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STUDY OF ARTEFACTS MISLEADING IN DIAGNOSING CAUSE AND MANNER OF DEATH AND TIME SINCE DEATH

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ABSTRACT: INTRODUCTION: Misinterpretation of findings can only be corrected by proper gathering and presentation of evidence unless the scientific expert is aware of these artefacts which results in disastrous results. Artefacts are commonly encountered during autopsy procedure and during Forensic Science Laboratory procedures. Delay in autopsy will result more artefacts. **MATERIAL & METHODS:** Material used for this study was the cases brought to Forensic Medicine department for medico legal autopsy. The study period was one year from 1st January 2013 to 31st December 2013. Among 1150 cases of post mortem examination, 74 cases were observed in which artefacts from different reasons were present, which mislead the medical officers and investigation officers in the diagnosis of cause of death, manner of death and in estimating time since death. **OBSERVATIONS & DISCUSSIONS:** Artefacts constitute 5.13% of total autopsies and during summer season there were more artefacts chiefly due to changes of decomposition followed by Rigor mortis and other factors. **CONCLUSION & RECOMMENDATIONS:** After detailed study of artefacts, many recommendations were suggested to medico legal experts and Crime Investigating authorities to avoid possibilities of misinterpretations for correct diagnosis and opinions in relation to diagnosis of identification, cause of death, manner of death and estimating time since death. **KEYWORDS:** Artefacts, Autopsy, Misinterpretation, Medical officer, Investigation officer, Decomposition.

INTRODUCTION: "If evidence has been properly gathered and presented, a mistake in interpretation may always be corrected. When the facts required for a correct interpretation are not preserved, the mistake is irreversible." This was the statement by ALAN RICHARD MORTIZ, a Forensic Pathologist.¹ Thus artefacts exist in every branch of biological science and unless a scientific expert is aware of these artefacts, and is able to differentiate these artefacts, could result in disastrous results. The science of medicine is not an exclusion or exception for the science of artefacts and references regarding the artefacts are seen right from ancient medical scriptures to modern medical literature. To interpret the autopsy finding in proper perspective, which could result in a homicide or criminal going scot free or an innocent being falsely implicated; when these findings may prove contrary to what was originally believed to be.²

Every Forensic Pathologist who has performed Medico-Legal autopsies has encountered one or more situations in which the findings may prove contrary to which he originally believed upon because of artefacts.³ Artefacts encountered during the course of medico-legal investigation at the autopsy table, in the forensic science Laboratories and even on slides must be recognized and interpreted correctly. This is not as easy as it seems to be, for some Artefacts can simulate a real pathological or physiological change so closely that it might be extremely difficult for even the most experienced and skilled Forensic Pathologist and other Forensic Scientists to recognize the

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difference. Delay in postmortem examination gives the scope for more artefacts to mislead cause of death, time since death, manner of death, mode of death, reconstruction of crime etc.⁴

MATERIALS AND METHODS: The materials utilized for this study were obtained from the cases that were brought to the department of Forensic Medicine & Toxicology, Kurnool Medical College, Kurnool, A. P. The study period is one year i.e., from 1st January 2013 to 31st December 2013. These include deaths from violent, traumatic causes, chemical deaths and natural deaths. 1150 cases of post mortems were studied and the artefacts along with ante mortem and postmortem findings noted, photographs taken and significance assessed in relation to cause of death and their influence on other ante mortem findings.

The inquest in forms 146(1) and (11) brought by the police for the conduction of postmortem examination were studied carefully for various details such as history furnished, injuries, circumstances of death and where ever it was felt necessary enquiries were made with the investigating officers, emphasizing on the time and date of death being reported to them, place of retrieval of the body eg: water medium, open field, closed rooms etc, whether medical treatment was instituted prior to death, mode of transport, whether body was preserved in cold storage or not.⁵

In addition, special care was taken in cases where various features/ injuries on the body due to assault, accidents, burns cases, decomposition and animal activity which were labeled either as ante mortem in nature or postmortem, under various sections namely 174 Cr. P. C., 201- I.P.C., 302 - I.P.C., 304[A] -I.P.C. etc.,⁶

The postmortem examination was done in accordance with the standard procedures advocated in the textbooks.

