



Published: December 31, 2023

**Citation:** Kumar K, Kumar V, et al., 2023 The definitive indefinite cause of death: Case series-based Evaluation and discussion of Negative and Obscure Autopsy., Medical Research Archives, [online] 11(12).

<https://doi.org/10.18103/mra.v11i12.4873>

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**DOI**

<https://doi.org/10.18103/mra.v11i12.4873>

ISSN: 2375-1924

## The definitive indefinite cause of death: Case series-based Evaluation and discussion of Negative and Obscure Autopsy.

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### ABSTRACT:

Medicolegal autopsies are routinely done by forensic pathologist to fulfil the objectives of autopsy and to solve the dilemma of investigating agencies. The objectives of a medicolegal autopsy are various depending on case to case which varies from establishing the identity of deceased to detect the any disease, injury or permanent physiological and pathological changes in the body that leads to death. But the medicolegal autopsy is not always concluding the main objective of it which is cause of death and such autopsies are categorised as obscure and negative autopsy. Acknowledgement of incidence of negative autopsy to the practicing forensic pathologist is necessary. We are discussing here some autopsies conducted by the author(s) after which the final scientific cause of death could not be ascertained. In this article, the steps to follow are discussed once an autopsy is designated as obscure or negative autopsy. The algorithm-based approach toward the determination of cause of death and importance of other circumstantial evidences has been discussed.

**Keywords:** Negative autopsy, Cause of death, Medicolegal, Sudden death

### Introduction:

Several surveys in various countries have shown that where a physician offers a cause of death without the benefit of autopsy findings, the error rate is of the order of 25–50 per cent, even in deaths in hospital. Thus, the value of an autopsy in improving the value of death certificates is undoubted, but it still has to be conceded that the autopsy is by no means infallible in revealing the true cause of death<sup>1</sup>. The term used for such an autopsy which does not lead the pathologist to cause of death is Negative Autopsy. It is defined in literature as, after a detailed history taking, meticulous dissection and thorough laboratory investigation, there are no findings present to ascertain cause of death. It is seen in 2-5 % of all autopsy cases<sup>2</sup>. Upon determination that an autopsy is grossly negative, the forensic pathologist should review the history and laboratory tests to determine whether additional history needs to be obtained or studies need to be performed<sup>3</sup>. The basic steps in conducting an autopsies are: obtaining photographs and video films for future evidential use in the Court of Law, retaining samples (body viscera and fluids) for chemical/toxicological analysis, histopathological/microscopic examination, and/or other ancillary investigations, restoring the autopsied body to the best possible cosmetic condition before handing over to the concerned legal authority, providing a detailed written postmortem examination report of the autopsy findings and their inferences concluded based on scientific reasoning. An autopsy without any positive findings that fail to reveal the cause of death with gross, microscopic, toxicological, and other necessary ancillary investigation is said to be a negative autopsy<sup>4</sup>. The probable causes of negative autopsy are: inefficient methods of conduction of autopsy, natural cause of death and the pathological finding is not appreciable on examination of tissues, negative chemical analysis report due to wrong analytical techniques for detection of xenobiotic, non- pathological cause of death for e.g., electrical disturbance in the heart and brain stem that cannot be observed on histopathologically, marginal pathology<sup>5</sup>. The incidence of sudden death is closely related to the negative autopsy. The sudden death is defined as the World Health Organization (WHO) definition of SD is a “death occurring within 24 h after the onset of the symptoms”<sup>6</sup>. It is most often the result of cardiovascular disease, which was reported to be the cause of sudden death in 56.4%-73% of cases, 58% of which was caused by coronary artery disease<sup>7-8</sup>. The cardiac deaths resulting into sudden death are classified into four groups as Brugada syndrome, Long QT syndrome, Short QT syndrome and Catecholaminergic Polymorphic Ventricular Tachycardia<sup>9</sup>. The most common non-cardiac causes

