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SILENT WITNES: UNRAVELING THE MYSTERIES ABOUT MANNER OF DEATH

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ABSTRACT:

Forensic medicine and pathology are crucial in uncovering the mysteries surrounding the manner of death in medicolegal cases. This review paper explores the methodologies, challenges, and advancements shaping this critical field. It delves into the classification of deaths as natural, accidental, suicidal, or homicidal, the methodologies used by forensic experts to differentiate between manners of death. The paper emphasizes the importance of investigation in pursuit of justice and public safety, evolution, and advancements in forensic pathology, toxicology, and anthropology. It acknowledges the challenges faced by forensic experts in determining the cause of death, such as the limitations of autopsy techniques, and the complexity of interpreting post-mortem findings. It asserts that forensic medicine can ascertain diverse facts by scientifically testing various evidence collected during an investigation. It also emphasizes the importance of expert opinions in legal cases involving death and the crucial role of the postmortem report as evidence in the entire case.

In medicolegal cases, pathology and forensic medicine play a critical role in solving the puzzles surrounding the cause of death. It explores how fatalities are categorized as suicide, homicidal, natural, or accidental, outlining the methods to distinguish between different causes of death. The study examines the development and advancements in forensic medicine while highlighting the significance of inquiry. It recognizes the difficulties forensic specialists encounter in the constraints of autopsy procedures and the difficulty of interpreting post-mortem results. Moreover, The postmortem report plays a critical role as evidence in the case, and the document also the significance of expert opinions in death-related legal matters.

1. INTRODUCTION:

Death, an enigma that has perplexed humanity for millennia, is a phenomenon that lies at the intersection of science, medicine, and law. In the realm of forensic medicine, the investigation of death takes on a unique and crucial role, with a primary focus on determining not only the fact of death but also the circumstances surrounding it. The "Manner of Death" and "Postmortem Findings " are two fundamental aspects at this investigation's heart." These elements provide invaluable insights into the complex mortality puzzle and are indispensable tools for forensic pathologists, law enforcement agencies, and the broader criminal justice field**.** **(Dr. Nastu Sharma)**

According to **Prof. R K Sharma, and Duarte Nuno Vieira**; the cause of death is an injury, disease, or the combination of the two when trauma kills so rapidly that there is no opportunity for sequelae or complication to develop, the injury is both immediate and proximate cause of death

1.2. Manner of death

It explains the reason for the death. The manner of death is either natural, unnatural, accidental, homicide, or suicide.

1.2.1. Natural deaths: natural death is defined as death caused solely by disease or natural process The investigation includes a complete autopsy, examination of the death scene, and clinical history.

1.2.2. Accidental deaths: Accident is defined for medical examiner death certification purposes as unnatural death resulting from a negligent chance of happening Traffic fatalities are not accidents. We can prevent them by improving road safety.

1.2.3. Suicide: For medical examiner death certification, suicide refers to self-inflicted injury resulting in death with evidence of intent to die. Such evidence may include an explicit expression of intent, such as a suicide note or verbal threat, previous attempts, or an act demonstrating implicit intent. (Anica Mann, Akshay Sharma, Aarushi Sharma, Reva Mann, and Avani Sharma)

1.2.4. Most common methods of suicide:

- Hanging
- Gunshots(firearms)
- Sharp object fatality
- Poisoning by narcotics or pesticides
- Drowning

1.2.5. Homicide: Homicide is defined as an act where one person causes the death of another person. In addition to this, a death that occurs during and is related to the commission of a felony is also considered a homicide. A violent death may stem from a deliberate or purposeful action, but it is not necessary that the intent to cause death be present or proven for it to be classified as a homicide. It can result from an act or failure to perform an act where the duty to act is imposed by law**.** Homicides are **criminal** and **non-criminal.** Criminal homicides are legally classified as **(a) murder or (b) manslaughter.** non-criminal homicides are classified as **a) justifiable homicide and b) excusable homicide.**

1.2.6. Undetermined: Undetermined is an appropriate designation for cases that have very little available information about the circumstances surrounding the death (e.g., partial skeletal remains) or where known information equally supports, conflicts with, more than one manner of death**.**

Furthermore, we will examine, that a nuanced understanding of this subject is essential not only for forensic professionals but also for policymakers, legal practitioners, and the public to ensure justice and the prevention of wrongful convictions.