The nature of the injuries or features whether ante mortem or postmortem was determined by examination with a hand lens, the characteristics of the injuries were studied carefully with reference to the presence or absence of vital reactions, wound edges, the site of the injuries, the overall state of the body and also by ascertaining the cause and mode of death that was determined after complete autopsy, chemical analysis report and histopathology report.⁷

Where ever necessary, in addition to the photographs taken by the police, photographs of interesting cases with respect to the study were taken and all the artefacts were grouped under different categories based of the causative factors as noted below:

- a) Physiological – during the process of dying.
- b) Resuscitative measures.
- c) Therapeutic artefacts
- d) Delay in subjecting the bodies for examination.
- e) Rough handling of the bodies- transportation artefacts
- f) Environmental factors – due heat or cold.
- g) Animal and insect activity.
- h) Improper storage of the bodies.
- i) Faulty dissection techniques.⁸

OBSERVATIONS: This study consisted of Out of 1150 medico-legal autopsies artefacts were encountered in 74 cases. The number of artefacts constitutes 5.13% of total autopsies [1150] conducted during the past one year from 1st January 2013 to 31st December 2013, which speaks of the importance of the study.

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Sl. No.	Month	Total Autopsies	No. of cases studied with suspected Artefacts	No. of cases with Artefacts
1	January	93	35	3
2	February	98	41	5
3	March	92	49	7
4	April	109	54	11
5	May	124	67	16
6	June	88	42	7
7	July	76	32	4
8	August	87	39	4
9	September	109	45	5
10	October	93	34	5
11	November	87	35	4
12	December	94	29	3
	Total	1150	502	74

Month wise statistical data are shown in Table (I) and Diagram I

Artefacts due to various factors enumerated in Table (II) have been included in this study, which shows that artefacts due to decomposition (35%) are the major contributor in one year, followed by breaking of rigor due to handling of the bodies in (19%), followed by artefacts in burns case (16%), artefacts due to animal and insect activity (15%), due to therapeutic and resuscitation artefacts in 12% and lastly due to faulty techniques in 3% cases respectively.

Artefacts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Decom position	-	1	3	4	7	3	2	2	1	1	1	1	26
Burns	1	-		2	2	1			1		1		8
Rigor mortis		1	1	2	2	-	1		1	1			9
Agonal			1						1		1		3
Animal & insect activity	1	1	1	2	2	1	1	1		2		1	13
Thera peutic	1	1	1		1	1		1		1			7
Resusci tation		1		1	2	1			1		1	1	8
Total	3	5	7	11	16	7	4	4	5	5	4	3	74

Monthly wise census of artefacts Table - II

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DISCUSSION: The analysis of the data shows that the percentage of artefacts due to Decomposition is high when compared to other factors, being more during summer season followed by rainy season and winter season.

This High Incidence can be attributed to the Factors that Accelerate the Putrefactive Process, namely:

- a) Warm environmental conditions
- b) Pre-Existing bacteremia
- c) Hypo volemic states as in exsanguinating injuries
- d) Delay in death being reported to the police
- e) Delay in subjecting the body for autopsy.
- f) Improper storage of the bodies
- g) Infestations by insects (Maggots)
- h) Gnawing by canines exposing cavities⁹

The process of putrefaction is essentially a fermentive process due to growth of microorganisms derived from alimentary canal, airway, skin but chief source of bacteria is from large bowel, which leads to elaboration of various foul smelling gases accompanied by softening of tissues due to enzymatic activity of bacteria and discoloration of the tissues.¹⁰

In this study, the wide spectrum of features produced by decomposition viz-bloating of body which can be misinterpreted as evidence of obesity, the combination of protuberant eyes, swollen lips, purged out tongue and purging of blood stained fluid from mouth and nostrils as a result of internal pressure of the gases and haemolysis which gives an erroneous impression of haemoptysis/haematemesis/asphyxial death/trauma to head and discharge of blood stained fluid from the genital orifices which can raise suspicion of an ante-mortem sexual injury were noted.

Further the Grooves/ Impressions produced around the neck by a tight collar or beaded chains which may be mistaken for strangulation marks, the patchy discoloration of the skin due to haemolysis and diffusion of hemoglobin which can be confused to ante-mortem bruising and the post-mortem blebs or fluid filled vesicles which may be misinterpreted as evidence of ante-mortem burning were commonly noted.¹¹

Estimation of time since death is important from medico-legal point of view, which is determined during autopsy examination by postmortem changes like immediate, early and late changes and presence or absence of rigor mortis

However Due to:

- a) Rough handling of the bodies during transport
- b) During removal of clothing from the body and
- c) While shifting the bodies holding the upper limbs, the rigor mortis may be broken at the shoulder or elbow which may lead to a false estimation of time since death but the presence of rigor in the jaw and lower limbs helps in rectifying the mistake. With reference to rigor mortis bodies which are preserved in the cold room are exempted.¹²

Presence of food particles in the respiratory passages may lead to a conclusion on death due to choking. However in this study and in the study conducted by Dr. Abdullah Fatteh, coincidental presence of food particles in the respiratory passages were seen in deaths with a distinctive cause

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viz- In Natural deaths due to coronary artery disease, in lung infections like pneumonia and in unnatural deaths due to Automobile accidents, asphyxial deaths as in hanging and in cases subjected to external cardiac massages.¹³

Absence of inflamed mucosa, tracheo-bronchial secretions and the mere presence of food particles in the upper respiratory passage which could not be seen in terminal bronchioles clinched the diagnosis and the findings were attributed as an Agonal artefact which accounted to 19%.