of sudden death were epilepsy (23.8%), intracerebral hemorrhage (23.8%), asthma (16.1%), and pulmonary embolism (12.5%), and the cause of death was undetermined in 4.3%<sup>8</sup>. Sudden death due to central nervous system (CNS) causes accounted for 15% of all cases of noncardiac deaths and was one of the most common non-cardiac causes of sudden death. Obscure autopsy is the diluted version of Negative autopsy where we observe some findings over the body in the form of trauma or pathology but they are insufficient to diverge themselves towards the cause of death. In a small number of cases, no satisfactory morphological cause of death can be found despite an exhaustive post-mortem examination<sup>10</sup>. It is defined as those which do not show a definite cause for death, in which there are minimal, indefinite or obscure findings, or even no positive findings at all. They are a source of confusion to any pathologist. Frequently, these deaths are due to obscure natural causes, but they may be due to certain types of injury or complications of injury, or to poisoning. Mild degrees of natural disease should not be implicated unless other possibilities are most carefully eliminated.<sup>11</sup> The relation between sudden death and negative autopsies are analysed here with the help of autopsies conducted by the authors which were inconclusive in view of cause of death and were designated as either negative or obscure autopsy.

## Cases Based Evaluation and discussion

### CASE NO. 1: AN EXHUMED BODY OF FEMALE CHILD

An exhumed body of female child was received in the mortuary of apex medical centre in Haryana, India for postmortem examination at magistrate request. The apparent cause of death as per police inquest is drowning as there were witnesses where the child was drowned. According to them, the kid fell down in a shallow pool of water while playing at neighbour's home and was rescued in moments but could not be resuscitated and declared dead at the hospital. On examination, the body was of a 3-year-old female child with findings of putrefaction that are corresponding to about one week post mortem interval. No external injuries were appreciable over the body. No injuries were detected over external genitalia as could be suspected when dead body detected in area far from home. Chemical analysis of viscera report was negative. Swabs report for detection of any spermatozoa/semen was negative. Diatom test was negative, however, though unreliable but could be possible cause of death in cases of putrefied dead bodies when recovered from water bodies as in

case of present case i.e., dead body found in household water tank. The cause of death was given as all the available reports are non-conclusive, no definitive scientific opinion regarding cause of death can be ascertained. However, circumstantial evidences were given due credence as the alleged history as per investigating authorities as drowning. However, vaso-vagal inhibition or dry drowning due to cold desiccated water cannot be ruled out. In this case all the negative findings concluded only one thing that the death was nonviolent. However, It was still a mystery how a 3 year child reach to the household water tank.

#### CASE NO. 2: SUICIDAL INGESTION OF VERMILLION

A young married female was brought to the emergency department with A/H/O ingestion of vermilion (known as Sindoor powder in vernacular language). On examination, she was not responding to the stimuli following which resuscitation measures were started. The patient was declared dead and the body was sent for medicolegal autopsy as the cause of death on provisional death certificate could not be ascertained. On examination, there were no external injuries were present over the body. The laryngotracheal structures were unremarkable with reddish staining of mucosa due to discoloration of saffron powder and the vermilion was found to be adhered to the laryngeal mucosa around the circumference of lumen and upto the primary bronchioles. The esophagus was traced as far as possible upto the stomach but no traces were found in the stomach except the chemical was visible upto middle 1/3<sup>rd</sup> of esophagus. On internal dissection of the cavities non-specific findings of asphyxia were noted i.e. visceral congestion, petechial hemorrhagic spots and cyanosis. As per history provided by bystanders family members, patient swallowed a handful of sindoor powder at home in front of them. The cause of death could not be ascertained while the nearest cause of death could be given as choking due to dry thick powder (due to dehydrating nature of salt of mercury and lead) or aspiration causing pneumonitis as during resuscitation the bolus might slipped downwards. However, histopathological findings and chemical analysis reports of viscera were not conclusive to ascertain the cause of death.