1.4 Mode of death:

Death occurs primarily due to failure of functions of any one of the three main organs heart, lungs, and brain. These three organs comprise the "TRIPOD OF LIFE". The modes of death could be due to syncope, asphyxia, or coma.

Syncope: stoppage of the function of heart and circulatory system

Asphyxia: stoppage of respiration

coma: stoppage of functions of the brain

1.5. postmortem examination:

An autopsy is the examination of the body of a dead person or body. An autopsy may be restricted to a specific organ part or region of the body. Autopsies are performed to determine the cause of death, for legal purposes, and for education and research. Understanding common postmortem changes and the variables that affect them allows the forensic pathologist to accurately estimate the postmortem interval (PMI) and to provide a time frame during which death occurred. (Anica Mann, Akshay Sharma, Aarushi Sharma, Reva Mann, and Avani Sharma)

2. Emerging technologies:

2.1. "Ethics and Forensic Radiology"

"Imaging for homicide investigations" authored by Krzysztof Wozniak· Artur Moskała · Ewa Rzepecka-Wozniak.

Laser scanning and photogrammetry are two highly effective methods that provide valuable insights into crime scene investigations. Not only do they allow for the registration of external body changes, but they also help to gather crucial data about the scene and the possible weapon used. With the use of a robot, the surface scanning process can be standardized and automated, making it even more efficient. By using this data to supplement further investigation, it is possible to reconstruct the scene and better understand what occurred for internal evaluations, PMCT and PMMR are the methods of choice.(M. Garetier, L. Deloire, F. Dédouit, E. Dumousset, C. Saccardy, D. Ben Salem,) PMCT is the most accessible and efficient screening method, especially when dealing with multiple fractures or foreign objects. On the other hand, PMMR is more expensive and time-consuming but is much more efficient in evaluating changes in soft tissues. PMCT has become the more popular choice due to its accessibility. we will mainly focus on the utilization of PMCT and how it can help improve crime scene investigations. (Leg Med, 11 (2009), pp. 136-138)

PMCT in homicide cases There are three main purposes for the application of PMCT:**1) diagnosis, 2) identification, and 3) documentation. (**Br J Radiol, 87 (2014), p. 201304881)**. Diagnosis:** PMCT acquisition before a conventional autopsy examination allows us to make a primary evaluation before conventional autopsy examination is started: to analyze the results, focusing on locations less accessible for conventional examination techniques (e.g., the facial part of the skull, cervical spine, extremities, pelvic region) as well as the possible presence of foreign bodies, including lodged projectiles important to be recovered during an autopsy examination. Such analysis has an important role, especially in cases of damaged cadavers (burnt, decomposed, fragmented). we reported the finding of an occult gunshot wound of the face with pieces of the projectile (it was irrelevant to the actual cause of death tension pneumothorax).

In some cases, the findings can even lead to primary conclusions about the cause of the (violent) death (aspiration of blood, haem pericardium as in fresh corpses we can differentiate body fluids. There are even changes related to the cause of death more likely to be proven by the results of PMCT, such as pneumothorax, including tension pneumothorax**. 2. Identification:** we can obtain vital information for exclusion/non-exclusion of the identity of the deceased person by comparison of registration of items of clothing, personal belongings, piercings, the shape of the ears, bone features(facial appearance, paranasal sinuses, healed fractures), signs of previous medical interventions (internal fracture stabilizations, pacemakers, etc.), dental features and even characteristic changes due to disease (arteriosclerosis, aneurysms, cysts, lithiasis, etc.). However, it should be stressed that the most relevant method of identification of the

deceased person is based on DNA sampling. **3. Documentation:** the obtained information can be stored and re-evaluated when new facts come to light. (Leg Med, 11 (2009), pp. 136-138)

