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MEDICOLEGAL AND ETHICAL ASPECTS OF A DEATH CASE DUE TO EPILEPSY: CLINICAL CASE, CLINICAL FORENSICS, OR FORENSIC PATHOLOGY?

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ABSTRACT

Background: An unwitnessed death in a man with epilepsy, found in a bathroom with a head injury and immersion, raises key clinical and forensic concerns. This case highlights the complex intersection between epilepsy-related death, head trauma, and possible drowning. **Case Presentation:** A 39-year-old man with a history of epilepsy was found unconscious in the bathtub, face down with his head submerged and a bleeding forehead wound, approximately 10 minutes after showering. The man had a history of monthly generalized tonic-clonic seizures with recurrent falls and head injuries, and was on regular antiepileptic medicine. On admission, he was unresponsive with a GCS of E1V1M1, absent vital signs, dilated pupils, decreased skin temperature, and a laceration wound on the forehead. An ECG showed asystole. **Conclusion:** This case reviews the high risk of sudden death in patients with epilepsy, likely involving seizure-induced trauma and possible drowning. It emphasizes the need for comprehensive epilepsy management and thorough medicolegal evaluation to determine the cause of death.

BACKGROUND

Epilepsy is a chronic neurological disorder characterized by recurrent, unprovoked seizures caused by abnormal electrical activity in the brain. It affects millions of people worldwide and is associated with significant morbidity and mortality. One of the most concerning outcomes in patients with epilepsy is Sudden Unexpected Death in Epilepsy (SUDEP), which represents a major cause of premature death in this population. SUDEP is defined as the sudden, unexpected, non-traumatic, and non-drowning death of a person with epilepsy, where postmortem examination does not reveal a structural or toxicological cause of death.

The mechanisms underlying SUDEP are multifactorial, including seizure-induced cardiac arrhythmias, respiratory dysfunction, autonomic dysregulation, and postictal brain suppression. Risk factors include frequent generalized tonic-clonic seizures, poor seizure control, prone position during seizures, and coexisting comorbidities. Importantly, many epilepsy-related deaths occur unwitnessed, complicating the determination of the exact cause.

From a clinical and forensic perspective, distinguishing whether a death is directly related to epilepsy requires careful evaluation. The presence of seizure history, medication adherence, recurrent trauma during seizures, and environmental hazards such as water exposure are crucial considerations. Forensic investigation—including autopsy, toxicology, and scene evaluation—is essential to establish whether the death is attributable to epilepsy, seizure-related complications, or other causes such as trauma or drowning.

Thus, understanding the pathways of sudden death in epilepsy is vital not only for clinical management and prevention but also for medicolegal determination of cause of death. This context sets the stage for analyzing cases where epilepsy intersects with trauma and possible asphyxia, requiring both medical and forensic perspectives.

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CASE PRESENTATION

A 39-year-old man with a known history of epilepsy was found unconscious in a bathtub, face down with his head submerged in water and a bleeding laceration on his forehead. Ten minutes prior, he had gone to shower, and his family found him unresponsive shortly afterward. The patient had a history of monthly generalized tonic-clonic seizures that often resulted in falls and recurrent head injuries, despite adherence to prescribed antiepileptic medication. He had no other significant comorbidities.

On arrival at the hospital, the patient was unresponsive with no vital signs, a Glasgow Coma Scale (GCS) of E1V1M1, and absent pupillary reflexes. His skin was cool to touch. Physical examination revealed a 4 × 2 cm laceration on the right forehead, approximately 2.5 cm lateral to the midline, with no other external injuries or signs of lividity. An electrocardiogram showed asystole. Despite resuscitative efforts, the patient was declared dead.

This case can be viewed from three perspectives:

Clinical Case: A patient with poorly controlled epilepsy presenting with seizure-related trauma and found in circumstances suggesting seizure-induced collapse.

Clinical Forensics: The scene (bathroom, bathtub with water, and head wound) raises suspicions of possible drowning complicating a seizure, necessitating medicolegal assessment.

Forensic Pathology: The autopsy and ancillary investigations (if performed) would focus on differentiating SUDEP, trauma-related death, or drowning as the cause of death.

