- Multidetector computed tomography (MDCT) is comparable to autopsy in the diagnosis of drowning.
- MDCT findings of airway froth and sediment are indicative of drowning.
- MDCT does not damage key forensic evidence.

appearance or thickening in the lungs, and swelling, fluid or sediment in the stomach. Images were then compared to autopsy reports and photographs.

MDCT indicated that all of the drowning victims had fluid in the paranasal sinuses and ears and ground-glass opacity in the lungs. Twenty-six (93 percent) had fluid in the subglottic (below the vocal cords) trachea and main bronchi. Fourteen (50 percent) had sediment in the subglottic airways. Six (21 percent) had frothy fluid in the airways, and 25 (89 percent) had ground-glass opacity and thickening in the lungs. Twenty-five (89 percent) exhibited swelling of the stomach.

No members of the control group had frothy fluid or sediment in the airways or sinuses, 11 (92 percent) had subglottic airway, tracheal and bronchial fluid. All members of the control group exhibited collapsed stomachs.

Autopsy results in these categories were similar to MDCT results for both study groups.

"Airway froth and sediment can be demonstrated on MDCT and were specific to drowning, thereby replicating the findings seen at autopsy," said Dr. Levy.

Based on this study, MDCT may provide support for the diagnosis of drowning when other causes of death have been excluded by a limited autopsy or external examination of the body. In addition, MDCT virtual autopsy may be useful as a pre-autopsy triage tool in mass casualty scenarios.

"More and more, advanced imaging tools such as MDCT are being applied to forensic investigations," Dr. Levy said. "In the future, imaging in forensics may be just as important as imaging in clinical medicine."

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Journal attribution required.

Radiology is a monthly scientific journal devoted to clinical radiology and allied sciences. The journal is edited by Anthony V. Proto, M.D., School of Medicine, Virginia Commonwealth University, Richmond, Va. *Radiology* is owned and published by the Radiological Society of North America, Inc. (radiology.rsna.org)

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"Virtual Autopsy: Two- and Three-dimensional Multidetector CT Findings in Drowning with Autopsy Comparison." Co-authors of the paper are H. Theodore Harcke, M.D., John M. Getz, B.S., Craig T. Mallak, M.D., James L. Caruso, M.D., Lisa Pearse, M.D., Aletta A. Frazier, M.D., and Jeffrey R. Galvin, M.D.

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