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A Rare Case Report of Sudden and Unexpected Death in Epilepsy (SUDEP) In a Child

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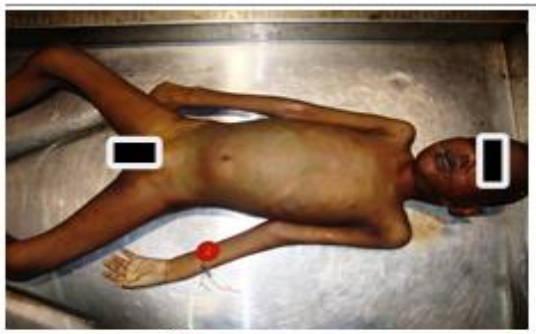
KEYWORDS

SUDEP, respiratory failure, cardiac arrest, child, mental disability.

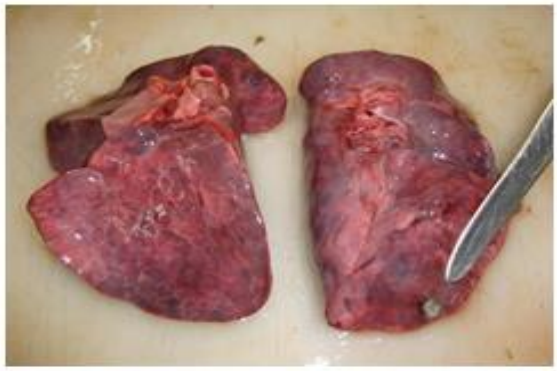
Abstract: Sudden Unexpected Death in Epilepsy **(SUDEP)** is a term used when a person suffering from epilepsy dies suddenly, after an episode of seizures and the reason for the death is attributed to unexplained respiratory failure or cardiac arrest. Post mortem examination usually reveals no abnormalities in victims. SUDEP accounts for 8-17% of deaths in people with epilepsy. It usually occurs in young adults, the average age being 28-35 years and it rarely occurs in children. The most important 'risk factors' probably are poor seizure control and seizures occurring during sleep.We report a case of an 8 year old mentally challenged boy, staying in a 'home' for children, certified to have mental retardation with 75% mental disability with seizure disorder for the past 4 years and on treatment with anticonvulsants was brought dead to casualty. History from the investigating officer revealed that the child had seizures during sleep and was found dead.

Case report

A 8 year old male child, staying in a orphanage was brought dead to casualty at Government Hospital Chrompet, Chennai on 11/11/23 7:30AM. The child was diagnosed to have cerebral palsy, microcephaly, blindness both eyes with mental retardation and a known case of seizure disorder for more than 4 years taking anticonvulsant medication. History from the investigating officer revealed that the child had an episode of seizure on 11/11/23, around 6 AM while asleep and was found dead by the caretaker with frothing over the mouth and nostrils. The child was shifted to our hospital mortuary and postmortem examination was conducted on 12/11/23, 12 noon.



(i)



(ii) Fibrocavitary white nodular lesion 3 X 2 cm - Lower lobe Left Lung

On postmortem examination: A moderately built and nourished male dead body with no evidence of any

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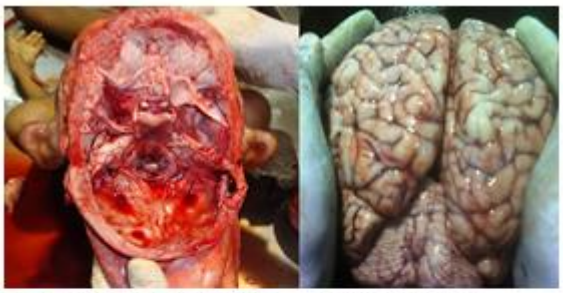
external injury anywhere on the body. Rigor mortis was present all over the body. Height : 118cms; Weight : 17kgs; Attitude of body: Lied on back with both lower limbs flexed. (I) Heart : Normal. C/S : All chambers contained clotted blood ; Valves: Normal; Coronaries : Patent ; Great vessels : Normal. Lungs : Normal in size. Fibrocavitary white nodular lesion 3 X 2 cm seen over the lower lobe of left lung. C/S : Both lungs congested. (ii) Fibrocavitary white nodular lesion 3 X 2 cm - Lower lobe Left Lung Larynx and Trachea : Contained white frothy secretions. Mucosa congested. Hyoid bone : Intact; Stomach : Empty. Mucosa : Normal. Liver, Spleen & Kidney : Normal in size. Cut Section: Normal Bladder : Empty. Pelvis and Spinal Column : Intact;