DISCUSSION

EPILEPSY

According to the conceptual definition by the International League Against Epilepsy (ILAE), epilepsy is a brain disorder characterized by a persistent tendency to generate recurrent epileptic seizures, accompanied by significant neurobiological, cognitive, psychological, and social consequences. An epileptic seizure is defined as a transient clinical manifestation resulting from abnormal, synchronous, and excessive neuronal activity in the brain. This activity can produce a wide range of symptoms, including motor, sensory, or consciousness disturbances, depending on the location and extent of the brain area involved. Therefore, epilepsy affects not only the physical health of the patient but also has broad implications for overall quality of life, including psychosocial well-being and cognitive function[1].

According to the ILAE 2017 classification, seizures are primarily categorized based on their type of onset: focal, generalized, or unknown. Focal-onset seizures originate within networks confined to one cerebral hemisphere and may be localized or more widely distributed, while generalized-onset seizures begin in and rapidly engage bilaterally distributed networks. Unknown-onset seizures are designated when insufficient information exists at the time of observation, though future data may allow reclassification. Focal seizures are further classified based on the individual's level of awareness during the seizure. If awareness is retained throughout, the seizure is termed a focal aware seizure; if awareness is impaired at any point, it is classified as a focal impaired awareness seizure. Awareness, used as a proxy for consciousness, refers specifically to the individual's ability to recall the seizure event, though responsiveness—while clinically relevant—is not used as a formal classifier. Focal seizures may also be described as motor or nonmotor, depending on the predominant symptoms, and the term "focal to bilateral tonic–clonic" is used to describe seizures that spread from a focal onset to bilateral involvement, replacing the older term "secondarily generalized[1].

Sudden Unexpected Death in Epilepsy (SUDEP) refers to the sudden and unexpected death whether witnessed or not of an individual with epilepsy, where no clear cause of death is found after a complete postmortem examination. Initially defined by Annegers in 1997, the definition was unified in 2012 to provide a more comprehensive classification system. SUDEP is now categorized into seven subtypes: definite SUDEP, definite SUDEP plus, probable SUDEP/probable SUDEP plus, possible SUDEP, near-SUDEP/near-SUDEP plus, not-SUDEP, and unclassified. This refined classification reflects a deeper understanding of the condition. SUDEP remains a significant public health issue, being the leading cause of epilepsy-related premature death and accounting for approximately 8–17% of deaths in individuals with epilepsy. Notably, it disproportionately affects young people, highlighting

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the urgent need for awareness, prevention, and improved management in this population[2].

Ethics and Medicolegal Aspects in Epilepsy

From an ethical standpoint, SUDEP counselling has been a topic of ongoing discourse in the management of people with epilepsy[3]. Current guidelines from NICE and the Task Force of the American Epilepsy Society recommend that physicians educate patients with epilepsy about the increased risk of epilepsy-related deaths, including SUDEP[4,5]. Physicians should be aware of the risk factors for SUDEP in their patients. Discussions with patients and their families uphold patient autonomy by honoring their right to be informed about their personal risks. Awareness of SUDEP risk may lead to improved monitoring, medication adherence, and other preventive interventions by all parties involved in the patient's care[6]. However, there is disagreement on this issue, with some arguing that informing patients about SUDEP could negatively impact their mental health and may not significantly reduce the actual risk. This puts physicians in a dilemma[3]. In response, it is recommended that counselling be tailored to each individual, based on informed consent and the patient's preferences, on a case-by-case basis[7].

The risk of death related to epilepsy, including SUDEP, legally constitutes a material risk that can significantly affect a patient's decision-making. Failure to disclose such a risk may amount to a breach of a physician's duty of care, and thus potentially constitute medical negligence[8]. Other aspects of patient management should also be evaluated to identify any deviations from the standard of care based on existing guidelines, including those related to diagnosis and therapy[9]. In death certification, SUDEP and epilepsy are often misclassified, largely due to the fact that most deaths are unwitnessed. A thorough investigation should be conducted before attributing the cause of death to epilepsy or other competing causes[10,11].

HEAD TRAUMA.

