

Fatal Heat Stroke in Vehicle Entrapped Siblings

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ABSTRACT

Background: *Vehicle entrapment is a recognized risk factor for paediatrics morbidity and mortality. The dominant concern about entrapment is heat stroke (extreme form of hyperthermia), though it often occurs in combination with other factors like asphyxiation and dehydration*

Objective: *To report a case of three children with heat stroke following entrapment in a car.*

Method: *A case report of 3 children with heat stroke following entrapment managed at Nnamdi Azikiwe University Teaching Hospital, Nnewi.*

Result: *One child died before presentation, one died on admission and the third recovered.*

Conclusion: *Vehicle entrapment poses a significant threat to childhood morbidity and mortality and the risk factors are embedded within the seemingly innocuous routines of daily family living. It is extremely invaluable that every means of public enlightenment is deployed to get the ignorant and unsuspecting public aware of this danger.*

Keywords: *Fatal heat stroke, vehicle, entrapped siblings.*

INTRODUCTION

Vehicle entrapment is a recognized risk factor for paediatrics morbidity and mortality. Even with the widespread under-reporting, the statistics is staggering and frightening and has been increasing over the years.¹ The dominant concern about entrapment is heat stroke (extreme form of hyperthermia), though it often occurs in combination with other factors like asphyxiation and dehydration. It may occur in various locations within a car's interior but Western reports mark trunk entrapment as the most frequent.²

Entrapment can either be intentional or unintentional. Intentional cases are seen in scenarios of robbery, kidnap, homicides and sometimes, in Munchausen syndrome. Child games, contingency abandonment of children by caregivers and accidents provide the opportunities for unintentional entrapment.

It is reportedly commoner in the summer months (between May and September) in western countries because of average higher environmental temperature (26.7°C – 34.4°C).² The equivalent of such relatively hot and humid season in Nigeria is from January to May. The interior temperature of a vehicle that will most likely result in entrapment consequences falls between 42.8°C - 60°C and this is easily attained in the periods mentioned above.³ Hence, the relative proximity and or exposure of the vehicle to a heat source like sun light or fire will also affect its entrapment potential and the swiftness with which it will happen. It is commoner amongst under 5 children. Heavy clothing increases risk. Dark clothes also increase the odds because of their tendency to absorb and retain heat. Compromised mental health in any of the child-caregiver pair increases the risk of entrapment. Vehicles that have low height and unlocked doors increase child's access to such danger. Conversely, neighbours and passers-by's access to such vehicle especially if stationary is likely to reduce the chances of entrapment.

The aim of this report is to enlighten the general public about the lethal threat of vehicle entrapment and to also remind clinicians to factor heat stroke as a possible differential in various forms of encephalopathy.

CASE REPORT

On 3rd April, 2013, both parents left their three children (2 females and 1 male) in their perimeter fenced house around 9a.m. Mother returned about 1p.m to find none of her children. She went in search of them only to discover them lying motionless in a month-long parked Mazda Saloon car. She forcefully opened the car door and shockingly discovered that the youngest (female, 3 years) had no signs of life. The child was lying prone on the foot rest of the back seat. The eldest child (female, 7 years) was also lying on the other foot rest of the back seat; unconscious and gasping for breath. The second child (male, 5 years) was also found lying prone on the back seat. Mother described the interior of the car as very hot.

She sprinkled cold water on the first two who still had signs of life but little changed prompting her to rush them to a nearby private hospital. They were subsequently referred to NAUTH after five hours of resuscitation with intravenous fluids with no remarkable improvement. The referral note revealed that the seven year old female had at presentation a Glasgow Coma Score (GCS) of 3/15, axillary temperature of 38.9°C, severe respiratory distress and impalpable peripheral pulse. She did not make urine despite five hours of intravenous fluid rehydration. The five year old male, according to the referral, had altered

consciousness with a GCS of 7/15, temperature of 39.5°C, severely dehydrated, pulse rate of 140/min; weak and thready. He also had two episodes of generalized convulsions each lasting < 5min; aborted with intramuscular paraldehyde.

