MedCrave
Step into the World of Research

International Clinical Pathology Journal

Mini Review

Open Access

CrossMark

Guiding principles and laws in the interpretation of postmortem findings

Abstract

The postmortem examination is fundamental to the practice of medicine. This important aspect of medical practice is crucial for the understanding of principles of medicine and pathophysiologic phenomena. The autopsy is however bedeviled by subjectivities which are largely tied to the attending pathologist's experience and idiosyncrasies. Subjective rather than objective deductions may lead to wrong conclusions with far reaching consequences in the adjudication of justice and public health issues. It is therefore highly imperative to have ground rules, laws and principles by which observations can be interpreted appropriately; devoid of the whims and caprices of specialists in anatomic pathology.

Volume 6 Issue 6 - 2018

Akinwumi Oluwole komolafe
Department of Morbid Anatomy and Forensic Medicine, Obafemi Awolowo University Teaching Hospitals Complex, Nigeria

Correspondence: Akinwumi O Komolafe, Department of Morbid Anatomy and Forensic Medicine, Obafemi Awolowo University Teaching Hospitals Complex, Ile-Ife, Osun State, Nigeria, Tel +234 8033557741, Email akinkamol@yahoo.com

Received: November 13, 2018 | **Published:** November 27, 2018

Introduction

The postmortem examination stands out as a classical investigation and gold standard to reveal hidden details of patients' antemortem care, pathophysiological derangements and associated challenges with overall management decisions on the patient.[1] It is a highly specialized surgical procedure that consists of a thorough examination of a corpse to determine the cause, circumstances of death and manner of death as well as evaluate any diseases or injuries that may be present and the contributions of such diseases to the process of death and concluding with appropriate interpretations, wholesome documentation and proper preservation of exhibits or evidence of the findings of the postmortem examination. The postmortem serves to evaluate among other things the competence and skills of attending physicians, peculiar atypical presentations to learn from, the sensitivities of the investigating equipment such as radio-imaging and point of care devices.[2,3] The requirements at every autopsy session differ depending on the type of autopsy. The class of autopsy defines the autopsy questions to be answered. The fundamental objectives of the clinical or academic autopsy include ascertaining the nature of the disease process or exact aetiology, the stage of the disease, the extent of the spread of a malignant process, explaining reasons for variations or departure from known associated or predictive and expected morphologies, establishing the cause of death, enumerating the factors contributing to death such as staff and institutional culpabilities and any medico-legal issues raised by the autopsy among other things.[4–6] Every case handled by the pathologist carries a latent virulent medicolegal potential which all physicians and pathologists should be aware of.[2,3]

The highlights of a forensic or medicolegal autopsy include ascertaining the identity of the deceased, documenting the means of identification, determining the manner or circumstances of death, establishing the pathophysiological mechanisms by which death occurred, the anatomo-pathophysiological correlations of all details of the autopsy to establish succinctly the initiating events and systematic documentation of the chronology of events that culminated in death as well as concluding with an opinion on the exact cause of death.[7] It is pertinent to state that the coroner's autopsy is a tool authorised by the legal authorities instructing pathologist with requisite documents to duly represent the legal interests of the coroner.[8] The postmortem report is just one of the portions of the overall evidence in case before the law court.[9] The report is only relevant to the law if it addresses the facts of law.[10,11] Thus the conclusion at every autopsy session is a blend of different factors such as the nature of autopsy (since the fundamental objectives of the clinical autopsy and medico-legal autopsy differ), the extent of the autopsy, the contribution of co-morbidities, the histomorphology of lesions and the experience of the pathologist among other factors. The afore-mentioned factors then play out in the ultimate decisions on the variables of the case. The subject of anatomical pathology is fundamentally an observatory discipline with variable subjectivities and quantifications or qualifiers such as mild, moderate or severe in order to indicate the severity of pathology; ultimately depends to a large extent on the cumulative experience of the pathologist. The pathologist therefore must have a systematic approach to dissection of the corpse, careful observation, sober reflections and wholesale integration of all available facts and evidence for succinct interpretation in order to re-write the story from the findings on the corpse to further reverse interpretation to the initiating disease or circumstances of death. Failure of diligent prosecution of every case on its merit and strict commitment to scientific principles may make the pathologist succumb to his human frailties and peculiar vulnerabilities of willful personal interpretations of universal truths, long-held values, unverified anecdotal information and obsolete misnomers and comical professional indoctrinations, assimilated during training. In order to avoid deliberate misinterpretation of findings for self-serving interests or twist of facts due to the whims and caprices of individual attending pathologist, it is absolutely necessary and highly imperative to lay down the ground rules and establish unassailable laws to guide the conduct and interpretation of autopsy findings. This paper is thus meant to intimate pathologist and all physicians with the laws that guide the interpretation of findings on postmortem examination, thus emphasizing objectivity rather than subjectivity and thus maintain the role of medical science in guarantying fairness, justice and equity in matters related to patients' care antemortem and postmortem.

