

CASE REPORT

Beyond the Gross: Unveiling the Microscopic Truth in 3 Autopsy Cases

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ABSTRACT

Histopathology, the microscopic examination of tissues, is a keystone of the autopsy examination, providing critical understandings outside what can be observed with the gross examination. In medicolegal autopsies, where the cause and manner of death may be unclear or contested, histopathology plays an especially vital role. This case series emphasizes the important role of histopathological examination in medicolegal autopsies. We present three cases where microscopic tissue exploration through histopathology provided essential information that significantly impacted the final determination of the cause and/or manner of death. In the first case, histopathology revealed subtle myocardial changes indicative of a previously unsuspected cardiac event. The second case demonstrated the utility of histopathology in distinguishing death due to rupture of hepatic cyst from alleged death due to blunt trauma. Finally, the third case highlights how microscopic evaluation identified a lethal but grossly undetectable disease process related to amniotic fluid embolism in a postoperative case. These cases illustrate that histopathology is a crucial tool in medicolegal investigations, often providing critical evidence that macroscopic gross examination alone cannot.

KEYWORDS

• Histopathology • Allegation • Embolism • Hydatid cyst • Manner of death

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INTRODUCTION

Histopathology forms an important part of medicolegal autopsies, which are performed to determine the cause of death in cases where the death is violent, suspicious, or otherwise not clearly explained.¹ Indeed, the very word "autopsy" is derived from the Greek roots for "to see for oneself" and refers to the examination of a body postmortem to uncover diseases and ascertain the cause of death (COD).² Though there are clinical, anatomical, and virtual autopsies, this discussion is on medicolegal, which is termed as forensic histopathology, and is legally required in unnatural deaths.

Forensic histopathology is a very significant branch of Forensic Medicine. It deals with the microscopic breakdown of various alterations at cellular/tissue level highlighting the cause of death, solving a gross ambiguity or even a crime mystery.³ It is a microscopic analysis and detailed study of tissues of the deceased. To be a thorough histopathologist, one has to be knowledgeable in handling microscopes and histo-techniques.⁴

Additionally, it makes a confirmation of diagnoses already made, ascertains a diagnosis of disease, and gives key evidences regarding the mode of death. Histopathological examination is done through a study of tissue samples under the microscope in order to detect cellular and tissue changes, which may be missed on gross examination; this is more so when the nature of death is in doubt. But the question of whether routine histopathological examination in medicolegal cases is necessary and effective is debatable, and many studies on this fact say it does not alter the determination of the cause of death significantly.⁵

Even if there are differing opinions about the usefulness, histopathology is indeed a concurrent part of forensic investigation. It goes a long way in making the pathologist comprehend the pathological conditions that might be on going during the death, hence doing good for both legal and medical knowledge about him.⁶ This blend of histopathological findings with the clinical data maximizes the accuracy of death inquiry and gives strength to the judiciary system with objective evidence that can make clear the manners of one's death.⁷

Here we present three cases where there were allegations of murder, criminal

negligence, surgical negligence leading the deaths which were alleged to be unnatural, but autopsy findings were negative for any unnatural cause of death and histopathology reports were suggestive of obvious pathology leading to the death in these cases.

Case no. 1

A 58-year-old male was brought to casualty of Government Medical College & Hospital with the history of assault by a group of boys and thereafter ran away from them, and while running collapsed suddenly. On admission, patient was unresponsive, pulse and BP was not recordable and ECG was flat, and so he was declared as brought in dead. He was a known hypertensive since 10 years. After receiving autopsy requisition letter and inquest from the investigating officer, autopsy was conducted. On autopsy, deceased was moderately nourished and of average built; post-mortem lividity was not fixed on the back; rigor mortis was well marked over face, neck, jaw and upper limbs, partial in lower limbs and absent in fingers and toes.

No visible ante mortem injuries were present on the body.

No any external or internal injuries to scalp, skull, meninges or brain were found.

However, heart was enlarged, weighing 440 grams, with fatty layer present over the atrial surfaces. Chambers were filled with blood and blood clots. Left ventricular thickness: 2.5 cm. Both Coronary Ostia: constricted, atheromatous yellowish plaques on the inner surface of the root of Aorta; Left coronary artery showed complete obliteration of the lumen. Right coronary showed partial obliteration of the lumen.

