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Case Report

DEATHS FOLLOWING DROWNING IN CALABAR, NIGERIA FROM 2007-2015.

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Abstract:
Aim & Objectives: To determine the number of deaths following drowning with emphasis on gender, age and possible season of the year that is most vulnerable.
Materials & Method: A total of sixteen (16) bodies of drowned bodies were autopsied in the department of pathology of university of calabar teaching hospital (ucth) from 2007-2015. The cases range from children to adults in a different circumstances and sites of drowning ranging from swimming pool to deep sea (ocean). The age also ranges from 32 weeks to 55 years.
Results: Out of the sixteen cases, twelve were male and the rest four are females giving a ratio of 3:1. The 32 weeks infant male was from a pregnant woman. Most if not all died of severe pulmonary oedema, asphyxia and a few soft tissue injuries; and fracture of the skull.

Keywords: Drowning, Severe Pulmonary oedema, Asphyxia, autopsy.

Introduction:

Drowning is defined as submersion in a liquid which could be in an ocean or in case epileptics, infants, alcoholic stupor with or without delirium or in infants in shallow water as left in bath.[1] Once respiratory impairment occurs and the individual airways appears below the liquid surface (submersion) or immersion as water splashes over the face the process of drowning has just begun. If rescued at any stage the term non- fatal drowning is said to occur; on the other hand if the person dies is termed fatal drowning. All these terms- 'near drowning',dry or wet drowning, active and passive drowning or delayed onset of respiratory distress could almost be prevented.[2] This is a leading cause of death in male child of ages 5-14 years in most part of the world. This is equally seen in or study as one of the victim 14 years was said to have been pushed by his father into the ocean. Reason that the child is a wizard hence had been the cause of all the misfortune happening to the family.

In USA, drowning is second cause of deaths related injury in children ages 1-4 years old with3/100,000[4] and in Thailand records had it that 2 year old children deaths occurs in 107/100,000.[5] In Africa and Central America, the incidence is almost 10-20 times as high as in USA.

Drowning been a life threatening event due to hypoxia needs an urgent care as to save the individual. We all appreciate the fact that there is a lot of difference between the sea water and fresh water with antecedent electrolyte disability. In most if not all the lethal hypercalcaemia could worsens near drowning as in dead sea.[6] The whole mechanism of death results when the person could not hold the breath as he/her is overwhelmed and gets aspirated. This results to spasms of the respiratory pathways with reflex response, coughing and at times laryngospasm. The water aspirated consequently causes dysfunction in the surfactant as this leads to increase permeability thus resulting to electrolytes and plasma alterations.[7]The ultimate final slut is hypoxia leading to death.

It is pertinent to note that fresh water drowning differs in all ramifications to sea water both in clinical and pathological findings. In essence while sea water leads to excessive dehydration and hypernatremia, fresh water on its own leads to haemolysis and hyponatremia.[8]In our own case majority of the drowned cases are from sea water while one was from the pool though all were brought in dead.

The main risk factors in drowning are male gender, excessive alcohol intake[4],lack of supervision and in some cases disease conditions like epilepsy as this group of people have high rate of getting drown easily.[10] Other disease status implicated to result to mortality in drowning are Myocardiac infarction, cerebrovascular accident(CVA), drug abuse, Syncope, arrhythmias, long QT Syndrome, Child abuse and suicide.[11,12] It is well known that the middle aged to elderly with pre-existing heart diseases, hypertension or vascular disease has tendency of CVA on immersion to cold water. The mechanism of incapacitation in these group is more probable due to sudden circulatory malfunction.[13] The whole mechanism starts with breath holding as long as the individual could before onset of neurogenic afferents effects on cutaneous thermos receptors cum respiratory intercostal muscles forces the individual to take a breath.[14] In effect holding breath could be extended by respiratory muscles thus resulting to swallowing diatoms/other sea debris against the epiglottis.[14]

In all cases of drowning –near or dry or wet types full resuscitation appears to be the hallmark in any emergency departments. This is to avoid sudden deterioration in few of the patients. They hypothermic ones are rewarmed in bath of warm water for at least 40 degree centigrade with guidance of rectal temperature monitoring. In all prophylactic antibiotics as to avoid chest infection, Septicaemia and intracerebral abscess are instituted.[15] In patients that has evidence of aspiration, chances are that the could present with features of pulmonary oedema and deteriorates urgently hence effective monitoring in an intensive care unit (ICU) in terms of pulse oximetry, arterial blood gas analysis with continuous positive airways pressure (CPAP) by a nasal canula in children/infants and mask in adults. All are focused as to create an arterial oxygen partial pressure (PaO2) of more than 8kPa with an F1o2 less than 0.5.[16]It is only when this fails that one could think of tracheal intubation and intermittent positive pressure ventilation (IPPV) with positive end expiratory pressure (PEEP).