The interminable relationship between anatomical pathology and clinical medicine

Anatomic pathology is basically investigative science that has

its firm foundations in the knowledge of core anatomy couples with preservation of these anatomical structures in unflawed tissue biochemistry and physiology. The discipline of Morbid Anatomy or Anatomical Pathology is essentially about recognizing lesions, interpreting them correctly at the macroscopic and microscopic levels and relating them appropriately to diseases.[12] Lesions are the structural alterations seen in tissues as a result of the disease process. Thus, anatomical pathology defines the reason for the 'dis ease' that is the suffering or discomfort in patients. It is essentially the evidence of the negative impact of the injurious agent on the tissue. The cell is known to be the basic unit of life and the tissue is constituted by cells having related functions. The natural habitat of the disease processes; the aetiology, evolution and progression is the cell. The cell continues to perform its functions at various degrees of capability as it finds itself able to adapt to negative situations and maintain homeostasis. Each cell's preserved structure guarantees preserved biochemical constitution and therefore its routine/day to day functioning. A compromise in structure without resolution or failure of homeostasis automatically leads to poor biochemistry of the cells and poor functioning. Tissues with related or complementary functions constitute organs and organs with related functions and contributory physiological relationships constitute organ systems which essentially make up the whole human being.

Distorted structure (Abnormal Anatomy)→Abnormal biochemical constitution (Abnormal Biochemistry → Anomalous function (Abnormal Physiology or Pathological physiology/pathophysiology) → Diseases/Disorders with variable clinical manifestations. Thus the subject of anatomical pathology is the bridge between the basic medical sciences and the clinical sciences (that is the basis for changes seen as the body departs from normal structure due to compromised anatomy, biochemical and physiological functions and the expression of the disease process seen in clinical practice)

The subject of anatomical pathology seeks solutions by endeavoring to answer questions generated by contextual cases and events with a view to resolve mysteries and clarify controversies. Such crucial questions include:

A. What are the structural changes observed during autopsies in individual tissues and organs of the body?
B. What disease or disease conditions impact these structural changes?
C. Are the structural changes in individual tissues and organs of the body related?
D. Can the structural changes in individual tissues and organs of the body be explained by a single disease process or is this a syndrome?
E. What are the evolutionary events from tissue insult to the lesions that is the pathogenesis?
F. What is the pathophysiology? How does this pathological event create abnormal functioning with resultant afflictions in the patient?
G. What unique structural alterations/lesions occur in tissues that pinpoint the initiating disease process that led to the cascade of events?
H. How may we rule out differential diagnoses of the lesions expressed in the tissues in order to resolve the potential conflict of making wrong diagnoses (conflict resolution of overlapping structural changes that may be seen in many diseases?
I. What are the overall attributes of this unique lesion: the morphology (the study of appearances in this case the structure in all entirety? This includes the site of occurrence (location), shape, colour, size (dimensions), consistency, secondary changes among other findings.
J. The stage of the disease process (the extent of the disease) as at the time of death
K. Functional significance or clinical correlation (clinic pathological correlation)
L. The interplay of factors/circumstances that could possibly modify or modulate the disease process. These include co-morbidities, syndromic associations, synchronous and metachronous tumours.
M. What are complications of the disease condition?
N. What are complications of treatment?
O. What are the incidental findings?
P. What is the exact cause of death indicating the proximate, intermediate and the immediate cause of death?
Q. Changes seen at autopsy depend on the stage of the disease and the expected clinico-pathological expressions/manifestations of the disease process in organ-systems according to the age of the patient.