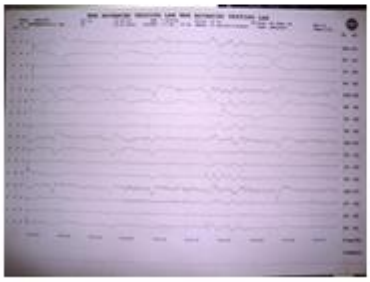
Scalp and vault, Dura were intact. On opening the skull: Calvarium was thickened 1-1.5 cm, uniformly over the entire vault.(Photo (iii,(v)) Brain: Normal in size.(iv) C/S: Pale. Base of skull Intact (iii) Thickening of Calvarium (iv) Brain normal (v) Thickening of Calvarium

Tissue bits from brain (hippocampus), heart, lungs and trachea were sent for histopathological examination. Viscera was preserved for chemical analysis.



iii) Thickening of Calvarium (iv) Brain Normal

c) EEG Normal



Histopathologic Examination Report: Portion of brain (hippocampus) section showed reactive gliosis. Portion of heart section showed fatty tissue with areas of haemorrhage and congestion. Lung section showed interstitial edema, congestion and pneumatic consolidation changes. Trachea (multiple sections) showed congestion and inflammatory changes. EEG Normal Opinion as to cause of death: The deceased would appear to have died of asphyxia due to aspiration pneumonitis.

Discussion: Sudden Unexpected Death in Epilepsy (SUDEP) is a term used when a person suffering from epilepsy dies suddenly, after an episode of seizures and the reason for the death is attributed to unexplained respiratory failure or cardiac arrest. Post mortem examination usually reveals no abnormalities in victims. In general terms, SUDEP is defined by precise criteria as sudden, unexpected, witnessed or unwitnessed, nontraumatic and nondrowning deaths in patients with epilepsy, with or without evidence of a seizure and excluding documented status epilepticus, in which post mortem examination does not reveal a toxicological or anatomical cause of death.(Nashef .L et al,1997) .[22] Sudden unexplained death is 24 times more common in patients with epilepsy than in the general population. SUDEP accounts for 8-17% of deaths in people with epilepsyand has an incidence among adults between

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1:500 and 1:1,000. It usually occurs in young adults, the average age being 28-35 years and it rarely occurs in children.[2] The most important 'risk factors' probably are poor seizure control and seizures occurring during sleep. Other risk factors include presence of generalized tonic clonic seizures, polytherapy with antiepileptic drugs, young age, duration of the seizure disorder, early onset of epilepsy and winter season.[3] SUDEP is most commonly attributed to one of three mechanisms:

• Seizure-induced central apnea.

• Cardiac arrhythmia.

• Neurogenic pulmonary edema.

