

An Approach to Obscure Death: A Case Series

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ABSTRACT

INTRODUCTION: An Autopsy doesn't always yield cause of death easily. In 20-25% cases detailed history, visit to scene of incident, histological, toxicological & microbiological investigations might be required. Even then circumstantial evidence plays important role.

CASE REPORTS: Article presents and discusses four cases, two of electrocution, one natural neonatal death and one accidental phosphorous poisoning. How challenging it can be to ascertain cause of death at rural hospital set up.

DISCUSSION: Various natural and unnatural causes can lead to death without any evident pathology or signs such as sudden infant deaths, biochemical disturbances, functional disorders like epilepsy, electrocution, concealed trauma, certain poisonings, vagal and anaphylactic shocks.

CONCLUSION & RECOMMENDATIONS: All necessary and possible investigations should be done in obscure deaths to exclude such causes and to prevent allegations that the death was not investigated as fully as it should have been. Special efforts are needed to raise awareness regarding use and storage of hazardous materials to prevent accidental deaths.

KEYWORDS: Obscure autopsy; Electrocution; Poisoning; Infant Deaths.

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INTRODUCTION

The importance of autopsy in determining the cause of death for certification is unparalleled. But, autopsy is by no means infallible in revealing the definite cause of death. Causes of death can be classified into Natural, Unnatural and Obscure deaths. In about 20% of cases cause of death is unclear after dissection of body in view of minimal, indefinite or no findings at all and is called as obscure autopsy.¹ In these cases detailed laboratory examination of different materials/samples from the body and verbal autopsy can

lead to cause of death. There may be no adverse medical history, the gross examination may reveal nothing abnormal and histological, toxicological & microbiological screening remains unrewarding. In such a situation, as Professor Alan Usher of Sheffield points out, the case needs to be labelled as 'unascertainable'.² Such cases may be termed as cases of negative autopsy. The rate may also vary according to the competency, personality and seniority of the doctor conducting the autopsy. Several surveys in various countries have shown that in cases where a doctor offers a cause of death without the benefit of autopsy findings, the error rate is of the order of 25-50%, even in hospital deaths.²

A less experienced doctor is often hesitant to show failure in providing a cause of death, feeling that it reflects upon his ability; whereas the more experienced doctor is less inhibited towards the same. If the death is due to interaction of multiple factors, as in case of anesthetic deaths, it may become difficult to determine the correct liability of each. This article discusses four case studies where cause of death was obscure at autopsy but verbal autopsy, circumstantial evidence and/or laboratory investigations played key role in determining the cause of death.

CASE REPORTS

Following Post-mortem cases had been done at Sub District Hospital, Phaltan, Pune, histopathology examination at Sassoon Hospital and chemical analysis at regional FSL, Pune.

Case 1: 60 year old man (Fig. 1), found dead in morning at his farm, where he was working overnight watering sugarcane. An electric supply line was



Fig. 1: Abrasion over face as result of fall

present nearby. Multiple superficial injuries in the form of abrasions were present on face & limbs, which were peri-mortem in nature. Police Inquest suggested Electrocution as cause of death, but no typical entry or exit electrocution lesions were observed after meticulous examination. No deep internal organ injuries corresponding to abrasions were found on autopsy. Only positive findings were petechial haemorrhages over lungs. Viscera report for chemical analysis came negative. Skin specimen sent for histopathology showed no specific changes related to electric injury. Histopathology of heart yielded no conclusive finding except some atherosclerotic changes.

Case 2: A 28 year second time 8 month pregnant female fell unconscious in bathroom, later declared brought dead. Autopsy did not reveal any significant findings externally and internally.⁸ month gestation foetus dead inside womb with no signs of maceration or anomaly. Histopathology came negative for amniotic fluid embolism. Later, crime scene investigation concluded faulty geyser as source of electrocution.

