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CASE REPORT Open Access

Crushed, uncooked egg in the oropharynx: a café coronary?

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Abstract

Background Obstruction of the upper respiratory airway can terminate in fatal asphyxia. Autopsy findings in asphyxial deaths as described in literature are not necessarily pathognomonic. A complete autopsy with ancillary studies is necessary to establish the cause, time, and manner of death.

Case presentation The authors present a 44-year-old male who was found dead in his car. He had been remanded in prison for drug trafficking 1 year prior to his death. No other history or death scene findings were provided by the police. Autopsy revealed a crushed, uncooked egg in his oropharynx. Postmortem radiology and toxicology were not done due to nonavailability of the required facilities. Death was ascribed to asphyxia due to a crushed, uncooked egg in the oropharynx.

The manner of death could not be ascertained because pertinent information regarding the deceased's medical records, locus report, and other ancillary investigations was not available.

Conclusions This report presents an unusual cause of mechanical upper airway obstruction that has never been documented and discusses some of the deficiencies of autopsy practice in resource-limited countries.

Keywords Asphyxia, Café coronary, Manner of death, Medicolegal protocol, Resource-limited countries

Background

Upper respiratory airway obstruction can result in severe respiratory distress and asphyxial death. Asphyxial deaths have been variously classified; the common causative factors have been grouped to include mechanical obstruction (suffocation through choking, smothering, trauma, positional, neck compression from strangulation, hanging, and drowning), chemical asphyxiation (inhalation of carbon monoxide or hydrogen cyanide), or being in an environment simply devoid of air (sewage tank or a deep well). Other special cases include sexual asphyxia and electrocution (Sauvageau and Boghossian 2010).

The obstruction, in some cases of choking, could be caused by airway pathologies due to natural diseases or foreign materials. Examples of the former include glosso-epiglottic retention cyst, glottic oedema, laryngeal spasm, injury to a cavernous laryngeal haemangioma, amyloid infiltration of the laryngeal plexus, and laryngeal impaction by an oesophageal polyp (Cochet et al. 1980; Porzionato et al. 2007; De Giorgio et al. 2005; von Eckardstein et al. 2016). Examples of foreign bodies include candies, tablets, pen, banana, chewing gum, grape, rubber balloon, beads, plastic knives, food, and salmon egg (Abdel-Rahman 2000; Aissaoui et al. 2012; Bhana et al. 2000; Edirisinghe 2011; Nikolić and Živković, 2013; Cascini et al. 2012; Njau 2004; Takamiya et al. 2016).

The postmortem findings include swelling of the face; frothy fluid in the mouth; cyanosis; congestion of the tongue and lips; lividity of the extremities; petechial haemorrhages; engorgement of the genitals with involuntary discharge of semen, urine, and faeces; engorgement

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of the right heart and venous system; pulmonary congestion and oedema; fluidity of the blood; and cerebral oedema (Byard 2011). These findings, which are generally nonspecific (Ely and Hirsch 2000) and completely absent in some asphyxial deaths, make the postmortem diagnosis of mechanical asphyxia problematic. However, the use of metabolomics has been shown to improve the histopathological diagnosis of asphyxia deaths (Locci et al. 2021; Varvarousis et al. 2017).

A complete autopsy is required to provide evidence regarding the cause, time, and manner of death for the purpose of medicolegal investigation and adjudication by the criminal justice system (Institute of Medicine (USA) Committee for the Workshop on the Medicolegal Death Investigation System, 2003). The success of such autopsies depends on the systematic approach employed by the forensic pathologist and the availability of required facilities. Histological examination of retained tissues is vital (De Giorgio et al. 2014).

The authors report an unusual asphyxial death involving the presence of a foreign body (uncooked egg) in the upper respiratory tract under unknown circumstances. Relevant literature is reviewed, and some of the deficiencies of police investigative practices and autopsy limitations in resource-limited countries (RLC) are discussed.

Case presentation

A 44-year-old male was found dead in his car, which was reportedly parked on a bridge. One year prior to his death, the now deceased had been allegedly remanded in prison for drug trafficking. The past medical, medication, and social histories were unavailable.