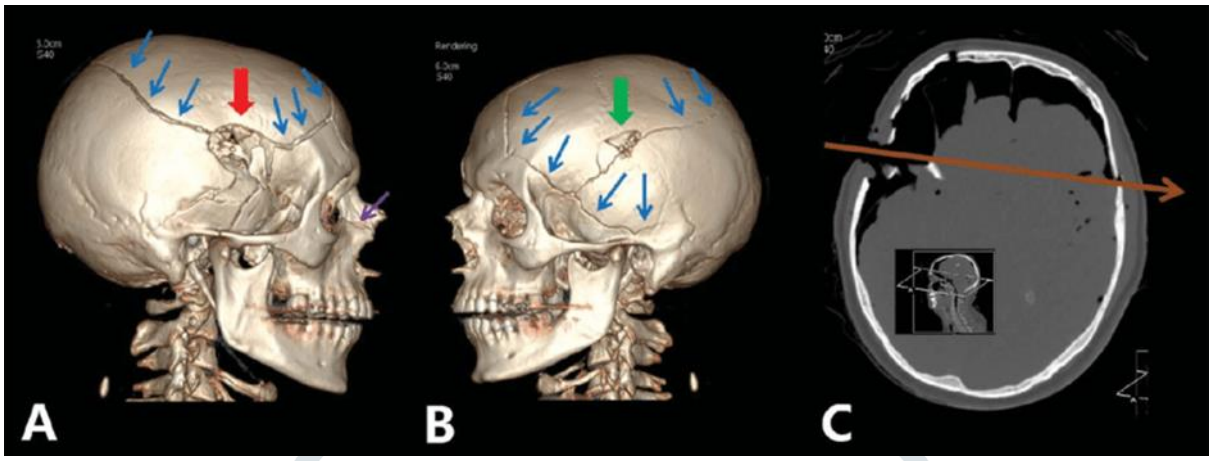

Fig 1: Demonstration of ballistic trauma by PMCT using 3D-volume rendering reconstructions (A and B) and a paraxial axial image. (C) Visualization of multiple fractures of the skull (blue arrows in A and B) with an entrance wound (red arrow in A) in the right temporal region and an exit wound (green arrow in B) on the left side. The trajectory of the bullet is given in the axial oblique reconstruction (brown arrow in C). •Woźniak, Krzysztof, Artur Moskała, and Ewa Rzepecka-Woźniak. 120 (2015): 846-855.

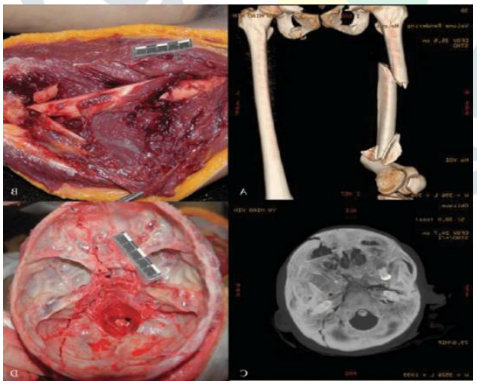

Fig 2: Comparison of PMCT and autopsy findings of victims in traffic accidents. (A and B) 3D reconstruction and autopsy showing comminated fractures of the femur. (C and D) Maximum intensity projection images and autopsy showing fracture of the skull base .Karger, B., et al. 116 (2002): 273-278.

2.2.“Autopsy features relevant for discrimination between suicidal and homicidal gunshot injuries” authored by B. Karger · E. Billeb · E. Koops · B. Brinkmann

The preference of short-barrelled firearms, especially of pistols, in both suicides and homicides. The number and the site of the entrance wounds Suicide commonly fires a single gunshot but 5.6% in this study and 1–7% in other studies fired more than once (Kimmerle, Erin H., and José Pablo Baraybar). Consequently, atypical entrance wound sites in a fatality suspected to represent a suicide should raise the level of suspicion but this finding alone cannot exclude suicide. In homicides, the main targets are the head (30–50%) and the thorax (25–45%) but due to the dynamic situations, the distribution is more even and many bullets enter via the dorsal surface of the victims. The shooting distance This parameter has received little attention in the literature and inconsistent classifications render a comparison difficult. In several series of suicides, contact or near contact wounds were present in more than 97%. In homicides, intermediate and especially distant gunshots predominate clearly while contact and near contact wounds were found in only 6–11% of this study. This finding can indicate surprise or defencelessness of the victim or a scenario similar to an execution. The direction of the bullet path and the direction of the internal bullet path may differ between suicides and homicides for a particular entrance wound site commonly intends to have a stable and comfortable position of the shooting hand and a fatal effect of gunshots (Kimmerle, E.H. and Baraybar, J.P., 2008). The geometric relations of the body and firearm may thus establish typical pos. Suicide editions of the firearm and typical suicidal bullet paths. Contrary to this static setting in suicides, homicides occur in a dynamic situation including motion, resistance, or flight of the victim and distant gunshots. This may cause atypical bullet paths compared to typical suicidal bullet paths in the same entrance wound location. It is clear that ricochetting bullets may interfere with these considerations but occur infrequently and can usually be recognized by bullet deformation and trace evidence. 1. Gunshots to the right temple. Suicides commonly show a bullet path directed front-to-back and upwards or parallel. A bullet path running back-to-front and or downwards is not indicative of suicide despite the typical entrance wound site. 2. Gunshots to the left chest. Suicides commonly fire from right-to-left or parallel while homicidal bullet paths frequently run from left-to-right. Thus, bullet paths directed from left to right are not typical for suicide. 3. Gunshots to the mouth. Suicides prefer an upward direction while a descending course is a rarity, which is also the experience of others. In homicides, many bullet paths appear to be directed parallel to the horizontal plane but the total number of reports is small and bullet paths directed upwards and downwards have also been reported. 4. Gunshots to the back of the head or neck. If a suicide chooses this atypical site, the bullet path is usually directed upwards while all directions occur in homicides. However, the peculiar characteristics of an individual case should never be sacrificed to general or preconceived notions because atypical findings do occur and in very rare cases, the “opposite” manner of death may be mimicked. This demonstrates that efforts to reconstruct the events are always important(Kimmerle, E.H. and Baraybar, J.P., 2008).