In this study post-mortem heat ruptures which occurs when the body is exposed to considerable heat, producing splitting of the soft parts as by cooking and which were of considerable length up to several inches and were superficial, in view of the possibility that an attempt has been made to dispose of the body by fire. In victim of wounds special care was taken in the interpretation of these changes which simulate incised wounds/ lacerated wounds. Heat ruptures were commonly noted over the shoulder blades, flexor aspects of both upper and lower limbs and over the front of thighs.

Heat fractures and charring of the outer table of the skull were encountered in some cases. Heat haematoma was not encountered in any.

The Contributing Factors to the High Percentage are:

- a) Self-Immolation being the common form of suicide.
- b) Homicidal burns as in dowry deaths
- c) Accidental burns sustained while cooking with kerosene pump stoves.¹⁴

Contribution from animal and insect activity accounted for 15%. Artefact due to ant-bite marks which resemble abrasion were the most common feature encountered, resulting in distinctive patterns of injuries which were dry, brown with irregular margins seen mostly over the moist parts of the body viz-around the eyes, armpit, groin, along the lining of clothes and in areas of hypostasis as in cases of hanging the oozing of blood from the bitten or ruptured petechiae over the lower limbs led to vertical streaks of blood staining the skin and soles of feet, also artefactual ligature marks were produced around the neck.

In bodies retrieved from water or aquatic environments. Loss of soft tissues due to the aquatic animal bites was seen around the eyes, lips, ear lobes and over the hands and feet.

Rodent activity resulted in loss of tissue mainly over the face and in one case the whole of the right eye and part of the tissue mainly over the nose were missing leaving characteristic teeth marks and also nibbling activity over the fingers and toes without any bleeding were seen.

An awareness of the existing fauna from where the body was retrieved viz-aquatic medium or open fields, presence of insects or maggots on the body and a knowledge of the distinctive characteristic produced by them with absence of extravasation of blood and a distinctive cause of death, helped in opining the features as post-mortem in nature due to animal or insect activity.

Multiple injection marks over the precordial region, defibrillatory marks simulating ring like contusions, extravasations of blood in the soft tissues of chest due to external cardiac massage and in one case fracture of the left side ribs over pre cardiac area with minimal contusions at fracture sites were noted. Presence of lubricant Xylocaine jelly for the passage of urinary catheter can be misinterpreted as seminal leak in female genital tract. Contusion caused by oxygen mask applied with force may mimic like smothering.

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A history of prior admission to hospital where resuscitative measures were taken up helped in opening them as artefactual. The percentage is 12%.

During the process of dissection, extravasation of blood in the neck tissues resembling ante-mortem extravasation of blood, Subluxation of cornua of hyoid bone and injury to the thyroid cartilage during the removal of the neck structures and injuries to the visceral organs viz-lungs, heart and liver by the dissecting knife were commonly noted and accounted for 3%.¹⁵

CONCLUSION: From the various artefacts observed, enumerated and discussed in this study, the essence lies in the recognition of pitfalls in the practice of Forensic pathology and separation of significant ante-mortem changes from the inconsequential post-mortem artefacts.

In Medico-legal cases misinterpretations may turn to have disastrous effects, particularly in an instance where homicide is a possibility one should be aware of the artefacts, for an autopsy finding is so important that it may make the difference between freedom and imprisonment for the life or death of some one.

Hence it is the duty of the Forensic pathologist to recognize and interpret the finding correctly or else misinterpretation or wrong conclusion may lead to:

- a. A wrong cause of death
- b. A wrong manner of death
- c. Undue suspicions of criminal offence
- d. A halt in the investigation of a homicide or Non-detection of a murder.
- e. Unnecessary spending of time and effort as a result of misleading findings.

In addition, it must be stressed that a mistake made by a pathologist in the interpretation of an artefact may haunt him later in the court, for many a lawyer knows about the pitfalls and may attempt to shake the testimony of a Forensic pathologist.