Absolute indicators for proper interpretation

The following are things to pay attention to during autopsies and subsequent sober and diligent interpretation:

a) An external general examination consistent with the disease process such as the definite lesions, sine qua non, habitus of a genetic disorder or syndrome.[13,14]
b) Weights – significant departure from the accepted norm[15]
c) Definite lesion/classic lesion/structural change–metastases, presence of tissues in abnormal location.[16]
d) Complementary/established relationships: cardiovascular system (CVS)-Liver- Spleen in chronic venous congestion; liver and splenomegaly in liver cirrhosis and portal hypertension.[17,18]
e) Lesions that correlate with one another and are clearly established in literature: pyogenic meningitis and Waterhouse Friderichsen syndrome (haemorrhagic adrenalitis or fulminant meningococcemia).[19]
f) Colour alterations or changes no matter how subtle–synthesized substance such as melanin, degenerative changes seen in leiomyomas due to necrobiosis in pregnant females, greyish white changes in infarcts. There are also specific colours in some lesions: geographic patterns and differential discolorations in nutmeg liver of chronic venous congestion, golden yellow colour in renal cell carcinoma and carcinoma of the prostate.
g) Definite location known to be consistent with literature- renal cell carcinoma, kidney in the pelvis – horse shoe kidney, benign cystic teratoma and its contents of teeth, hair, bone etc[20]
h) Shape- peculiar shape – shape of the heart in some disorders such as egg shape in transposition of the great vessels or horse shoe shape in the tetralogy of Fallot.[21]
i) Relocation or abnormal location–situs inversus, dextrocardia, horse shoe kidney[22]
j) Histo-morphology confirming microscopic appearance–harmatoma, choristoma, teratoma.[23–25]
k) Altered anatomy- malrotations, developmental anomalies.[26]
l) Contextual interpretation–haemorrhagic in shock, compressive atelectasis in the setting of mass or fluid in the pleural cavity.[21]
m) Evidence of failure of full embryological development–tracheo-oesophageal fistula, renal agenesis etc.[27]

In order to avoid willful or inadvertent interpretation of autopsy findings of all types in all circumstances, I propose the following

Citation: Komolafe AO. Guiding principles and laws in the interpretation of postmortem findings. *Int Clin Pathol J.* 2018;6(6):186–190.
DOI: 10.15406/icpjl.2018.06.00186

laws and affirm the sole authorship of these laws and the absolute originality of these over dozen laws; applicable to the universal practice of clinical and forensic autopsies across all climes.

The classes of laws are:

a) Absolute laws
b) Substitutionary or exclusion law
c) Relative laws
d) Reactionary laws
e) Circumstantial laws
f) Revelation law

The laws guiding the interpretation of findings at autopsies

Absolute laws

i. The weight disparity law: The law states that "for any significant difference in weight, there is a pathology" ("nihil autem fit in solutidine")
ii. The law of absoluteness or all or none law: The law states that "the lesion that is pathognomonic or typifies a disease process must always be present in order to affirm that the disease occurred.
iii. The lesion-pathology law or structural alteration pathology law: The law states that "the presence of a lesion or structural change in tissues depicts a pathological process".
iv. The absent/subtraction and additional portions law: The law states that "absence of portions and additions of portions or parts to a tissue or organ depicts a disorder.

Reactionary laws

I. The pathogenetic sequence law: The law states that "Every lesion upon exhibiting has patterns, has predictable origins and progressions.[28]
II. The complementary lesion law: The law states that "organ findings in related pathologies of similar aetiologies have complementary lesions in other organs"
III. The anatomic relationship law or anatomic conformity law: The law states that "in anatomically related organ systems, the expression of lesions are inevitable when stages have been taken into consideration"

Circumstantial laws

The stage expression law: The law states that "only the lesions as per stage of the disease process will be seen" The initiating disease law or circumstances law: The law states that "every disease condition is defined by its predictive lesions". Though related to the pathogenetic sequence law; this law is different because there is specific pattern of progression of diseases and known sequelae. The lesions betray the initiating disease and circumstances.