Other organs were normal, congested with no any obvious pathological abnormality.

Before giving cause of death, organ pieces and whole heart was preserved and sent for histopathological confirmation of coronary artery disease.

This case was booked under S.302 IPC in view of history of assault by multiple people. However, since the cause of death was not unnatural and histopathology reports were awaited, it was a challenging scenario for the investigating officer.

Histopathology report was suggestive of

gross heart showing white fibrotic patch near apex with tiny hemorrhagic areas. Left anterior descending coronary showed near complete occlusion. (Figure 1).

Microscopy shows evidence of old healed MI, myocardial hypertrophy, lymphocytic and few neutrophilic inflammatory infiltrate with myocytolysis along with hemorrhages within the myocardium suggestive of acute MI (Figure 2 a & b).

Histopathology report thus was confirmatory of the coronary artery disease.

Case no. 2

A 49-year-old male was brought to casualty of Government Medical College & Hospital with the history of blunt injury to abdomen followed by collapse within few minutes while travelling in a bus due to sudden application of brakes by the bus driver. On admission to casualty, patient was unresponsive, pulse and BP was not recordable and ECG was flat, so he was declared as brought in dead. He was not

having any known history of any pathology or chronic disease before this accident. After receiving autopsy requisition letter and inquest from the investigating officer, autopsy was conducted. On autopsy, deceased was moderately nourished and moderate built; post-mortem lividity was not fixed on the back; rigor mortis was well marked over face, neck, jaw partial in upper limbs and in lower limbs and absent in fingers and toes.

No visible ante mortem injuries were present on the body even over the abdomen.

No any external or internal injuries to scalp, skull, meninges or brain were found.

No any abnormality in pleura, lungs or heart.

Liver was enlarged, weighing 2050 gms, yellowish at places, firm in consistency, with rupture of whitish cystic nodules over the right lobe. On cut section, it shows multiple small cysts containing whitish cystic fluid within the parenchyma of the liver. (Figure 1 & 2)



Figure 1: Gross of heart showing white fibrotic patch near apex with tiny hemorrhagic areas. LAD showing near complete occlusion

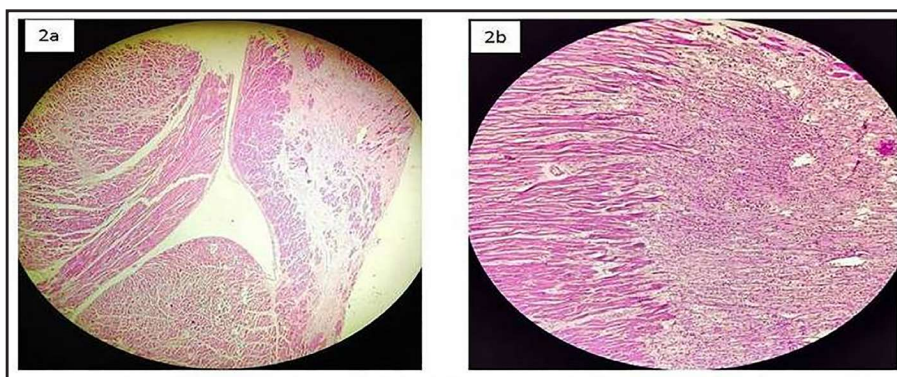


Figure 2a & 2b: Microscopy (2a and 2b) shows evidence of old healed myocardial infarction, myocardial hypertrophy, lymphocytic and few neutrophilic inflammatory infiltrate with myocytolysis along with haemorrhages within the myocardium-suggestive of acute myocardial infarction

Before giving cause of death, organ pieces and whole liver were sent for histopathological examination.

This case was booked under S.304A IPC in view of history of sudden death due to blunt injury to abdomen while travelling in a state transport bus. The cause of death was given as Shock due to rupture of hepatic cyst, however, histopathology reports were awaited. It was puzzling situation for the investigating officer

as it was a death occurring due to aggravation of an already underlying infective pathology of hydatid cyst.

Histopathology report was suggestive of gross appearance of liver showing single large cystic cavity with whitish contents inside (Figure 3). Microscopy of hydatid cyst showed numerous free hooklets and daughter cysts with protoscolices (Figure 4).