Case 3: Neonate was brought to casualty by parents and declared 'Dead on arrival'. Medical officer on duty suspected foul play due to some marks on neck. Parents gave history of febrile illness for 3 days. On autopsy it was found that marks on the neck were due to skin fold. Internal findings suggested some inflammatory condition later confirmed as pneumonitis on histopathology.



Fig. 2: Postmortem Artefact on neck

Case 4: 23 year old recently married female admitted to primary health centre with history of nausea, vomiting and irrelevant talk since 2 days. Her condition deteriorated and died within 12

hours. Nothing remarkable could be concluded from treatment records. Later relatives told she mistakenly brushed her teeth by Ratol (Rat poison) paste few days back. Autopsy findings showed some ecchymosis patches (Fig. 3) on trunk and



Fig. 3: Ecchymosis patch on trunk

some minor injuries on hand. Internal organs were congested. Chemical analysis of viscera came negative while Ratol paste (Fig. 4) contained elemental Phosphorus.



Fig. 4: Rat poison mistaken for Tooth paste

DISCUSSION

Case 1 describes scenario where an old man found dead with minor injuries sustained due to fall. These injuries were not sufficient cause death. Wet soil in the farm might be the reason for non-development of typical entry exit wound of electrocution. Electrical mark is an important sign for forensic pathologist to determine the cause of death, which might be the only evidence of contact with electricity. The prevalence and appearance of electrical marks varies depending on multiple factors. In the absence of distinctive

morphological findings on the body, electrocution as a cause of death is often established by exclusion of other possible causes and supported by circumstantial evidence collected at the scene of the incident. Electrical injuries to the skin may range from superficial erythema to full thickness burns and charring involving deep tissues. Also, under some circumstances, no obvious electrical injury may be present. In a study done by Karger B *et al*, some extent of skin damage was observed in 79% of cases, while in remaining 21%, there were no detectable changes on the skin.³ Negative chemical analysis report for viscera and inconclusive findings of histopathology lead to establishment of cause of death on circumstantial and verbal autopsy. Old age persons are more vulnerable to complications of electrocution. In electrocution current capable of over stimulating the heart, nervous system or causing damage to internal organs leads to death. Non-electrical trauma is also quite common with source greater than 300 Volts, current might be transmitted by means of arcing, caused by formation of conductive plasma between the source and the ground. The blast effect of high-voltage arcing can throw the victim away from the source, causing fatal injuries. The distance to which an electric arc can jump is proportional to the voltage.

Case 2 of pregnant woman found unresponsive in bathroom with inconclusive autopsy and histopathology findings emphasizes the importance of crime scene visit and circumstantial evidence. Finding of faulty geyser by Investigating Officer is very crucial. Strength of current perceptible to a human as a tingle is 1 milliamp, whereas 5 milliamp produces tremors, and 15-17 milliamp causes contracture of the muscles. Ventricular fibrillation occurs between 75 and 100 milliamp or ventricular arrest at very high currents.⁴ Most fatalities occur with the domestic voltage between 110 and 380 Volts. Most of the deaths from electricity are from cardiac arrhythmias, usually ventricular fibrillation leading to cardiac arrest.¹ Death may occur as a result of respiratory arrest, due to paralysis of intercostal muscles and diaphragm or rarely by affecting the brain stem when the current enters through the head. *Case 1 & 2* didn't show any entry or exit wounds. Laboratory and histopathological reports ruled out other possibilities of natural and unnatural deaths.

Case 3 raises suspicion at start but culminates to natural cause of death. In case of Infant deaths detailed history should be elicited and suspicion of foul play is important, but postmortem artifacts should be ruled out. In case of fat child natural

fold of skin may resemble strangulation marks. Meticulous examination especially in decomposed bodies is required to rule out skin and underlying tissue damage.⁵ The cause of death in neonaticides can broadly be divided into deliberate acts and omissions of care. The usual scenario is of an abandoned infant, where the identity of the mother is unknown. In present case baby brought to hospital by parents rules out abandonment and good weight rules out neglect. Most common unnatural causes of death are reported to be neglect, asphyxia, drowning, stabbing, and blunt head trauma.⁶ History of febrile illness in present case pointed towards acute infective etiology which was confirmed on histopathology as pneumonitis. It signifies importance of histopathology in obscure deaths.