Substitutionary law or law of exclusion

The law of mutual exclusion: The law states that "if a unique or definitive lesion was absent, then the pathology or circumstance it represents did not occur"

Revelation law

The microscopy/histomorphology law: The law states that "Microscopic examinations of hidden, unclear gross lesions or controversial lesions are absolutely revealed only if representative sections have been taken".

Relative laws

The arrested pathogenetic sequence law: The law states that "the absence of lesions, may be due to surgical interventions, use of drugs or peculiar circumstances of the patient such as genetic, race, healed or burnt out lesion etc". The modifier or pattern alteration law: The law states that known pathogenetic sequence of disease could be altered by factors such as genetics, pre-morbid condition. Examples include HbSS patients with thalassemias, an on-going infective process; an example being tuberculosis and accompanying or co-existing with a fungal infection or a superimposed bacterial infection. A coroner's autopsy needs to be critically assessed by the pathologist to avoid any miscarriage of justice.[29–32] The circumstances of death should be clearly and systematically documented.[30,33,34] The onus is on the pathologist to obtain and preserve evidence to prove the cause of death and mechanisms of death in relation to the circumstances of death beyond all doubts.[2,3]

Expected morphological features in autopsies generally

A. The autopsy is essentially a study of appearances that is morphology of organs and conscientiously relating them to specific disease processes or most probable circumstance in which they occurred.[3,35,36]
B. Possible findings include:
C. Morphology of the disease process that caused the various structural and dysfunctional or pathophysiological changes that resulted in death that is the primary disease or initiating disorder. The initiating event is applicable for a forensic autopsy.
D. Morphology of the predisposing disease condition predating the primary disease process causing death.
E. Morphology of the complications of the primary disease that precipitated the changes and sequence of events resulting in death.
F. Morphology of the complications of treatment.
G. Morphology of the iatrogenic injuries
H. Morphology of the syndromic associations
I. Morphology of incidental findings. Incidental findings are chance findings that do not in any way contribute to the disease progression or death. If they contributed to death in any way, then they are not incidental findings. They are then regarded as part of the primary disease process or its complications.
J. Morphology consistent with old age or age related findings. There may be presence of structural changes that could result in death in old age. A change consistent with old age should therefore not be seen as a pathological lesion.
K. Morphologies that constitute non-specific changes and thus inconsequential or inconclusive. The anatomical pathologist is expected to make a clear distinction between all the above morphologic features and relate them carefully, systematically and scientifically to the circumstances of death. Therefore efforts should be made to tie anatomo-pathological findings with the pathophysiologic basis.

Reporting on the coroners' autopsy

The coroner's autopsy report is a potential legal document which is quite sensitive.[3] It betrays the competence or otherwise of the anatomical pathologist, medical practitioner or practicing forensic pathologist who the law sees as a medical expert in this case and whose judgment and opinions carries significant weight in the law court.[37] He may be summoned to court to give evidence-in-chief. The expectation from the anatomical pathologist, medical practitioner or practicing

forensic pathologist is thus very great. He is therefore expected to be truthful, unbiased, unassuming, scientific in his judgment, evidence based with no vain extrapolations and avoid contradicting himself.[38–40] Highlights of a legally foolproof and professionally sacrosanct medicolegal report

The main points of a legally sacrosanct coroner's report include the following with due diligence and systematic approach in dissection and interpration,[2,3]:

a) Flawless biodata: Flawless biodata is very essential in law for legal reasons. A mistake in biodata documentation may be used to the negative advantage by the defense counsel. A mistaken identity or age or sex of the corpse on which the autopsy is conducted may make the evidence invalid.
b) Make a well-guarded and well-constructed opening statement to establish the cause of death beyond doubt such as death was due to injuries sustained in a road traffic accident or death was due to natural disease or misadventure.
c) Simplify the medical terms into simple lay man's terms as much as possible so that it will not appear ambiguous.
d) A clearly supportive general external examination as carefully and diligently observed on the corpse
e) Define the injuries, both external and internal causing death
f) State the mechanisms by which the injuries caused death that is establishing the pathophysiology of death.
g) State the likely circumstances in which the injuries occurred
h) State the co-morbidities present and their likely contributions or otherwise to the process of death.
i) List pertinent negatives; that is any other diagnoses that could conflict with your judgment and steps taken to rule them out.
j) List any diagnostic tests conducted at autopsy to confirm your suspicions or rule them out.
k) Include pertinent autopsy histology results.
l) Include pertinent toxicology results.
m) Include visual documentation such as photographs or video recording of the postmortem process.