This type of injury is more commonly referred to as Traumatic Brain Injury (TBI). TBI is characterized by the impact of external mechanical forces, rapid acceleration-deceleration, or penetrating injury to the head. Traumatic brain injury (TBI) is classified into two types of injuries: penetrating injuries and closed head injuries. Penetrating injuries are defined as those that involve a breach into the skull and dura mater, leading to damage to the brain parenchyma. Conversely, closed head injuries are distinguished by the presence of injuries, concurrently accompanied by the preservation of the integrity of the skull and dura mater[12,13].

The clinical signs associated with TBI are outlined below[13]:

- A period of loss or a decreased level of consciousness is hereby defined as such.
- Subjects may experience a loss of memory for events that occurred either immediately before or after the injury.
- A modification in psychological condition was observed at the time of the injury.
- The patient exhibits neurological deficits that are not necessarily transient, as well as an intracranial lesion.

The categorization of traumatic brain injury (TBI) is determined by clinical factors, including the duration and severity of consciousness, the presence of amnesia and neurological symptoms, and the results of structural brain imaging (e.g., CT or MRI). TBI is then classified as mild, moderate, or severe based on these criteria[12,13].

Mild traumatic brain injury (TBI) is characterized by the following: loss of consciousness lasting less than 30 minutes, post-traumatic amnesia lasting less than 24 hours, or any alteration of consciousness, with a Glasgow Coma Scale (GCS) score of[13-15]. Concomitantly, moderate to severe traumatic brain injury (TBI) is clinically characterized by a loss of consciousness lasting a minimum of 30 minutes to a prolonged coma, post-traumatic amnesia lasting a minimum of 24 hours to permanent impairment, or a Glasgow Coma Scale (GCS) score as low as 3 (moderate: 9-12, severe: <9)[12,13].

Ethics and Medicolegal Aspects in Head Trauma

Traumatic head injury is one of the most common causes of death and disability worldwide. The clinical and pathological features of head injury are not only helpful for its diagnosis and treatment, but also can help analyze the wounding mechanism in the field of forensic medicine. The study involved the assessment of various medico-legal parameters related to head trauma. The types of trauma encountered included

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blunt force injuries, sharp force injuries, firearm-related injuries, penetrating trauma, and cases involving multiple trauma types. The anatomical sites affected by the head injuries were diverse, including the parietal, temporal, occipital, and frontal regions, as well as facial injuries and cases involving multiple sites. The manner of exposure to the trauma was classified as accidental, homicidal, or suicidal in nature. Various causes of injury were identified, such as falls, road traffic accidents, gunshot wounds, physical abuse, and sports-related incidents. The mechanisms underlying these injuries included severe blows to the head, rotational movements, and combined mechanisms[14].

ASPHYXIA

Asphyxia is defined as the deprivation of oxygen to the body, resulting from insufficient oxygenated blood flow. This condition may have multiple etiologies, involving both external and internal factors that impede the delivery of oxygen to vital organs. Asphyxia can be classified as either partial (hypoxia) or total (anoxia). The hallmark signs of asphyxia, such as petechiae, cyanosis, fluidity of blood, and visceral congestion, are not specific indicators and may also be observed in deaths from other causes[15-17].

The pathophysiological mechanisms of asphyxia include[16]:

1) *Airway obstruction*
The decrease in the amount of respired air, particularly the inhalation of oxygen, can be attributed to two possible causes: mechanical obstruction or pathological obstruction. Mechanical obstruction manifests through the compression of airways, resulting in various forms of obstruction such as hanging, strangulation, and internal obstruction by foreign bodies. The term "pathological obstruction" refers to a condition in which a disease obstructs a specific pathway. Such diseases may include tumors located in the larynx, pharynx, or trachea, depending on the anatomical location and the nature of the tumor.
2) *Impaired exchange of gases*
The alteration of oxygen and carbon dioxide exchange at the alveolar level due to such a cause can be classified as violent and pathological. The violent type is caused by the inhalation of poisonous gases, which can interfere with oxygen uptake due to their high affinity for hemoglobin. The pathological type is characterized by a range of respiratory ailments, including alveolar lung disease, pulmonary embolism, systemic lupus erythematosus, sarcoidosis, and pneumonia, among others.
3) *Impaired respiratory movements*
The interruption of the respiratory process can be triggered by external thoraco-abdominal compression, positional asphyxia, and traumatic pneumothorax. It has been established that other etiology, including pathological pneumothorax, can result in respiratory dysfunction.
4) *Impaired transportation*
In the event of toxic gas inhalation, there is a possibility of the occurrence of carboxy hemoglobinemia and methemoglobinemia. These conditions are detrimental to metabolic activity and can result in ischemic injury due to anoxia. The pathological type has been observed in cases of coronary heart disease, cardiovascular failure, anemia, and hemoglobin disorders. The underlying mechanism involves a disruption in the vascular supply to the tissues, resulting in tissue dysfunction or damage.
5) *Impaired utilization*
If body tissues are unable to utilize the available oxygen, this phenomenon can occur despite the presence of an adequate oxygen supply and the proper functioning of the respiratory mechanisms. This phenomenon has been observed in cases of cyanide poisoning.

As previously indicated by the aforementioned mechanisms, the deprivation of oxygen for 3-5 minutes can result in fatality and the initiation of the vicious cycle of asphyxia[16].

Ethics and Medicolegal Aspects in Asphyxia

Asphyxia, from a legal perspective, can be caused by various events such as hanging, strangulation, suffocation, smothering, choking, electric shock, and others[18]. Mechanical asphyxia occurs due to obstruction of the orifices and airways, as seen in cases of drowning and suffocation. There were 84 cases (4.36%) caused by drowning in water[19]. Drowning is defined as the process in which air in the lungs is replaced by water[18].

Drowning can be accidental, suicidal, or homicidal, with accidental drowning being the most

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common. However, post-mortem findings in drowning cases are often inconclusive, and no specific morphological finding is considered pathognomonic for drowning. Various investigative procedures have been explored, such as blood biochemistry analysis, measurement of electrolytes in pleural fluid, and evaluation of serum strontium and fluorine levels, as well as atrial natriuretic peptide levels[20].

One important advancement in the diagnostic approach to drowning is the detection of diatoms in the lungs, bone marrow, and other internal organs. Although the diatom test is widely regarded as the gold standard, it also has certain limitations. The presence of foreign bodies components of the drowning medium in the respiratory passages is considered a significant finding in determining ante-mortem drowning, even in decomposed bodies[20].

Whenever a body suspected of drowning is brought in for post-mortem examination, there are key medico-legal questions that must be addressed [18]. The principal diagnostic finding is the detection of diatoms in bone marrow and internal organs such as the lungs, liver, and kidneys, which is considered a reliable diagnostic indicator[20].

Medicolegal evidence should be preserved carefully and subsequently handed over to the investigating authorities for forensic analysis[18]. In terms of prevention, treating underlying medical conditions such as epilepsy is a significant social consideration. Patients should be referred to a neurologist for comprehensive management.

ASSOCIATION BETWEEN EPILEPSY, HEAD TRAUMA AND ASPHYXIA

Seizure-related head injuries (SRHIs) are generally described as any form of head dysfunction, pain, or altered consciousness that arises accidentally during a seizure episode[21]. Following a seizure, individuals may also experience postictal symptoms such as delirium or psychosis, which can negatively impact the overall treatment process for patients with epilepsy (PWE). Both SRHIs and postictal phenomena are significant contributors to increased healthcare expenses, as they often necessitate hospitalization, adjustments in therapeutic strategies, and result in reduced social and occupational functioning[22].

Conversely, individuals with epilepsy especially those with uncontrolled seizures face a heightened risk of head injuries, which further elevate mortality. Seizure-related traumatic events, such as falls during generalized tonic-clonic seizures, can result in fatal head trauma[23]. Sudden Unexpected Death in Epilepsy (SUDEP) is another lethal link in the epilepsy-head injury cycle. While head trauma isn't a direct cause of SUDEP, repeated seizures and associated brain damage contribute to risk. SUDEP accounts for 8–17% of deaths in people with epilepsy[24].