Case 4 describes accidental poisoning by rat poison and delayed manifestations. There was 4 – 5 days delay of accidental brushing and clinical manifestations. Patient and relatives were unaware of poisoning and it came to notice only after investigation. Ratol contains 3% yellow phosphorus in a tube 15gm. Usual fatal dose is 60mg (1mg/kg body weight).⁷ There are reported cases accidental poisoning due to mistaking it for tooth paste. A single use can be fatal especially in children. Orally ingested yellow phosphorus is rapidly absorbed through the gastrointestinal system and approximately 70% is accumulated in the liver within 2 to 3 hours. It accumulates to a lesser extent in the heart (12%), kidneys (4%) and leads to acute hepatic failure.⁸

The patients are usually asymptomatic during the initial 72 h of ingestion, or they may have signs and symptoms of gastrointestinal irritation. After 72 h they develop deranged liver function, acute hepatic failure, coagulopathy. Central nervous system effects include changes in mental status like confusion, psychosis, hallucinations, and coma.⁹ In severe ingestions of ratol paste, patients do not have the initial asymptomatic stage, and they die due to shock and cardiopulmonary arrest in early stages itself. Cardiac toxicity includes hypotension, tachycardia, arrhythmias, and cardiogenic shock. The general status of the patient deteriorated within hours at hospital and the patient developed encephalopathy and died as a result of cardiovascular collapse. There is no specific antidote for Phosphorus, hence treatment is mostly supportive. Primary health care is ill equipped for handling such cases. Sample of vomitus was not available. Viscera chemical analysis came negative possibly due to either poison completely eliminated

from the body by vomiting / purging / lungs / metabolism or taken in small amount. Present case emphasizes the importance of detailed history, high degree of suspicion and preservation of vomitus/ gastric lavage sample.

Causes of obscure autopsy can be classified as:

1. Natural diseases where pathological process not conspicuously evident.
 - Death precipitated by emotional stress and strain acting on a previously diseased heart or any other organ, the existence even unknown to the victim.
 - Death occurring from functional failures, e.g. epilepsy, strokes, etc.
2. Biochemical disturbances like uremia, hypo & hyperglycemia, hypocalcaemia, electrolyte imbalance as in potassium deficiency etc.
3. Endocrine dysfunctions such as adrenal insufficiency and thyrotoxicosis or myxoedema.
4. Concealed trauma in the form of Concussion, blunt injury to the heart, blast effect without any external injury and electrocution without any external mark.
5. Poisoning cases such as delayed subtoxic or narcotic poisoning, anesthetic overdose or maladministration, neurotoxic or cytotoxic poisons and plant poisoning, etc.
6. Other causes like reflex vagal inhibition, incompatible blood transfusion, air embolism, allergic reactions, anaphylactic deaths etc.

CONCLUSION & RECOMMENDATIONS

An obscure autopsy should be approached with suspicion and ancillary investigations must be carried out in order to exclude such causes and to prevent allegations that the death was not investigated as fully as it should have been. The saying 'eyes see what mind knows' is applicable here, so more the autopsy surgeon knows about the total scenario, the more he/she can elucidate from the autopsy. Verbal autopsy and crime scene visit are main pillars of investigation into cause of death in obscure deaths. Remedial suggestions to prevent accidental deaths like the ones reported in this article, is moral responsibility of Doctor. All standard safety equipment should be installed with periodic inspection of electric appliances. Marketed poison packaging should be distinct and alarming from regular use household items. Early

medical advice should be sought in case of ill health however trivial it may be. Special efforts are needed to raise awareness regarding use and storage of hazardous materials.

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