



# Significance of Virtual Autopsy: Exploring Its Relevance and Added Value

## Abstract

Virtual autopsy offers numerous advantages over traditional autopsy, including reduced invasiveness, decreased time and cost, and improved diagnostic accuracy. This paper explores these advantages in detail, highlighting how virtual autopsy can lead to a more efficient and accurate examination of the deceased.

## Introduction

In all states & countries, without exception, an autopsy is a widespread procedure; the reasons for its appointment and the procedure for conducting it are regulated by law.

During an autopsy, the cavities of the skull, thoracic, abdominal cavity and the cavity of the lesser pelvis are examined, while certain pathological changes in the body are established, which make it possible to determine the cause of death.

In recent years, a number of states have begun to use the method of virtual autopsy based on post-mortem computed tomography.

Virtual Autopsy is a non-invasive technique that utilizes imaging technologies to create a virtual 3D body of a deceased person's body. The virtual body is then used to perform a detailed examination and analysis of the body without the need/Minimal invasive for traditional invasive autopsy procedures. Virtual Autopsy has been gaining popularity in recent years as a more efficient and less invasive alternative to traditional autopsy.

Section 14 of the Coroners and Justice Act 2009, UK (in force from 25 July 2013) suggests that a post-mortem examination of a body is not limited to an autopsy and may include CT (or MRI) imaging.

The Royal College of Pathologists, UK has drafted the guidelines for post-mortem cross-sectional imaging in adults.

## Benefits

The benefits of applying Virtual Autopsy are numerous. One significant benefit is that it eliminates the need for invasive procedures, which can be traumatic for family members and loved ones of the deceased. Instead, Virtual Autopsy utilizes non-invasive technologies such as computed tomography (CT) to generate high-resolution images of the body. The images are then reconstructed into a 3D model that can be viewed from any angle, allowing pathologists to examine the body thoroughly.

Another significant benefit of Virtual Autopsy is that it can be performed quickly and efficiently. Traditional autopsies can take hours or even days to perform, depending on the complexity of the case. In contrast, Virtual Autopsy can be completed in a matter of hours. This speed can be crucial in situations where time is of the essence, such as when investigating a potential outbreak of a contagious disease. There is no risk of infection of mortuary personnel (doctors, laboratory assistants and orderlies) with tuberculosis, hepatitis, HIV, COVID -19 and other dangerous infectious diseases.

Virtual Autopsy can also be used to gather more detailed and accurate information about the deceased's body than traditional autopsies. The high-resolution images generated by the technology can detect even minor injuries or abnormalities that may have been missed during a traditional autopsy. This information can be essential in determining the cause of death, especially in cases where the cause may have been unclear.

The need to apply Virtual Autopsy arises from the desire to reduce the trauma and discomfort associated with traditional autopsies. Many people are reluctant to have their loved ones undergo invasive procedures, and some cultures even forbid it. Virtual Autopsy provides a non-invasive alternative that can help alleviate these concerns while still providing valuable information about the deceased.

In addition to reducing trauma and discomfort, Virtual Autopsy provides added value in terms of increased accuracy and efficiency. The detailed information gathered by the technology can be used to inform medical research, improve medical diagnoses, and even inform public health policy. The speed of the procedure can also be a significant advantage in certain situations, such as when investigating a potential disease outbreak.

One of the main advantages of virtual autopsy is the preservation of the body of the deceased, which is extremely important for representatives of many religions. It is also an opportunity for a faster, more detailed and more gentle examination of areas of the

human body, which is technically difficult for a traditional autopsy. Post-mortem imaging can help identify signs of antemortem injury in cases of mechanical trauma.

Virtual autopsy data can be stored in digital format and are available for further examination after burial or cremation. They can be used to conduct commission and complex forensic medical examinations with the participation of various specialists, including those from different regions, as well as for investigating authorities, prosecutors and courts.

### Case Studies

A virtual Autopsy is a useful tool for documentation, visualization and analysis of the findings of blunt force trauma with a large potential in forensic medicine.(1,2)

A virtual Autopsy is a useful tool for the documentation and visualization of wounds, the detection of bullets and bullet fragments in the body, the bullet course, inflicted injuries, and the cause of death in Gunshot Injury cases (3)

In cases of sudden deaths, disease (pathology) related deaths, Similar to the clinical experience but in many more organs, the tissue specimens obtained using the clinically approved biopsy needle are of sufficient size and adequate quality for a histological . ACN III needle under CT guidance may become a reliable method for targeted sampling of tissue probes of the body for histopathological examination. (4). Upto 5000 diseases have been detected by Virtual autopsy techniques, which may have been missed with traditional autopsy.

Postmortem weights of the liver and spleen can accurately be assessed by nondestructive imaging. Multislice CT overcomes the limitation of putrefaction and venous air embolism by the possibility of excluding gas. Congestion seems to be even better assessed. (5)

## Return on Investment

The return on investment for Virtual Autopsy can be significant. While the technology may require a higher upfront investment than traditional autopsies, the increased efficiency and accuracy can lead to significant cost savings over time. Additionally, the non-invasive nature of Virtual Autopsy can help reduce liability risks associated with traditional autopsies, which can be costly for hospitals and medical institutions.

## Conclusion

In conclusion, Virtual Autopsy is a valuable tool that provides numerous benefits over traditional autopsies. The method is considered an alternative to traditional autopsy in 98% of the cases where the cause of death can be determined with virtual autopsy alone (with Toxicology & Histopathology) without opening all the 3 cavities of the body.

Its non-invasive nature reduces trauma and discomfort, while its speed and accuracy provide valuable information for medical research and public health policy. The return on investment for Virtual Autopsy can be significant, making it a worthwhile investment for medical institutions and hospitals

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