2.3."Investigating ante, perimortem and postmortem injuries": forensic implication authored by Jaiyeoba Ojigho Jennifer Efe, Odokuma Emmanuel Igho, Umukoro Joysour Mamuyovwi.

According to some authors, injuries to bones can occur before death (antemortem), at or near the time of death (perimortem) or after death (postmortem) describing the time of occurrence. s. Antemortem, postmortem, and perimortem injuries were interpreted based on fracture patterns, fracture edges, bone tears, plastic deformation, and adhesive materials found within investigated bones. basic features of antemortem injuries were smooth and round fractured edges within bones. Sharp, smooth fractured edges were observed among perimortem bones in contrast to irregular, blunt fractured edges and uneven discoloration in postmortem bones. Straight-line incisions were seen in bones with sharp force injuries, the presence of an entrance wound in ballistic injuries while an impact area was discovered in most bones with blunt force injury. Findings showed a significant association exists between ante, peri, and postmortem injuries in the ulnar, radius, and femur bones. Features of antemortem injuries observed from this investigation were the presence of an impact area, rounding, and porosity near the fractured edges. Rounding fractured edges in antemortem injuries has been associated with bone repair and healing. From this study, evidence of perimortem and postmortem injuries observed among skeletal elements was the presence of specific fractured angles and edges peculiar to perimortem and postmortem injuries. Further findings from this study revealed acute angles among perimortem bones while right angles were noticed among post-mortem bones. Sharp, smooth fractured edges were also observed among perimortem bones in contrast to irregular and blunt fractured edges alongside uneven discoloration in postmortem bones. The calvaria, skull, ulnar, radial, and femur bones from this investigation had shown more postmortem injuries depicting that most damage occurred after death. Postmortem damage could also result from the air-exposed environment which may affect the morphology and microstructure of the bones. Further findings showed that postmortem bones were parched and brittle, which could be due to decomposition which degrades the collagen component and elasticity. Findings from this study showed that antemortem, perimortem, and postmortem injuries were present among investigated bones. Blunt force injury was most common, hence findings will be of vital use in medicolegal investigations of deaths. Findings will also be useful to forensic anthropologists in creating a biological profile for an individual or group of people (Efe, J. O. J., Igho, O. E., & Mamuyovwi, U. J. (2021).

Fig 9: skull showing blunt force injury to head and face.Efe JO, Igho OE, Mamuyovwi UJ 2021;20(1):50.

Fig 11: Femur bone showing an area of delamination in perimortem injury 2021;20(1):50.

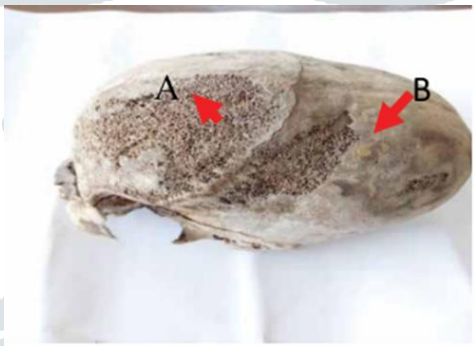

Fig 10: Skull showing perimortem injuries .Efe JO, Igho OE, Mamuyovwi UJ

Fig 11: skull showing post-mortem injuries .Efe JO, Igho OE, Mamuyovwi UJ 2021;20(1):50.