The conclusion of the pathologist as a summary of his overall integration of his findings and final opinion

The Pathologist's opinion about the cause of death should be a concise and precise summary of his systematic documentation well integrated within the context of science. Issues should be clearly related together without contradictions.[37] The anatomical pathologist, medical practitioner or practicing forensic pathologist need to be conversant with issues of medicolegal importance on his case and within his jurisdiction of practice.[41] All issues germane to the report should be conscientiously attended to by the pathologist in the written coroner's report as well as when presenting the evidence in the law court (Evidence-in-Chief and cross-examination).[37] The opinion of the pathologist is essentially one of the most crucial evidence in court cases. The weight given to such medical evidence is the sole prerogative of the court.

Acknowledgments

None.

Conflicts of interest

The auhtor declares there is no conflicts of interest.

References

1. Underwood J. Post-mortem imaging and autopsy : rivals or allies? *Lancet*. 2012:379(9811):100–2.
2. Komolafe AO, Titiloye NA. Litigations in Medical Practice. *Niger J Fam Pract*. 2015;6(1):1–4.
3. Komolafe AO, Titiloye NA. The role of the pathologist in medical litigations. *Niger J Postgrad Med*. 2009;2(1):18–25.
4. Winters B, Custer J, Galvagno SM, et al. Diagnostic errors in the intensive care unit: a systematic review of autopsy studies. *BMJ Qual Saf*. 2012;21(11):894–902.
5. Graber ML. The incidence of diagnostic error in medicine. *BMJ Qual Saf*. 2013;22(SUPPL.2):21–7.
6. Schwanda Burger S, Moch H, Muntwyler J, et al. Diagnostic errors in the new millennium: A follow-up autopsy study. *Mod Pathol*. 2012;25(6):777–83.
7. Brinkmann B. Harmonisation of medico-legal autopsy rules. *Int J Legal Med*. 1999;113(1):1–14.
8. Carpenter B, Tait G. The Autopsy Imperative: Medicine, law, and the coronial investigation. *J Med Humanit*. 2010;31(3):205–21.
9. Loar C. Medical knowledge and the early modern English coroner's inquest. *Soc Hist Med*. 2010;23(3):475–91.
10. Ginsberg M. The Confrontation Clause And Forensic Autopsy Reports — A Testimonial. *La L Rev*. 2013;74(1):1–104.
11. Foucar E. Pathology expert witness testimony and pathology practice: A tale of 2 standards. *Arch Pathol Lab Med*. 2005;129(10):1268–76.
12. Komolafe A, Titiloye N, Omonisi A. The histopathology report. *Niger J Postgrad Med*. 2009;2(1):26–33
13. Lorin de la Grandmaison G, Fermanian C, Durigon M. Analysis of discrepancies between external body examination and forensic autopsy. *Am J Forensic Med Pathol*. 2008;29(1):40–2.
14. Burton JL. The external examination : An often-neglected autopsy component. *Current Diagnostic Pathology*. 2007;13(5)357–65.
15. Fedrick J. Neonatal Deaths. *Neonatology*. 1971;18(5–6):369–78.
16. Wolbach SB. A New Type of Cell Inclusion, Not Parasitic, Associated With Disseminated Granulomatous Lesions. *J Med Res*. 1911;24(2):243–61.
17. Okuda K, Kong K, Ohnishi K, et al. Clinical Study of Eighty-six Cases of Idiopathic Portal Hypertension and Comparison With Cirrhosis With Splenomegaly. *Gastroenterology*. 1984;86(4):600–10.
18. Primignani M, Carpinelli L, Preatoni P, et al. Natural history of portal hypertensive gastropathy in patients with liver cirrhosis. *Gastroenterology*. 2000;119(1):181–7.
19. Wassum JA, Batalis NI. Waterhouse-Friderichsen Syndrome. *Acad Forrensic Pathol International.* 2013;3(3):344–345
20. Patel J, Sheppard MN. Pathological study of primary cardiac and pericardial tumours in a specialist UK Centre: Surgical and autopsy series. *Cardiovasc Pathol*. 2010;19(6):343–52.
21. Papadakis M, Raju H, Behr ER, et al. Sudden cardiac death with autopsy findings of uncertain significance: Potential for erroneous interpretation. *Circ Arrhythmia Electrophysiol*. 2013;6(3):588–96.
22. Griffiths PD, Paley MNJ, Whitby EH. Post-mortem MRI as an adjunct to fetal or neonatal autopsy. *Lancet*. 2005;365(9466):1271–3.
23. Roulson J, Benbow EW, Hasleton PS. Discrepancies between clinical and autopsy diagnosis and the value of post mortem histology; a meta-analysis and review. *Histopathology*. 2005;47(6):551–9.