On presentation in Children Emergency Room (CHER) of Nnamdi Azikiwe University Teaching Hospital, Nnewi, the seven year old female still had a GCS of 3/15, severe respiratory distress with apnoeic gasps. Fresh blood was oozing from her mouth. Peripheral pulses were absent and her heart beat was faint and irregular. She died within 10min of arrival despite resuscitative efforts that included oxygen therapy, cardiac compression and bag-valve-mask ventilation.

The five year old boy had a GCS of 5/15, severely dehydrated, weak peripheral pulses, cold extremities, delayed capillary return (4 seconds) and temperature of 37.1°C. A working diagnosis of heat stroke with hypovolaemic shock was made and he was further resuscitated with intravenous normal saline, oxygen therapy and routine nursing care for an unconscious patient. Two hours later, he regained full consciousness. Investigations done (CSF analysis and MCS, CBC, Urinalysis) were essentially normal. He later recalled that the deceased elder sister opened the car door and led them into the car. He was discharged after three days of admission having made steady recovery. He is to continue a scheduled follow-up in the Paediatrics Neurology Unit. Parents refused to give consent for a post-mortem on the dead girl despite elaborate counsel by the managing team.

DISCUSSION

Heat stroke is also known as sun stroke, thermic fever and siriasis. The National Association of Medical Examiners defines heat stroke as exposure to high temperatures, with complications involving the Central Nervous System (CNS), and failure of thermoregulation in the absence of other reasonable causes of hyperthermia.⁴ Vehicle entrapment is a common cause of this condition and it is known to occur even when the car windows are partially open.¹ This index case, which claimed the lives of two children, took place within a stationary car whose interior was noted to be terribly hot, in the month of April, which was intensely hot and humid; both risk factors for heat stroke. In fact, the Nigerian Meteorological Agency forecast for the area on the day of the incident was 34°C, which is well within the risky temperature range for vehicle entrapment. A similar incident still involving a parked car occurred in Aba, Southeast Nigeria, two weeks earlier claiming the lives of two 4 year old twins⁵.

Other contributory factors in the index fatal entrapment include inadequate caregiver supervision, negligence and lack of access of the neighbours to the vehicle involved. The parents apparently were oblivious of the risk inherent in leaving the children unattended without ensuring that the car doors were securely locked. The culture of high walled perimeter fencing as a form of security also posed a disadvantage in this case. Were the house unfenced and accessible to neighbours and passers-by, a timely rescue may have been possible.

Ignorance of the dangers in leaving children unattended may have been a factor but it is instructive to know that this approximates to child neglect in medico-legal terms⁴. It is therefore vitally important that children are never left to play in or around unlocked vehicles or left alone in an unattended car, even with the windows down. The need to run a quick errand, while the children are left alone inside a car, is dangerous and should be discouraged.

Dehydration and hypovolaemic shock are common presentations of vehicle entrapment and these were very much evident in this case report. Sweating and evaporative fluid losses cause drop in plasma volume which inexorably lead to decreased cardiac output, compromised tissue perfusion, anaerobic respiration, elaboration of toxic metabolites and multiple organ damage. This altered metabolism could lead to disseminated intravascular coagulopathy which occurred in the deceased girl. It is unclear what gave the five year old boy the survival advantage even ahead of his seven year old elder sister. It was possible the boy had a better pre-incident hydration status.

CONCLUSION

Vehicle entrapment poses a significant threat to childhood morbidity and mortality and the risk factors are embedded within the seemingly innocuous routines of daily family living. It is not improbable that many cases of sudden onset of seizures in an otherwise healthy child might be related to heat stroke. It is invaluable that every means of public enlightenment is deployed to get the ignorant and unsuspecting public aware of this deceptive danger.

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