3. Types of Death and Comparisons:

3.1.Gunshot wounds:

Gunshot wounds occur when a bullet hits the body, producing injuries One of the most common causes of death and injury Severity of injuries depends on multiple factors, including the type of weapon and bullet and the affected body area May result in severe tissue and organ damage with sudden incapacitation, profuse bleeding, fractures, and death.

3.2.Suicidal:

in case of suicidal gunshots, the positions and directions of the wound are very important, the site of elections are (i) the temple (about 60%) (ii) the center of the forehead (iii) the roof of the mouth (iv) midline behind the chin (v)left side or front of the chest. A suicide using a revolver or a pistol usually shoots himself in the right temple bone. in rifle and shotgun the butt is usually supported by the ground and the weapon is fired by hand into the head. Gunshot suicide max observed in 64%men and 40%women Angle of shot and no of shots fired: in suicide, only single shot Presence of gunpowder residue in the hand of victims and weapon doesn't stay in the arm. (Am J Forensic Med Pathol 1999;20:1)

Suicidal Firearms Deaths			
Site	Handgun (%)	Rifle (%)	Shotgun (%)
Right temple	50.0	22.9	9.3
Left temple	5.8	3.3	3.7
Mouth	14.5	24.3	31.7
Forehead	5.9	15.7	8.1
Under chin	2.4	9.1	10.6
Back of head	3.6	3.8	1.2
Chest	13.2	15.7	19.9
Abdomen	1.4	1.9	5.6
Other	3.2	3.3	9.9

Fig 12: Suicidal exit gunshot wound

Fig 13: gunshot entry wound on skulls

3.3.Homicidal:

In the case of homicidal gunshot wounds, the location of entrance wounds is wide range depending on their circumstances, the bullet may strike the body in various places and at different angles if the victim runs most of the entry wounds are on the back if the victim rushes towards the assailant the wounds are on the front of the body. If the assailant is in a panic under strong emotion several shots may miss the target or grass the skin. Wounds on the sites and limbs are suggestions of murder. (J Forensic Sci 2015;60:1373)

Fig 14: multiple exit wounds in homicidal

Fig 15: multiple entry wounds in homicidal case

3.2.1. Stab or punctured wounds:

A stab wound is produced when force is delivered along the longer axis of a narrow or pointed object such as a knife, dagger sword, chisel, nail, needle, spear, arrow, screwdriver, or blade. Etc. in the depths of the body. The wound is deeper than its length and width on the skin. the characteristics that describe a stab wound are (i) margins (ii) length (iii) depth (iv) width (v) shape (vi) direction. (Int J Legal Med 2000;113:259, J Forensic Sci 2020;65:833)

3.2.2. Suicidal:

Suicidal incised wounds of extremities are usually found on the flexor surface of the wrists, the outer side of the left arm, and forehead, the front and outer side of the thighs, in the front of the abdomen and chest. Fatal incised wounds of the arm are almost always suicidal. Suicidal wounds of the chest are on the left side and directed downwards and inwards. A wound caused by running on a knife tends to be more horizontal in direction. A person who commits suicide usually exposes the portion of the body to be incised, for example, he may open his collar before cutting his throat, or pull up his shirt before cutting his chest or abdomen suicide usually does not injure the face. (Forensic Sci Med Pathol 2018;14:295)

The important features of self-inflected wounds are: (i) they are multiple and parallel nearly so, in any one area. (ii) they are uniform in depth and direction. (iii) they are relatively minor. (iv) The fatal wounds are present on several limited assessable areas of the body, such as the front of the neck, wrists, groin, and occasionally on the back of the legs or the chest. (v) hesitation marks or tentative cuts or trail wounds: they are cuts that are multiple, small, and superficial often involving only the skin, and are seen at the beginning of the incised wound.