24. Shen-Schwarz S, Neish C, Hill LM. Antenatal ultrasound for fetal anomalies: Importance of perinatal autopsy. *Fetal Pediatr Pathol*. 1989;9(1):1–9.

25. Murray J, Kielkowski D, Leiman G. The prevalence and age distribution of peripheral pulmonary hamartomas in adult males. An autopsy-based study. *S Afr Med J*. 1991;79(5):247–9.

26. Thayyil S, Robertson NJ, Sebire NJ, et al. Post-mortem MR and CT imaging in fetuses, newborns and children : an evidenced based approach. *Diagnostic Histopathol*. 2010;16(12):565–72.

27. Batt RE, Yeh J. Müllerianosis: Four developmental (embryonic) müllerian diseases. *Reprod Sci*. 2013;20(9):1030–7.

28. Katz IN, Goldman AM, Langendorf R, et al. The Diagnostic Value of the Electrocardiogram based on an analysis of 149 Autopsy Cases. *Am Heart J*. 1942;24(5):627–52.

29. Cordner S. Forensic pathology and miscarriages of justice. *Forensic Sci Med Pathol*. 2012;8(3):316–9.

30. Wadee SA. Forensic pathology--a different perspective: investigative medicolegal systems in the United States. *Med Law*. 1994;13(5–6):519–30.

31. Frank H, Bcom I, Hamilton G. The Goudge Inquiry and the role of medical expert witnesses. *Can Med Asso J*. 2010;182(1):53–6.

32. Davis JH. Mistakes and Failures in Forensic Pathology. *Acad Forensic Pathol*. 2011;1(4):382–5.

33. Sharma BR, Gupta M, Bangar S, et al. Forensic considerations of missed diagnoses in trauma deaths. *J Forensic Leg Med*. 2007;14(4): 195-202.

34. Dettmeyer R, Preuß J, Madea B. Malpractice — role of the forensic pathologist in Germany. *Forensic Sci Int*. 2004;144:265–7.

35. Komolafe AO, Titiloye NA. Essentials of Autopsy Pathology. *Niger J Fam Pract*. 2016;7(1):7–14.

36. Komolafe AO, Titiloye NA. Autopsy Pathology: General Principles and Interpretation. *Niger Clin Rev J*. 2008;71(2):31–3.

37. Obafunwa JO, Ajayi O, Okoye MI. Medical evidence and proof of cause of death in Nigerian courts. *Med Sci Law*. 2018;58(2):122–34.

38. Melinek J, Thomas LC, Oliver WR, et al. National Association of Medical Examiners Position Paper : Medical Examiner , Coroner , and Forensic Pathologist Independence. *Acad Forensic Pathol*. 2013;3(1):93–8.

39. Bove KE, Iery C, Autopsy Committee, College of American Pathologists. The role of the autopsy in medical malpractice cases, II: controversy related to autopsy performance and reporting. *Arch Pathol Lab Med*. 2002;126(9):1032–5.

40. Chadwick DL, Krous HF. Irresponsible testimony by medical experts in cases involving the physical abuse and neglect of children. *Child Maltreatment*. 1997;2:313–21.

41. Hanzlick RL. A Perspective on Medicolegal Death Investigation in the United States : 2013. *Acad Forensic Pathol Int*. 2014;4(1):2–9.

Citation: Komolafe AO. Guiding principles and laws in the interpretation of postmortem findings. *Int Clin Pathol J.* 2018;6(6):186–190.
DOI: 10.15406/icpjl.2018.06.00186