CASE NO. 3: A CASE OF DEATH DUE TO EPILEPSY: With history of seizures, on examination, no external injuries were found, no internal findings were found suggestive of, investigating authority the apparent cause of death daure aane se/epileptic fits. Being forensic experts, the differential causes were head injury, poison so the

viscera have been preserved for chemical and histopathological examination, CSF sample have been taken for biochemical and microbiological examination apparently, all the external and internal findings were negative for traumatic as well as pathological condition. After getting all the report the author found nothing to make a concrete cause of death. So the only thing remained to certify a probable cause of death as epilepsy though this was a unsatisfactory conclusion made but there was nothing to suggest a definite cause of death.

#### Discussion:

The negative autopsy should not be considered as a failure of forensic pathologist as the biological cause of death varies from electrical disturbance in cardiac or neural pathways to marginal pathology which is hard to demonstrate histopathologically. There could be various reasons for an autopsy to be negative which varies from case to case and depends significantly on the circumstantial evidences. In a case of suspected poisoning, when no fatal injury were present over the body and the pathologist do not find any marked local findings in the organs due to the presence of any xenobiotic; the viscera is usually sent for chemical analysis. And in rare scenario, there are causes when a negative viscera report is received from the forensic science laboratory: treatment given to counter or eliminate the toxicity of xenobiotic, considerable time interval between intake and autopsy, completely metabolised xenobiotic in the body, dela in the examination of viscera, improper preservation of viscera, use of wrong analytical technique<sup>2</sup>. Autopsy observations have been classified according to the extent of the disease process and the likelihood that it caused death. The following is a list of these five classes: I. Autopsy findings are inconsistent with continued life and the lethal mechanism is structurally demonstrable or inferred irrefutably (e.g., ruptured myocardial infarct and pulmonary thromboembolism II. Presence of natural disease with lethal potential, sufficiently advanced that any competent pathologist will recognize the findings as capable of causing death (e.g., marked Arteriosclerotic cardiovascular disease (ASCVD) III. Marginal pathology, ordinarily insufficient to explain death, combined with compelling history and exclusion of other causes at autopsy (discussed later). IV. Lethal lesion is not structurally demonstrable and the diagnosis is based on history and exclusion of other causes (e.g., epilepsy). V. Undetermined following investigation, autopsy, and toxicologic examination (<5%).<sup>5</sup>

The steps to be followed after autopsy when a forensic pathologist suspects that no specific

morphological findings are present over the body and the case might go towards negative autopsy: i) Re-examination of all organs where pathology or trauma could left concealed or unobserved. ii) histopathological examination of all organs especially coronary arteries iii) Biochemical examination of blood and vitreous humour iv) instruction to the investigating agencies to gather circumstantial evidence v) clinicopathological conferences on a case where cause of death could not be ascertained.

### **Discussion over above-mentioned cases:**

In case number 1, the child was playing at home and while playing she fell into the water filled well usually kept for cattles in the rural areas, however nobody witnessed it. But the child was recovered from it immediately. The diatoms test were negative, the reports of chemical analysis of viscera was negative, no evidence of spermatozoa or semen over the clothes and vagina. Then manner and cause of death in this case is declared undetermined. However, the role of putrefaction in

masking the findings is not deniable. In the second case of vermillion, neither the asphyxial findings were present nor any fatal injuries were present over the body. However, the interventions done for resuscitation of the patient diluted the findings. In case number 3, the diatoms test was negative and no other fatal injuries were present over the body. However, in a young male, the cause of death as vagal inhibition cannot be ruled out.

### **Conclusion:**

The non-determination of cause of death after an autopsy is not the least outcome. Mere autopsy is not the method to only rule out a significant cause of death. Circumstantial evidence for exclusion in cases of obscure autopsy. Proper history taking, inability of pathologist, developing nations not resourceful, autopsy methodology. Proper training of medical examiner, human error, machinery errors, assessment errors non blinding factors. FSL. Clinico-pathological Conferences should be conducted to discuss the cases. Pathologist vs forensic pathologist. A pathologist with forensic medicine.

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