Central apnea induced by epileptic activity or occurring in the postictal phase is thought to be the most common cause of SUDEP. The mechanism of seizure-induced apnea may be the inhibition of the brainstem by the brain's own endogenous GABA-ergic seizure-terminating mechanism.[13] Fatal cardiac arrhythmias are thought to be the mechanism underlying cardiac causes of SUDEP. An existing hypothesis is that a lethal cardiac arrhythmia is caused by epilepsy-induced autonomic discharges to the heart.8 These might occur in a normal heart with no evidence of structural or conduction abnormalities or in a heart with existing myocyte injury secondary to catecholamine excess from prior seizures. The two main potentially lethal arrhythmias implicated in SUDEP are ictal ventricular tachyarrhythmias and ictal bradycardia / asystole. Acute neurogenic pulmonary edema can follow severe head injury, subarachnoid hemorrhage, or epileptic seizures. Pulmonary edema is found in many cases of SUDEP at autopsy.[15] A proposed mechanism for seizure-induced neurogenic pulmonary edema is the intense generalized vasoconstriction from the massive seizure-related outpouring of central sympathetic activity, which leads to an increase in pulmonary vascular resistance.[15]

Causes of bilateral hyperostosis of the skull vault

• Secondary to chronic antiepileptic drug intake

•Marrow hyperplasia secondary to thalassemia major

• Hyperparathyroidism

• Acromegaly

Craniosynostosis is a condition in which one or more of the fibrous sutures in an infant skull prematurely fuses by turning into bone (ossification), thereby changing the growth pattern of the skull. [3] It occurs in one in 2000 births.3 Premature closure of the sutures results in increased intracranial pressure and the skull or facial bones to change from a normal, symmetrical appearance causing visual impairment, sleeping impairment, eating difficulties, or an impairment of mental development combined with a significant reduction in IQ.[2] .Prevention of SUDEP Unfortunately, although we still are unable to prevent or even completely reverse some cases of epilepsy, preventive measures have been proposed in order to minimize the occurrence of SUDEP,[14] although strict evidence for their effectiveness is still lacking. Good control of seizures is the first line of defense The most effective conventional way to control seizures is antiepileptic drug therapy. Medication adherence involves factors such as getting prescriptions filled, remembering to take medication on time and understanding the instructions. If that approach is unsuccessful, other therapies that could be considered include epilepsy surgery and vagus nerve stimulation.[11,17] Reduction of stress The majority of studies define stress as circumstances that people would find stressful.[1,17] It has been established that a diagnosis of epilepsy may bring with it many potential stresses, many of which are chronic.[17] The seizures, and in particular their unpredictability, are a major source of stress for a patient with epilepsy.[17] Furthermore, stress may cause people to forget to take medication, leading to an increase in seizures. Stress can trigger an increase in the breathing rate (hyperventilation), provoking seizures in certain patients, especially those with absence seizures; negative emotions related to stress (worry or fright) may cause seizures, especially in people with temporal lobe epilepsy. Stress also increases cortisol levels, which may also influence seizure activity.[1] Participation in physical activity and sports As physical activity has been considered as having an anticonvulsant effect, it is rational to believe that regular physical activity (with appropriate professional supervision) may attenuate the frequency of seizures and cardiac abnormalities that could predispose patients to SUDEP.[17,24] Supervision at night Night-time supervision involves the use of bed seizure monitor or breathing alarm), in the bedroom.[1,19] They are designed to detect nocturnal GTCS. These alert

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family members to the presence of a seizure, allowing them to render any aid necessary in the ictal or post-ictal settings.[1,19] Omega-3 fatty acids supplementation It was proposed that omega-3 fatty acid supplementation in patients with refractory seizures may reduce seizures, seizure-associated cardiac arrhythmias and, hence, SUDEP.13 In fact, intake of long-chain omega-3 fatty acids, commonly found in fish and fish oil improves the development of the brain (from the composition of cell membranes to cerebral function) and all omega-3 fatty acids are important for treating or preventing cardiovascular and neurologic diseases, including epilepsy.[4,13]

Conclusion Physicians should establish a task force to assess the current state of knowledge on SUDEP (clinical management, research directions, and educational, social and cultural efforts).Also, if there is a reasonable chance of preventing SUDEP, it must be discussed with all patients with epilepsy who are at highest risk of SUDEP. Possible strategies that patients with epilepsy and their families can adapt to try and reduce SUDEP risk could then be explained by the physician.

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