In summary, the interplay between head injury and epilepsy significantly amplifies mortality risk. Traumatic injury can precipitate epilepsy, and epilepsy increases vulnerability to further head trauma and SUDEP, creating a vicious cycle with potentially fatal consequences.

Individuals with epilepsy especially those experiencing generalized tonic-clonic seizures (GTCS) are at elevated risk for postictal respiratory dysfunction and apnea, which can directly lead to central asphyxia. Central apnea often initiates the cascade of events that culminates in SUDEP, with respiratory arrest typically preceding cardiac failure in monitored cases[25].

Head injuries, commonly resulting from seizure-induced falls, compound this risk. Traumatic brain injuries can further impair brainstem function, exacerbating respiratory compromise and increasing the likelihood of asphyxia events post-seizure. Forensic autopsy studies of SUDEP decedents frequently reveal signs of both mild head trauma and pulmonary congestion, with prone positioning significantly associated with fatal asphyxia up to 57 times higher risk when compared to non-prone positions[2].

Together, these factors illustrate a multifactorial fatal pathway: seizures cause falls and head trauma, which in turn can disrupt respiratory control and lead to central or positional asphyxia; coupled with seizure-related apnea and autonomic dysfunction, these interlinked mechanisms create the typical lethal sequence seen in SUDEP. Understanding this triad is critical for effective risk management, preventive strategies, and accurate forensic interpretation.

The findings in this case highlight the interplay of three major pathways that may lead to death in epilepsy: seizure-induced trauma, drowning/asphyxia, and Sudden Unexpected Death in Epilepsy (SUDEP).

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From the clinical perspective, recurrent generalized tonic-clonic seizures significantly increased this patient's risk of fatal complications. Poor seizure control, despite medication, and repeated trauma are known predictors of epilepsy-related mortality.

From the clinical forensic perspective, the bathroom setting complicates interpretation. The patient was found submerged, raising the possibility of drowning. However, without typical drowning signs (e.g., frothy fluid, water in airways), the role of immersion remains uncertain. Witness absence further limits certainty.

From the forensic pathology perspective, autopsy would aim to determine whether the primary mechanism was SUDEP, traumatic brain injury, or drowning. SUDEP is usually a diagnosis of exclusion, made when no anatomical or toxicological cause of death is found. In this case, seizure-induced apnea or cardiac arrhythmia, compounded by trauma and prone positioning, likely contributed.

Ethical and Medicolegal Aspects:

Clinicians have a duty to inform patients and families about the risk of SUDEP while balancing psychological impact.

Failure to counsel about epilepsy-related death risks may be considered negligence, particularly if preventive strategies were not discussed.

Medicolegally, accurate death certification is critical. Misclassification of SUDEP or seizure-related deaths remains common, which can impact epidemiological data and public health policy.

CONCLUSION

This case emphasizes the importance of viewing epilepsy-related deaths through three complementary lenses: clinical case, clinical forensics, and forensic pathology. Clinically, the patient's poorly controlled generalized tonic-clonic seizures placed him at high risk for sudden death. From the forensic clinical standpoint, the bathroom environment and presence of water necessitated careful scene analysis to exclude accidental drowning. From the forensic pathology standpoint, SUDEP remains a strong consideration, particularly when autopsy findings exclude other causes.

Ethically and medicolegally, the case underscores the duty of physicians to counsel patients and families about SUDEP risks, the necessity of preventive strategies such as seizure safety and environment modification, and the responsibility of forensic experts to provide an accurate determination of cause of death. Ultimately, sudden death in epilepsy should not be attributed hastily to a single factor, but requires a multidisciplinary approach combining clinical insight, forensic investigation, and ethical awareness to provide clarity for both medical science and the justice system.

ETHICAL APPROVAL

There is no ethical approval

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

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AUTHOR CONTRIBUTIONS

Conceptualization, Adji Suwandono; data collection, Hedva Rayna and Funica Asri; literature review, Alfonsus Aryo and Sandy Adi; writing—original draft preparation, Hedva Rayna, Funica Asri, Alfonsus Aryo, Sandy Adi; writing—review and editing, Hedva Rayna, Funica Asri, Alfonsus Aryo, Sandy Adi; supervision, Adji Suwandono.

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