The body was recovered from the scene by the police after being informed of its presence at the locus and transferred to a public mortuary. The body was embalmed 4 days later by the mortuary personnel. Throughout this period, the pathology team was not informed, and the police could not provide the team with a locus report when it was requested. There was no information as to relevant past medical and social histories; the only information volunteered was that of an incarceration in prison, 1 year earlier, for drug-related offences. A postmortem examination was conducted 3 weeks after the body was deposited, on the instruction of the coroner.

At autopsy, external examination showed that the body was unclothed, and the hands were not 'bagged'. The internal examination revealed a crushed, uncooked egg with egg shell fragments, drooling yolk, and egg white (albumen) in the oropharynx (Fig. 1a, b & c). The opaque white appearance of the albumen (Fig. 1c, black arrows) is most likely due to protein denaturation by the embalmment fluid.

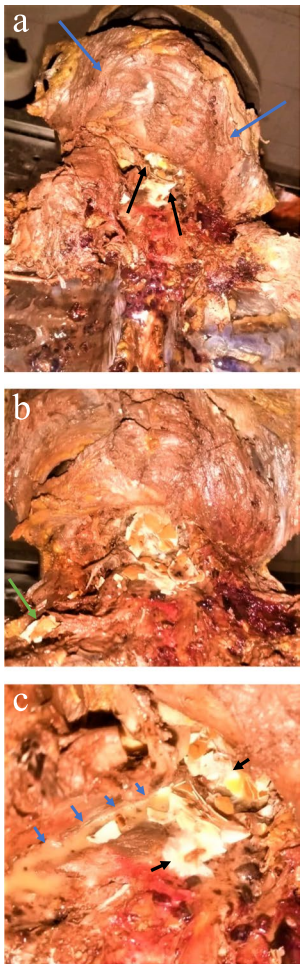

Fig. 1 **a** Crushed, uncooked egg in the oropharynx (black arrows). The skin of the anterior neck is reflected (blue arrows). **b** Close-up view of the oropharynx showing the crushed, uncooked egg. Displaced fragments are also seen (green arrow). **c** Close-up view of the oropharynx showing a stream of flowing egg yolk (blue arrows) and lakes of egg white (albumen) (black arrows)

Postmortem radiology and toxicology were not done due to lack of the required facilities.

Death was attributed to asphyxia due to obstruction of the upper respiratory airway (oropharynx) by a crushed, uncooked egg.

Discussion

Choking refers to the mechanical obstruction of the upper airway, at any level from the pharynx to the carina (Memchoubi et al. 2020). This obstruction can be partial or complete. Partial obstruction results in inadequate in-flow of air with mild to moderate respiratory distress, while complete obstruction results in total restriction to airflow with severe respiratory distress (Memchoubi

et al. 2020). Internal airway obstruction in children is often accidental due to foreign bodies like beads, tablets, sweets, and other small items that the child was attempting to swallow (Foltran et al. 2013; Nixon et al. 1995).

In adults, the settings include suicide, homicide, or accident. The classical accidental scenario is found in 'café coronary' where food passes into the airway, and the cough reflex is insufficient to propel it out; it is often associated with a drunken state or any condition of inebriation that reduces the ability of the victim to cough out the food item (Di Maio & Di Maio, 2001). Homicidal choking can also occur in association with gagging, where the mouth is blocked with a foreign object like a cloth which might have been shoved deep into the oropharynx; this could even be a signature mark in some drug-associated killings (Saukko and Knight 2016).

In a retrospective analysis of 14 autopsy cases of upper airway obstruction, Lino et al. (2010) identified three types of upper airway obstruction using postmortem computed tomography (CT) scan. In type 1, the foreign body is situated between the oral cavity and oropharynx, while the epiglottis sits in its normal position. In type 2, the foreign body is situated in the oropharynx, just above the epiglottis, pushing the epiglottis posteriorly and obstructing the airway, while in type 3, the foreign body obstructs the laryngeal inlet while pushing the epiglottis anteriorly. In view of the emphasis on the position of the epiglottis in this CT classification and the likelihood of dislodging the obstructing object during evisceration at autopsy, it could be difficult to replicate this classification. Successful identification with classification at autopsy is easily achieved where the 'aspiration' was witnessed or an antemortem imaging had been done; the pathologist will then be expected to perform a careful neck dissection, which ensures that the foreign object is not dislodged. The case being presented can perhaps be considered to be a type 2.