Generally, it is pertinent to rewarm all whose core temperature gets to less than 28 degree centigrade due to effect on myocardium and great propensity in resulting to ventricular arrhythmias. Also in cardiovascular patients and in sudden myocardial infarction these are urgently

warmed using haemofiltration or even cardiopulmonary bypass.[17,18]
In our study, though quite late as all were brought in dead we tend to evaluate the gender mostly affected, age, and season of the year most vulnerable and possible cause in some of the cases.

Materials and Method: A total of sixteen (16) drowned bodies were brought in the department of pathology of university of calabar Teaching hospital from 2007-2015. They range from infants to adults of ages 32 weeks to 55 years. A detailed autopsy was carried out on all the bodies and report written.

Results:

Figure 1: Shows bleeding from the petrous and mastoid haemorrhage: This is often a finding common to drowning and always used as a diagnostic tool in few of the cases at dispute.

Figure 2: Showing a section of lung with Pulmonary oedema. This is seen in almost all the patients at different levels- moderate to severe pulmonary oedema.

Figure 3: Showing gross cyanosis of all the body with frothy fluid mixed with frank haemorrhage on the nostrils and mouth.

Figure 4: A section of the lung with multiple foci of haemorrhages and frothy fluid of severe glassy shining pulmonary oedema.

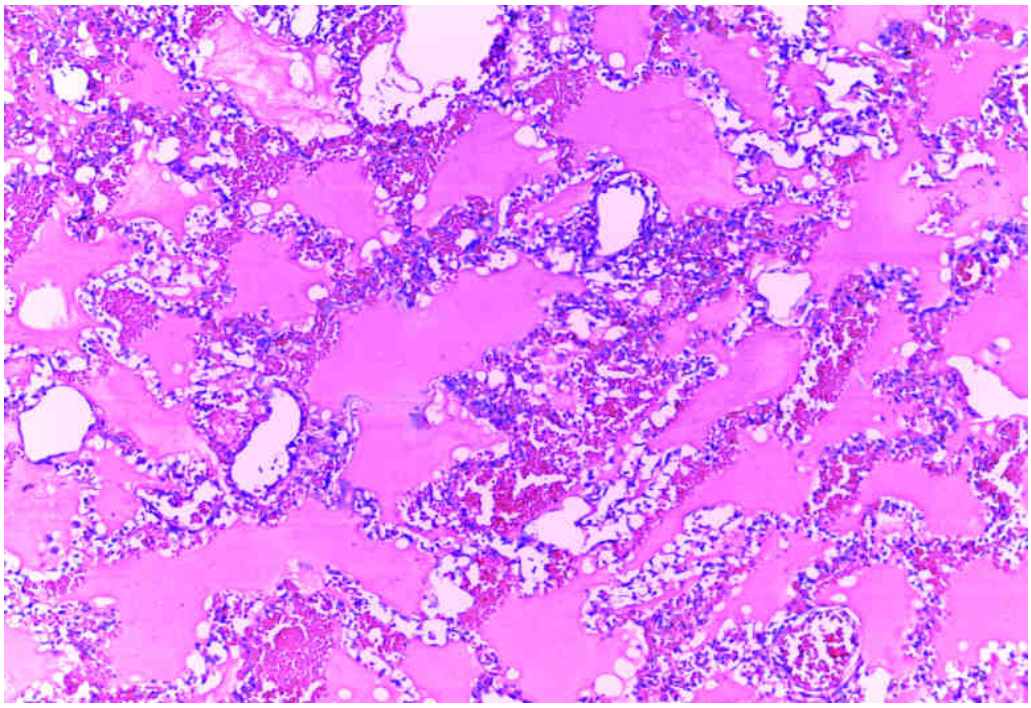

Figure 4: Shows severe pulmonary oedema-with complete distortion of the alveoli and pale eosinophilic water logged alveolar spaces and mild infiltration by mononuclear inflammatory cells.