Figure 3: Gross of liver showing single large cystic cavity with whitish contents inside

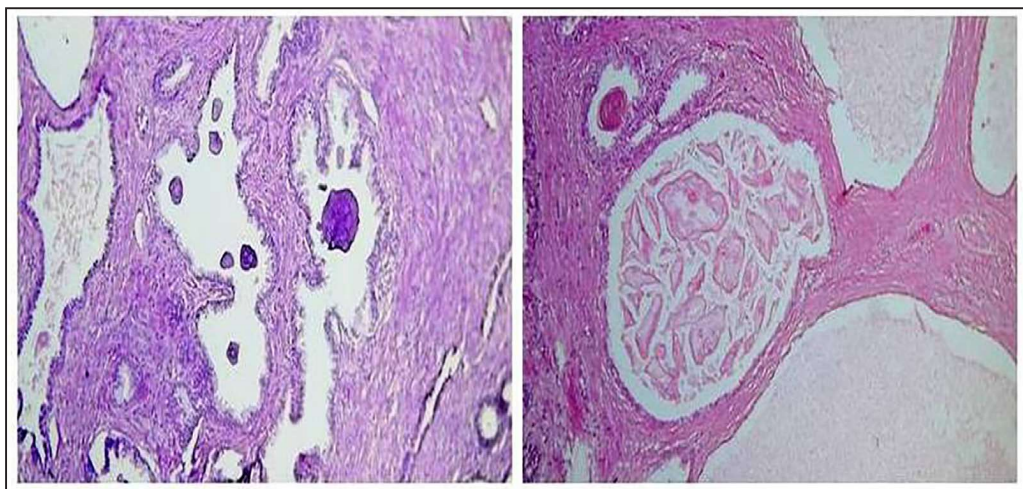


Figure 4: Microscopy of hydatid cyst showing numerous free hooklets and daughter cysts with protoscolices

Final cause of death was given as – Shock due to rupture of hydatid cyst of liver.

Case no. 3

A 29 year old female, a primigravida was brought to the mortuary of GMC & Hospital,

after Caesarean section and had delivered a male baby with a history of sudden collapse after short period of breathlessness 24 hours after section. On perusing through the hospital papers before autopsy, Caesarean section was electively planned due to cephalopelvic

disproportion, no any complications arose during surgery and during immediate postoperative care. Before death she had a period of hypoxia with cyanosis while she was admitted in the ward. Allegation of surgical negligence and lack of proper care arose from the relatives against the obstetrician. Since it was a maternal death, autopsy was being conducted with team of Forensic, Obstetrician, and Pathologist.

On autopsy, the deceased was of short stature with body length 140 cm, with thin built.

Rigor mortis was well marked and generalised over upper part of the body, partially appeared in limbs. Post-mortem lividity present over the back except over the pressure areas, was not fixed, with purple discoloration. There was evidence of cyanosis of nail beds. No oozing from mouth or nostrils.

On observing the sutures of lower segment Caesarean section, they were found to be intact, no any wound dehiscence and no any opening of the sutures was seen. Subcutaneous sutures were found to be intact with margins of the wound - clean cut and well defined. On dissection on the uterus it was of size 20x15x6

cm with a horizontal intact sutured wound over the lower segment of uterus. No oozing or gaping was seen on cut section, thickness of the endometrium 3cm and endometrial surface showed areas of congestion with no any placental remnants or any haemorrhages or any adhesions.

Both lungs were intact, soft and spongy and on cut section congested and oedematous. Other organs were intact and congested without any gross abnormality.

All organ pieces whole lungs and whole uterus was preserved for histopathological examination. Cause of death was given as "Opinion kept pending for histopathology examination report".

Later the histopathology report was received and it was suggestive of presence of mucoid material within small pulmonary blood vessels and alveolar septa with aggregates of fetal cells (Figure 5a). There was presence of homogenous amorphous materials in pulmonary alveoli; presence of marrow elements in the pulmonary vessels suggestive of bone marrow embolus (Figure 5b). Other organs were not suggestive of any microscopic abnormalities.