RECOMMENDATIONS:

To the Autopsy Surgeon:

1. Knowledge towards the existence of artefacts that may be encountered during routine autopsies.
2. To seek information from the investigating officers relevant to the case, emphasizing on the circumstances of death, time and date of death, place of retrieval of the body stressing on the surrounding environment and history of hospital admission prior to death.
3. Whether body was preserved in cold storage or not.
4. Care to the employed while shifting the body or during removal of clothing.
5. To adopt proper dissection techniques as advocated in the text books and make subtle charges which are indicative in certain cases.
6. To consult senior pathologists, documents, the features by photography and diagram before giving an opinion.
7. Organs/ tissues removed from the body for histopathology or chemical examination should be noted in the P.M. report and also if the body is subjected to embalming procedure, the same should also be entered.

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To the Police:

1. It is rather a common practice for the investigating officer to ask the Forensic pathologist to give the cause of the death in cases of decomposition.
2. The Post-mortem examination should be conducted at the earliest for if the body is decomposed, the duty of the pathologist is increased to correctly recognize the features an Ante-mortem or post-mortem and will not be able to provide much information and the very purpose of conducting the autopsy will be defeated.
3. The majority of the mortuaries in Government hospitals and District hospitals are still in primitive stage without adequate light, ventilation, abundant water supply and facilities for preserving the body.
4. The necessity for improved mortuary services has always been stressed by the investigating officers. Hence, a police mortuary or improvement of the cold storages in the morgues, where in dead bodies can be preserved for at least 30 days in a freezer with a capacity hospitals should be made.
5. Just like the Heart, Brain and Lungs is the tripod of life, modernization of investigation by improving the police force and forensic science laboratories alone will not bear any good results in an investigation of death as indicated by the poor acquittal rate which is less than 20% in our state. Unless the forensic medicine department is improved to an equal standard and a proper interaction and Co-ordination of the three agencies involved in medico-legal work are made accessible, the collection of the material required to establish the corpus-delicti will be difficult. Hence:
 - 1) Visiting the scene of occurrence by the forensic pathologist.
 - 2) Proper storage of bodies for decomposition leads to difficulty in Identification of the person and also in interpreting the features/ Injuries.
 - 3) Subjecting the bodies for autopsy at the earliest.
 - 4) Faster analysis of the visceral organs sent for chemical analysis.

The above recommendation may help in reducing the mistakes and may aid in the proper investigation of a crime.

REFERENCES:

1. Alan R. Moritz – animal activity after death. Pathology of trauma. Edited by J. K. Mason chapter – 18, Pages 227-231.
2. Erry Man. H. E. et.al. – University of Tennessee, Journal of Forensic Medicine. Pages 230-237. (Jan 1991)
3. Curry – Poison Detection In Human Organs, II Edition. (1969); 19.
4. Dr. Abdullah Fatteh – artefacts in forensic pathology, (1996); 42-71.
5. Erben and Nadrolnik – The quantitative demonstration of Air embolism in certain cases of fatal trauma. Journal of Forensic Medicine. (1963); 45-50.
6. Forney et.al. – Mercury content of Human tissue from routine autopsy material. Page 292 (1949).
7. Grellner et.al. – Quantitative alteration of DNA content in strangulation is an artefact. Forensic Science International. Pages 15-20 (Sep 1997).
8. Gonzales et.al. – Legal Medicine Pathology and Toxicology. II Edition. (1954); 61.

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9. Gerald et.al. – Postmortem skeletal lesions, Forensic Science International. (Mar 1997);155-156
10. Huglund W. D. – Contribution of Rodents to postmortem artefacts of bone and soft tissues. King county medical examiner's office, Seattle U.S.A. journal of Forensic Science. Page 6 (Nov 1992).
11. Huglund W. D. – Analysis of human remains recovered from aquatic environments. King county medical examiner's office, Seattle U.S.A. Journal of Forensic Sciences. Page 38 (July 1993).
12. Kibayash K, Tobata N. et.al. – Immunohistochemical demonstration of bleeding in decomposed bodies by using anti-glycophorin-A, monoclonal antibody. Japan – Forensic Science International. Pages 1-8 (Jan 1997).
13. Kemi M, Nomura Y. et.al. – Japan – Journal of Experimental Animal. Pages 44-46 (July 1995).
14. Mirza F. H. Makhdoom et.al. – Importance of correct interpretation of postmortem artefacts in medico-legal autopsies. Journal of Pakistan Medical Association. Pages49-50 (1998).
15. Maschka – The plastic, elastic and contractile deformation of the heart muscle in rigor mortis. Journal of Forensic Medicine. Pages 148-167 (1964).

Fig. 1: Putrifactive colour changes mimicking like contusions.

Fig. 2: Decomposition peeling.

Fig. 1

Fig. 2

Fig. 3: Postmortem wounds by maggots.

Fig. 4: sutural separation due to putrefaction.

Fig. 3

Fig. 4

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Fig. 5: Ant bite marks mimicking like abrasions.

Fig. 5

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