Fig 16: suicidal cutting hesitation marks

Fig 17: Hesitation marks of suicidal case

3.2.3. Homicidal:

They are usually multiple and can occur in any region of the body. Wounds of the chest are present over a wider area and are more horizontal. They may be directed from below upward which is rarely seen in suicidal wounds. incised wounds situated on the back or in such a position as cannot be easily reached by a suicide are homicidal. Incised wounds on the nose, ears, and genitals are usually homicidal and are inflicted on account of jealousy or revenge in case of adultery, causing disfiguration. Cut-throat wounds cause immediate death from hemorrhage, air embolism, or inhalation of effused blood into the respiratory tract. Clothes are typically involved. Additional injuries are often present: Defense injuries, Active: on the palms of the hand in the

attempt of the victim to grab the blade Passive: on the dorsal or anterior aspects of the forearm or hands in the attempt of the victim to protect themselves from the blade. (J Forensic Leg Med 2012;19:207)

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Fig 18: Active homicidal defense wounds.**Lorenzo Gitto, M.D., Robert Stoppacher, M.D**

Fig 19: Passive defensive wounds .**Lorenzo Gitto, M.D., Robert Stoppacher, M.D**

Fig 20: multiple stab wounds **.Lorenzo Gitto, M.D., Robert Stoppacher, M.D**

3.3.1. Asphyxial deaths:

Asphyxia is a condition caused by interference with respiration or due to lack of oxygen in repaired air, due to which the organs and tissues are deprived of oxygen (together with failure to eliminate. Causing unconscious or death.

Suffocation: asphyxia due to the mechanical obstruction of the respiratory orifices or inadequate amount of oxygen in the environment (smothering, choking, confined spaces / vitiated atmosphere) (West J Emerg Med 2018;19:707)

Strangulation: asphyxia due to external compression of the neck using the body's weight or a force other than the body's weight (hanging, ligature strangulation, manual strangulation) (J Emerg Trauma Shock 2011;4:320)

Mechanical asphyxia: asphyxia due to impaired breathing secondary to the body being in an unnatural position or severe compression to the neck, chest, or other areas of the body that make respiration difficult or impossible (positional asphyxia, traumatic asphyxia, smothering, choking, and strangulation)

Drowning: asphyxia due to partial or complete submersion of the body in a liquid resulting in liquid inhalation, impairment of pulmonary exchanges, and oxygen deprivation (Acad Forensic Pathol 2018;8:8).

Special types: asphyxia that shows combined or unusual mechanisms. As below

3.3.2. Hanging:

Hanging is self-suspension is a form of asphyxia caused by the suspension of the body by a ligature that encircles the neck, the constricting force being the weight of the body. (Vieira et al., 1988; Sauvageau, 2009)

3.3.3. Suicidal hanging:

Hanging is a common method of committing suicide. A typical method of self-suspension is to attach a rope to a high point, such as a beam, window casing, ceiling fan, branch of a tree, etc. The lower end is formed into either a fixed loop or a slip knot just placed around the neck. (Demirci et al., 2009a) the victim stands on a stool, chair, or other platform and jumps off or kicks away the support due to which the body is suspended. Ligature marks may show a heterogeneous pattern due to several reasons (multiple loops around the neck, movements of the victim during strangulation, etc.)Autopsy findings (J Forensic Leg Med 2016;42:19): Ligature marks on the neck area and fingernail abrasions may be present, Internal findings are the same as manual strangulation but are less frequent, Facial congestion and cyanosis are more prominent than in manual strangulation, Ligature strangulation mainly results in venous total occlusion rather than arterial compression

Fig 21: Multiple loop marks. Lorenzo Gitto, M.D., Ponni Arunkumar, M.D.

3.3.4. Homicidal hanging:

It is extremely rare. It is difficult for a single assailant to carry it out, unless the victim becomes unconscious by injury or by drug, or it is taken unawares or is a child or a very weak person. Homicide should be suspected (i)where there are signs of violence or disorders of furniture or another object, (II) where the clothing of the deceased is torn or disarranged(iii) where there are injuries, either offensive or defensive. in all doubtful cases, circumstantial evidence is important. (Leg Med (Tokyo) 2011;13:259)

3.3.5. Case reports:

- A 2-year-old girl died of pacifier aspiration (Forensic Sci Int 2004; 141:73)
- 46-year-old man trapped between the rims of an automatically closing door of a supermarket (Arch Med Sadowej Kryminol 2006;56:61)
- A 48-year-old man was found dead with a ligature around the neck and another around the feet (J Forensic Leg Med 2012;19:434)

3.4. Drowning:

Drowning is a form of asphyxia due to the aspiration of fluid into air passages, caused by submersion in water or other fluid. complete submersion is not necessary, for submersion of the nose and the mouth alone for a sufficient period can cause death from drowning about 150,000 persons die from drowning each year around the world. Lindsey Harle, M.D.