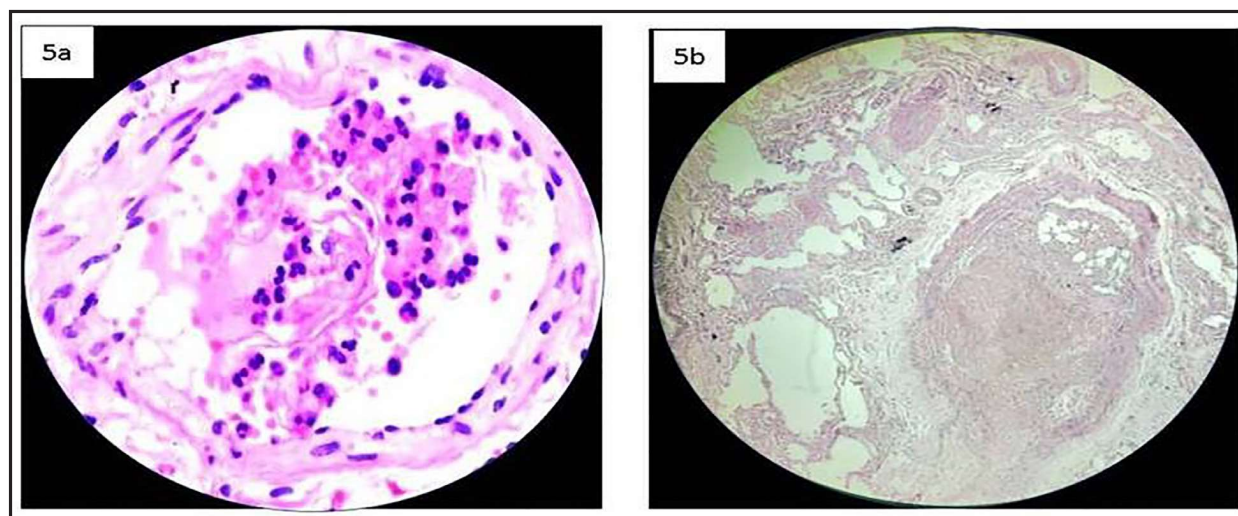


Figure 5: Microscopy of lung showing presence of mucoid material within small pulmonary blood vessels and alveolar septa with aggregates of fetal cells suggestive of amniotic fluid embolism (5a) and presence of marrow elements in the pulmonary vessels-suggestive of bone marrow embolus (5b)

The final cause of death was given as "Amniotic fluid embolism in a case of post caesarean section" after collectively interpreting and analysing the autopsy findings, and histopathology report.

DISCUSSION

Gross examination alone does not yield much information in the investigation of suspicious or sudden deaths; therefore, histopathology is very important. In these instances of death

where the exact cause of death is not obvious, detailed insight into the underlying diseases or injuries that may have contributed to the death is offered by histopathological examination, thereby assisting in reaching a definitive cause.

The quality of autopsies is always quizzed in courts, more so in developing countries. Wrong decisions or misjudgements are unwanted in medicine but very precarious in forensic medicine. If a wrong opinion as to cause of death is given, either an offender can be acquitted or an innocent individual can be penalized. Therefore, an expert opinion with aid of histopathology reporting is always required before giving the final cause of death.⁸ In the first case, several young men were initially charged with murder (Section 302 of the Indian Penal Code) for allegedly assaulting the deceased. The deceased collapsed and died while running away from them. The investigating officer faced a challenge because the body showed no visible injuries, and the cause of death was unclear prior to the histopathology report. The initial suspicion was coronary artery disease, but this couldn't be confirmed. Once the histopathology report became available, it revealed significant coronary artery disease, specifically a 90% blockage of the left anterior descending artery due to circumferential thickening. This confirmed that the death was due to natural causes. As a result, the investigating officer was able to drop the murder charges against the young men.

This case highlights the importance of histopathology and its vital role in autopsy which helps to establish the cause of death accurately when the gross autopsy findings were inconclusive. Such autopsies, aided with histopathology, do provide answers to ambiguous questions in relation to cause of death.⁹

In our second case, facts clearly indicate that histopathology counts in fixing the factual cause of death and averting false charge in criminal investigations. In the beginning, charges according to Section 304A of the Indian Penal Code were framed. The possible charges against the driver were based on the premise that blunt force injury to the abdomen during the bus ride led to death. The possible cause of death was the "shock due to rupture of a hepatic cyst." The investigating officer in this case wisely deferred his action until formation

of the histopathology report. The importance of the histopathology report becomes clear when we examine the microscopic findings: the report revealed the parasitic nature of the cyst which definitively demonstrated that the deceased had a pre-existing hydatid cyst in the liver. The blunt trauma possibly due to the bus ride hence played an incidental role in rupturing the already diseased pre-existing cyst, rather than causing the cyst. The histopathology prevented a potential miscarriage of justice by establishing the presence of a pre-existing medical condition and its role in the death, thereby exonerating potentially innocent individuals.