In all the cases examined(autopsied) all appeared pale salmon pink to deep bluish in colouration (Generalised cyanosis) with moderate to severe pulmonary oedema/frothy fluid from the nose and mouth mixed with frank blood. A few shows features of washerwoman appearance- hands and feet appearing shrivelled and pale.

Also seen is evidence of shocked kidneys with distinct cortico-medullary differentiation. In all five of the cases out of sixteen had fracture of the skull at different levels ranging from the frontal bone to occipital.

Conclusion/Discussion: In all the cases we autopsied appeared with generalised cyanosis with Cutis-anserina (goose skin appearance) and strong undisputed lividity. However, we concluded that the cause of death is overwhelming asphyxia following drowning with moderate to severe pulmonary oedema. In almost all the cases there was no seasonal variations noticed as could be seen in few studies like Ahmet Guzel et al.[19] In our study, most of the cases occurs at the ocean (sea water) when the ship capsized and the rest was in the swimming pool(fresh water). Both cases happened about February and August respectively at different years within the study period. There were a few submersion injuries in five out of the sixteen cases (16); more were seen in the ocean cases with fractures of the skull at different sites – temporalis, occipital and frontals. This is followed with multiple soft tissue injuries and subarachnoid haemorrhages. However, the only infant we had in our case had a classical hand and foot syndrome with peeling of the epidermal region; and generalised cyanosis. Infants are generally are often drowned in bath tube likened to Turkish studies[19]but in our case was among the capsided ship.

Among the age range the vulnerable age is from 24-32 years and the ratio is 3:1 which translates to male and female respectively. This group of age appears to be the working class of any nation population studies. This

age range is distinct to few studies where mostly found are teenagers from age range 1-19 years in united States according to Brenner et al.[20] However, in most studies like in Ahmet et al [19] male gender appear dominant and this is seen in our case with twelve males and four females. In terms of age group, the younger ones are mainly male that are affected.Maleprobably in our setting the bread winners of most family.

In as much as lung injury is the major complication in patients that died following drowning, other lesions like hypoxic ischaemic encephalopathy could be seen in patients that survive prior to hospitalization as cause of death.[21,22] This is probably the features of suggested death in the boy that the father pushed into the pool to die on suspicious of been a wizard.The cause of death in such case could have been due to reperfusion problem, sustained acidosis or obvious cerebral oedema with release of excitatory neurotransmitters and seizures. Other attributes of the encephalopathy could be severe hypotension, impaired cerebral autoregulation or multi-organ dysfunction and severe hyperglycaemia.[23] Its pertinent to know that there is a great difference between fresh water and sea water drowning like in our own case in ocean and swimming pool while in sea water drowning there are massive dehydration and hyponatraemia; as distinct to fresh water with hyponatraemia and haemolysis.

The sudden onset of cerebral hypothermia could be attributed to reason why some submerged individuals could withstand long asphyxiated period especially in children thus not having any irreversible neurological changes. However, selective brain cooling by pulmonary heating through constant flushing of the lung at drowning before cardiorespiratory arrest could be of great assistance.

Generally, drowning is preventable both in children and adult unless when its accidental like in our case- sudden capsizing of the entire vessel (ship). Preventive could be in terms of swimming lessons, careful observation of all during swimming, avoidance of canal swimming/rivers,introduction of warning signs with symbols and some social vices like avoidance of intake of alcohol, overloading of vessels capacity prior to travelling, life jackets; and periodic re-training of staff and users of the pool. Also effective training/re-training of medical team on resuscitative measures at all levels in warming of hypothermia individual, positioning of the patients by rescuers in a vertical position as to keep airway open thus preventing vomiting/aspiration.[24] These could involve training as per complications from submersion injuries treatment strategies to be urgently applied once there is such cases.

All depends on speedy recovery and urgent institution of cardiopulmonary resuscitation where applicable. In the nutshell, the prognosis is better with cases of profound hypothermia as rewarming may appear difficult in absence of effective circulation.

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