As previously mentioned, the risk of choking has been found to be increased in children, because of the propensity with which they bring objects to their mouths, coupled with the relatively small luminal diameter of the airway. Choking is not uncommon in middle-aged persons who swallow large food boluses, individuals with mastication and/or deglutition problems, those intoxicated with alcohol and drugs of abuse, and patients on prescribed sedatives. Others are sufferers of cerebrovascular disease, dementia, and Parkinson's disease, as well as some patients with psychiatric disorders (De Donno et al. 2017; Lino et al. 2010). The lack of past medical, medication, and social histories, eye witness account, and the absence of death scene examination and photography all precluded the identification of risk factor(s) in the index case.

The aetiology of asphyxial death can be very complex, as it may result from multiple pathomechanical factors (De Giorgio et al. 2007). The presence of impacted object(s) in the pharynx or larynx can precipitate severe respiratory distress, with pulmonary congestion and cyanosis. However, the rapidity with which death can occur without obvious respiratory distress in some cases suggests the possibility of a vasovagal cardiac arrest resulting from the stimulation of the superior laryngeal nerve (Aissaoui et al. 2012; Payne-James et al. 2011). Café coronary, also referred to as bolus death, presents suddenly in the absence of any previous sign of respiratory discomfort and is often confused with acute myocardial infarction even when witnessed while the victim was eating (Batson et al. 2021). According to Wick et al. (2006), the diagnosis of café coronary can only be made with confidence in cases where the clinical history, circumstantial evidences, and foreign body demonstration at autopsy or during resuscitation are available. Death in this condition is attributed to a sudden reflex cardiac arrest, apart from the effects of suffocation by asphyxia. This condition is frequently observed in middle-aged or elderly individuals. As earlier stated, it is commonly associated with intoxication by alcohol or other drugs, dementia, and other neurological disorders, as well as missing tooth (Blaas et al. 2016).

It is interesting that the victim in the index case swallowed an uncooked egg. This would appear to be an unusual practice, where the uncooked egg was swallowed with its shell. The consumption of uncooked egg in this geographical region (Nigeria) requires that the egg shell is first broken before draining its content (yolk and albumen) for consumption. Unfortunately, the absence of relevant social history and toxicological studies makes it difficult to draw conclusions; the latter might reveal a predisposing state of inebriating factor.

The diagnosis of choking at autopsy requires attention to specific details. Apart from the routine of thorough external examination and careful evisceration, a meticulous neck dissection with removal of the tongue is mandatory. The latter exercise is quite difficult in markedly stiffened, embalmed bodies, particularly in situations where the 'Y-incision' has been employed for cosmetic reasons. Despite the limitations, a detailed neck dissection is necessary to establish the cause and manner of death in every medicolegal case (Blaas et al. 2016). In the index case, the uncooked egg was found to be crushed; when this crushing occurred, it could not be ascertained. A detailed history, crime scene examination, and prompt autopsy prior to the embalmment might have provided an answer. A postmortem X-ray or CT scan could only have been ordered prior to autopsy if there was a clear indication from the history; such a diagnosis will not be missed

in centres where virtopsy is routine (Aquila et al. 2013; Nwafor et al. 2018). A systematic review by Gascho et al. (2019) concluded that the combined use of postmortem CT and MRI may be considered an alternative to autopsy, particularly in hanging cases. In the index case, there was no suggestive history warranting the ordering of postmortem imaging, and only a detailed autopsy revealed the diagnosis.

In RLC, radiological facilities are not available in the autopsy room, and those available in the hospital are usually used strictly for the living. When postmortem radiology is inevitable, as in some medicolegal cases, pathologists in RLC enlist the services of a receptive radiologist who would arrange for the deployment of a mobile X-ray machine. Rarely, the cadaver is transported to the radiology department for pre-autopsy imaging. This practice is highly discouraged because of the risk of spreading infection and the negative psychological effects it has on both the living patients and personnel of the radiology department.

