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A Case Report: Determining the Cause of Death in a Decomposed Body - Traumatic Injury or Drowning?

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Abstract:

Drowning, a phenomenon typically occurring in aquatic settings, continues to be a significant public health issue, transcending socioeconomic boundaries. A substantial portion of water-related fatalities are the result of accidental drownings, with a smaller yet notable percentage being attributed to suicidal or homicidal acts. Additionally, some drowning incidents are compounded by factors such as injury, intoxication, or exposure to extreme environmental conditions. Diagnosing death by drowning in forensic medicine is particularly challenging, especially when the body is discovered in a state of decomposition, as traditional signs may not be evident. A comprehensive forensic examination, encompassing external, internal, and laboratory analyses, is crucial for determining the cause of death. This case report presents an unusual instance where the autopsy surgeon faced a diagnostic dilemma, having to discern whether the cause of death was drowning or another external event leading to a fatal outcome.

Keywords: *Drowning, injury, intoxication, decomposition, autopsy surgeon, fatal outcome.*

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Introduction

Drowning is defined as death resulting from submersion in water or another liquid, leading to an inability to breathe. While both 'submersion' and 'immersion' describe the act of being placed under water, 'drowning' specifically refers to death caused by this condition. In contrast, immersion or submersion can describe situations where a body is found in water, regardless of the cause of death. During an autopsy, distinguishing changes caused by drowning from those occurring postmortem in water is essential for accurate forensic analysis. Drowning is classified under mechanical asphyxia, but it involves complex physiological and biochemical disturbances, making it an oversimplification to consider it purely an 'asphyxial death.' Asphyxial processes, however, play a key role, as water obstructs the respiratory passages, preventing breathing. Several factors influence an individual's reaction to drowning, including pre-existing medical conditions, the chemical composition of the water, and the volume of liquid inhaled. Importantly, complete submersion is not required for drowning; even partial occlusion of the nose and mouth by water can be fatal. As a result, drowning can occur in various settings, from oceans and rivers to shallow bathtubs **(Viz, 2011).**

Drowning is a significant public health concern, frequently reported in India. Accidental drowning is the most common type, often involving fishermen, bathers, dock workers, intoxicated individuals, and those with epilepsy. Suicidal drowning is more prevalent among women, sometimes involving self-restraining measures such as tying limbs or attaching weights. Homicidal drowning, however, is extremely rare **(Rao, 2010).**

Globally, drowning is the third leading cause of unintentional injury-related death. In the United States alone, it accounts for nearly 4,000 deaths annually, ranking as the tenth most common injury-related fatality. In forensic investigations, determining how and why a body became submerged and why the individual could not escape is critical in establishing the cause and manner of death. Key forensic topics include postmortem diagnosis, environmental factors, and the estimation of the time of death. Research and case studies on drowning incidents contribute to expanding knowledge and improving medico-legal death investigations. Investigating water-related deaths presents unique challenges.

Not all deaths in water result from drowning; factors such as extreme temperatures, intoxication, or underlying medical conditions may be primary causes. Examining submerged bodies often requires coordination among multiple agencies, including emergency responders, law enforcement, forensic scientists, and medical examiners. Upon body recovery, assessment for vital signs, injuries, and other forensic indicators is crucial. Law enforcement officials collaborate with first responders to document the scene and assess potential criminal involvement. Continuous analysis and dissemination of data from drowning cases help improve public health strategies and resource allocation, ultimately aiding in the prevention of water-related fatalities **(Armstrong and Erskine, 2018).**

Case Report

An unknown young adult male decomposed body was referred from the District Civil Hospital due to the absence of a forensic expert. A postmortem examination was conducted by a forensic expert at our department. The apparent cause of death as mentioned in police papers was due to drowning.

Autopsy Findings

The body was wrapped in a white sheet and further wrapped in a purple sheet. The deceased was wearing a checked shirt, blue jeans, a sleeveless vest, black socks, brown shoes, black underwear, a white thread around the chest and abdomen, and a black tagdi around the waist. The clothing and body were smudged with mud, grass, and decomposed tissue, and emitted a foul odor. The body was in an advanced stage of putrefaction with postmortem bullae present. The scalp hairs were black and easily peeled off, and the facial features were bloated and unidentifiable. The chest was tense, and the abdomen was distended. The penis and scrotum were intact and distended. No ligature mark was found around the neck (Fig. No.1).

Injuries included bluish bruises on the right and left frontal regions, each with underlying subgaleal hematomas (Fig. No. 2). The skull was intact, and the brain showed diffuse subdural hemorrhage and was soft and putrefied (Fig. No. 3). Other visceral organs were also soft and putrefied. The final opinion mentioned that it will be given after receiving the chemical analysis and diatom test reports. The right femur bone was preserved for DNA analysis if required by the police. The injuries were determined to be antemortem and caused by blunt force.

Figure No.1: Putrefactive Body

Figure 2: Subgaleal hematomas over skull

Figure 3: Brain showed diffuse subdural hemorrhage and was soft and putrefied

Discussion

Death is a process rather than a singular event. While some cells in the body remain alive and may exhibit movement, others are in the process of dying or have already perished. Decomposition begins in certain cells while others are still viable, resulting in an overlap that can persist for several days in temperate climates. Decomposition involves two main processes: autolysis and putrefaction. Putrefaction, often the primary focus when discussing decomposition, varies between individuals, environments, and even different body parts. It is the final stage of decomposition, leading to the gradual breakdown and liquefaction of tissues through bacterial fermentation **(Rao, 2010).** Drowning victims often exhibit cadaveric spasm; however, in this case, such signs were difficult to determine due to decomposition changes. A visible hematoma was found on the head. Identifying diatoms in the tissues of drowning victims is a controversial method. Diatoms are microscopic algae with silica cell walls, present in both seawater and freshwater. They can enter the body through the lungs and travel to various organs, suggesting antemortem drowning. However, due to their widespread presence in the environment, this conclusion is debated. Diatoms can enter the body through inhalation, ingestion, or aspiration, raising concerns about contamination during analysis. While their presence can support a diagnosis of drowning, their absence does not rule it out, as diatoms are not exclusively associated with drowning cases **(Sharma and Bajpai , 2013).**

At autopsy, there are no definitive findings to diagnose drowning. The diagnosis relies on the circumstances of death and a combination of nonspecific anatomical findings. Chemical tests for drowning are generally unreliable. If an individual is found dead in water and other causes of death have been ruled out, drowning is presumed. The key question in this case is whether death resulted from drowning. The preliminary cause of death, considering all factors, could be that the deceased fell, struck their head on a hard surface, became unconscious, and subsequently drowned. This hypothesis may be confirmed by the diatom report.

Conclusion

The analysis of drowning cases necessitates meticulous examination, particularly for bodies recovered from water that do not exhibit clear signs of drowning. In such instances, a diatom test becomes crucial. However, the final determination of drowning as the cause of death hinges on a comprehensive autopsy and precise, timely information provided by law enforcement, rather than solely on the diatom test. Investigators must remain vigilant for potentially misleading confessions. For diatom testing, it is essential to collect samples from distant organs, long bones, and blood from the left side of the heart when there is any uncertainty. Furthermore, it is imperative to rule out other causes of death, such as strangulation or head injuries, to ensure an accurate diagnosis. The coordinated efforts of various professionals, including forensic pathologists and law enforcement, are critical to the thorough investigation of such cases.

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