3.4.1. Suicidal drowning:

in India, drowning is a common method for committing suicide, especially among women, more particularly in localities near the sea or river. suicidal drowning may be preceded by swallowing or poisoning, cutting the

throat, or other suicidal attempts. Injuries may be caused during falls, especially if the bodies are found in the wells.

3.4.2. Homicidal drowning:

Murder by drowning is very rare, except in the case of infants and children. A person may be pushed into a river or into a sea. Marks of strangulation or severe violence applied to the head are presumptive of homicide. Bruises are strongly subspinous signs of struggle or marks of violence on the body that are likely to be found in such cases. (Harle L. Drowning)

3.4.2.1. Antemortem drowning:

"Antemortem drowning" refers to the process of drowning that occurs while a person is still alive. It is the opposite of post-mortem drowning, which refers to drowning that is determined after death through a post-mortem examination or autopsy.

(i)External cadaveric spasm (ii)face froth (mouth and nose) (iii) internal: voluminous lungs (pulmonary edema) (iv) rib marking on lungs. (v)oedematous air sac (vi) hemorrhage present in ear and mastoid air cell(vii) diatoms present inside the bone (viii)no struggle marks. (ix0 water in the stomach(x) cerebral oedema.

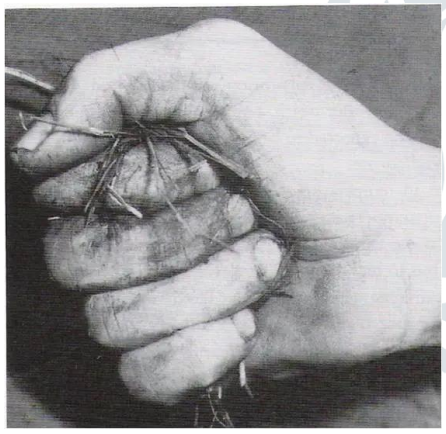

Fig 22: cadaveric spasm Lorenzo Gitto, M.D., Ponni Arunkumar, M.D.

Fig 23: face froth in antemortem drowning Lorenzo Gitto, M.D., Ponni Arunkumar, M.D.

3.4.2.2. Post-mortem drowning:

"Post mortem drowning" is the term used when a person is found dead in water, and the cause of death is confirmed to be drowning after a thorough examination, usually during an autopsy. It's crucial to distinguish between "post-mortem drowning".

(i)emphysema aquosum (ii) cadaveric spasm is absent. (iii) struggle marks present. (iv) absence of blood in the froth. (v)no water in the stomach. These are the major characteristics of the postmortem drowning sp(Harle L. Drowning).

4. forensic tools and techniques in postmortem examination:

Postmortem examinations, commonly known as autopsies, are critical in forensic medicine for investigating the causes and circumstances of death. In cases of suspected homicide or suicide, forensic pathologists conduct thorough postmortem examinations to gather evidence and make determinations regarding the cause and manner of death. Here's an overview of how postmortem examinations are conducted in homicidal and suicidal cases:

4.1.Homicidal Cases:

1) **External Examination:** It's crucial to document injuries and wounds on the body, and collect trace evidence like hairs, fibers, or gunshot residue. The internal examination should be conducted carefully to identify any injuries or trauma, and biological samples must be collected for toxicological analysis. It's equally important to analyze the injuries in detail to understand the extent of the damage. By following these procedures, we can ensure justice is served and the truth is uncovered. Determination of the nature, extent, and severity of injuries. Helpern, Milton. "The Postmortem Examination in Homicides." Am. J. Med. Jurisprudence 1 (1938): 165.
2) **Weapon Examination:** It is critical to identify and meticulously document any evidence related to weapons. Additionally, it is imperative to assess injuries thoroughly to determine if they align with a specific type of weapon. This approach can aid in identifying potential suspects and lead to a more successful investigation.
3) **Toxicological Analysis:** It is crucial to test biological samples for the existence of drugs, poisons, or other harmful substances. This helps in identifying and preventing potential harm to individuals and society. Helpern M. The Postmortem Examination in Homicides. Am. J. Med. Jurisprudence. 1938;1:165.
4) **Documentation and Photography:** It is essential to document findings thoroughly, with detailed notes and photographs. Equally important is the preservation of evidence, which can prove critical in legal proceedings.