The manner of death can be classified as accidental (Francis et al. 2013), homicidal (Kurihara et al. 1992; Kitulwatte and Edirisinghe 2020), or attributed to suicide (Pampin and Varela 2001; Sauvageau and Yesovitch 2006). Psychiatric disorders are associated with suicide, while abuse of drugs and alcohol has been associated with accidental death resulting from choking. The determination of the manner of death in the index case was difficult due to nonavailability of relevant histories and locus report.

Although proper documentation and poor forensic practices are the norm in underdeveloped and RLC (Ameh and Shehu 2002), low-cost, high-quality methods of verbal autopsy, paired with emerging use of electronic data capture and other innovations, can make cause of death (COD) systems low cost and relevant for a wide range of childhood and adult conditions (Jha 2014).

Furthermore, postmortem toxicology, where available and funded, could have helped to detect the presence or absence of prescribed and unprescribed medication, drugs of abuse, and alcohol. In a study by Ripoll et al. (2019), about 52% of the victims of sudden death had positive toxicological findings, while the immediate cause of death in approximately 25% of cases was directly attributable to the toxic compounds. Such toxicology laboratories are unavailable in RLC. Sending these samples to other facilities overseas attracts huge extra cost, and this can delay concluding the autopsy report. The problems associated with the lack of postmortem toxicology is compounded by the practice of hurried embalmment by mortuary attendants, lack of an effective coroner system, and ignorance on the part of relatives who are in a hurry to bury the deceased. The embalming fluid interferes with toxicological analysis while rendering the interpretation of the analysis problematic for the inexperienced forensic toxicologist (Takayasu 2013).

The index case occurred in Lagos State, Nigeria, with a supposedly established medicolegal system supported by the Lagos State Coroner's System Law (2007), which in Sect. 16 states that 'There shall be no tampering with the body of a deceased person found lying within a Coroner's District by way of chemical preservation, dismemberment or disposal by any form, prior to the conduct of a post mortem examination except by the prior authorisation of the Medical Examiner'. Neither the police nor the mortuary staff complied with the law.

The rapid decomposition of poorly preserved bodies in tropical environments inside refrigerators powered by poor electricity supply, and delayed autopsies even by experienced pathologists, could prevent accurate diagnosis.

The recognition of possible homicidal settings would attract proper removal of bodies from the crime scene, necessitating the 'bagging' of the hands and subsequent collection of DNA samples from the hands, in the hope of identifying a perpetrator. The handling of the present case by the police would not have allowed for proper forensic investigation. The manner of death in the index case remains speculative. However, the authors are inclined to consider death as being accidental, following a café coronary; the body displayed no injuries that would suggest homicide.

Conclusions

In conclusion, upper airway obstruction due to crushed, uncooked egg in the oropharynx is an extremely rare cause of asphyxial death. The cause of death cannot be used as a standalone to infer the manner of death. Pertinent information regarding the deceased's medical, medication, and social histories as well as information derived from death scene examination, postmortem radiology, and other ancillary investigations must be integrated. This report highlights some of the challenges plaguing forensic pathology practice in resource-limited countries. Government funding and political will are crucial for tackling these challenges (Obenson and Enow Orock, 2017). Finally, though this report may be regarded as being anecdotic because of its lack of locus examination findings, clinical history, radiological findings, and toxicological findings, the authors believe that this case report will serve as a useful resource in the enrichment of evidences available for forensic pathologists (De Giorgio, 2007).

Abbreviations

RLC	Resource-limited countries
CT scan	Computed tomography scan
MRI	Magnetic resonance imaging
COD	Cause of death

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Authors' contributions
MIA, performed the autopsy, did the literature search, and prepared the draft manuscript. SSS, supervised the autopsy and reviewed the manuscript. JOO, shared some literature material and extensively revised the manuscript.

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Consent for publication
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Competing interests
The authors declare that they have no competing interests.

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