4.2. Suicidal Cases:

1) **Psychological History:** Review the individual's mental health history and any known suicidal tendencies.
2) **External Examination:** It is imperative to document any self-inflicted injuries or wounds to ensure proper treatment. It is also important to identify any signs of hesitation marks or previous attempts, as they could be indicative of underlying mental health issues. Arango, Victoria, Mark D. Underwood, and J. John Mann.

3) **Internal Examination:**
4) It is crucial to thoroughly investigate any internal injuries and determine if they were self-inflicted. Additionally, it is important to search for evidence of drug overdose or poisoning to ensure an accurate diagnosis and appropriate treatment.
5) **Toxicological Analysis:** Testing for the presence of drugs or substances that may have contributed to the suicidal act.
6) **Psychological Autopsy:** In some cases, a psychological autopsy may be conducted to explore the individual's state of mind leading up to the suicide.

5. Conclusion:

5.1. Summary of key findings:

The main purpose of a medicolegal death investigation is to determine the cause and manner of death in types of death as mandated by law, including deaths that occur because of violence or suspicious activity or that are unexpected or unattended, as well as deaths with public health implications such as certain infectious disease processes.1 The forensic pathologist is responsible for the collection of evidence from the body, documenting injuries to the body, and deducing how these injuries occurred and the timing of the injuries as well as the time of death of the individual.2 However, determination of the cause and manner of death is rarely made by postmortem examination alone. Frequently, it is a process that involves the correlation of autopsy findings, examination of the scene and circumstances of death, the medical and social history of the decedent, and laboratory studies. Identification of a decedent is a pivotal point in a death investigation. The identity may reveal a motive for homicide, a psychiatric disorder pointing to a suicide, a medical history that may have been responsible for a sudden and unexplained death, or a history of high-risk recreational activities that may have resulted in an accidental death. If the possibility of uncertainty exists, the identity should be confirmed scientifically through fingerprint or dental comparison, comparison of antemortem and postmortem radiographs, or DNA analysis. Most deaths involving decomposed remains are referred to the office of the medical examiner or coroner because the cause and manner of death as well as the identity of the decedent are frequently not readily apparent at the scene. In such cases, forensic pathologists often rely on consultation with experts in other disciplines in the forensic sciences, including forensic anthropologists, odontologists, toxicologists, and radiologists, and less commonly with other specialists such as forensic entomologists, botanists, and behavioral scientists. He or she must also work closely with law enforcement and, in some cases, with other agencies such as social services.

5.2. Continued relevance in forensic science:

The medicolegal investigation of decomposed, mummified, skeletonized, mutilated, or incinerated remains therefore necessitates a multidisciplinary approach. Forensic anthropologists and odontologists, in particular, play crucial roles in the examination of decomposed remains. An anthropologist may be needed to determine

whether skeletal remains are human or nonhuman in origin. If the remains are indeed human, the anthropologist may then provide estimations of the age, sex, race, living stature, and other individualizing characteristics of the decedent such as skeletal changes resulting from natural disease processes or particular occupational or recreational activities. Identification of skeletal trauma and differentiation of antemortem and perimortem trauma from postmortem skeletal damage due to taphonomic factors such as burial, animal predation and scavenging, and weathering are also among the tasks of the forensic anthropologist. If antemortem dental records from an individual suspected to be the decedent can be located, the forensic odontologist can often provide identification. If no such records are available, the forensic odontologist can also provide an estimation of the age of the decedent through examination of the dentition, as well as information about trauma to the facial structures. In addition, any antemortem radiographs may provide the identification because any bone can have unique and individualizing morphologic characteristics. In cases in which no identifying information is available, a DNA sample can be submitted to the Combined DNA Index System (CODIS) for analysis. If a matching DNA profile is not found, the sample will be entered into the Combined DNA Index System database and maintained for future comparisons. Most decomposed and skeletonized bodies are found in rural or isolated settings in which the remains are not located for a period. The reported case is highly unusual in that the remains went undetected for almost 4 years, despite their location in the family home in a residential neighborhood that had been visited by county officials on multiple occasions. The mother and son had established a pattern of social isolation, undoubtedly contributed to by a language barrier and cultural differences as well as by the decedents' lack of relatives and the neurologic impairment of the son. When unlikely circumstances merge to create highly unusual death investigations, the medical examiner/coroner must use a multidisciplinary approach to the medicolegal investigation.

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