Hanen Zenati reported a case of hydatid cyst in a 45-year-old female with abdominal distension, tenderness, and altered general status following an abdominal contusion. Imaging revealed ruptured hydatid cysts in the liver, causing complicated hydatid peritonitis.¹⁰

In above complicated cases, the combination of trauma and underlying disease can make it difficult to identify the actual cause of death. These factors can influence each other in different ways: an existing illness may exacerbate an injury, or on the other hand, trauma could aggravate a pre-existing health issue, ultimately resulting in death. It is essential to pinpoint the primary cause, the key factor in the death, in these scenarios. Histopathology can serve as a useful additional resource in these intricate investigations, aiding in the understanding of the complex relationship between trauma and natural disease.¹¹

In our third case, there was allegation of surgical negligence in Caesarean section and all eyes were on the issuance of the cause of death after autopsy. However, due to lack of any gross autopsy findings, the role of histopathology was important to rule out whether the cause of death was due to surgical complications or something else. Fortunately, accurate identification of embolic material such as fetal cells and amniotic fluid components in the lungs was conclusive of amniotic fluid embolism while also ruling out any other potential causes or lacunae in surgery.

R. McDougall, reported a fatal case of amniotic fluid embolism syndrome in a 41-year-old woman during emergency Caesarean section and mentioned that in some cases classical risk factors may be absent, leading to difficulty in diagnosis of embolism.¹²

Amniotic fluid embolism occurs in approximately one in 25,000 deliveries.¹³ The death rate is 60-85% and accounts for approximately 5-10% of all maternal deaths.¹⁴ This typical microscopic finding suggesting amniotic fluid embolism supported the defence of the Obstetrician that unfortunate event was a rare and unavoidable complication rather than a result of lack of care.

In a nut shell, the role of histopathology in alignment with autopsies is crucial in defending against allegations of surgical negligence by providing unambiguous reporting. Such evidence are very significant in influencing not only the opinion as to cause of death but also any potential legal outcomes. In a study by Divya Sharma *et al.*, histopathology accompanied with clinical information and gross findings was beneficial in establishing the cause of death in 26% of the cases.¹⁵

CONCLUSION

Histopathology plays an important role in medicolegal autopsies:

- **Undiagnosed Conditions Identification:** Histopathology can identify slight pathological changes that might escape detection through gross examination of the organ. For instance, conditions such as myocardial infarction, pulmonary embolism, or infections can be diagnosed after sudden death through microscopic examination of tissues, which is necessary in cases where a prior medical history does not indicate such conditions.
- **Clarification of Ambiguous Gross Findings:** Histological examination may elucidate where gross findings are inconclusive. In instances where the gross examination has revealed no significant abnormalities, if yet the cause of death cannot explain, then histopathological examination will show histological changes indicative of disease processes, and hence the determination of the cause of death can be refined.
- **Contributes to Legal Evidence:** Any results coming up from histopathological investigations may stand as an improved convincing evidence in the legal field, especially in medico-legal autopsies. They will affirm the theorized mode of death, for example, natural, accidental,

or homicidal, and also may provide an explanation of the circumstances causing the death which must be brought up during legal proceedings.

- **Epidemiological Insight:** Such information can be derived from the histopathology examinations and will contribute to public health knowledge by identifying a pattern in the disease process with wider implications-for instance, infectious diseases or hereditary conditions that could potentially affect surviving relatives.
- **Guidance for Further Investigation:** If a particular cause of death cannot be made out, then histopathology will establish grounds for further research to be conducted into whether environmental or hereditary factors may have led to death, mainly in the case of SCD occurring in the young, where absence of a previous medical history invites suspicion.

Thus, histopathology is an important investigative tool providing a wider scope for investigation in suspicious or sudden death cases, where they convey an accurate picture during autopsy, thus bettering the medical and legal understanding.

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REFERENCES

1. Shubhendu K., Mundri S., Kumar S., Kumar A. The Impact of Histopathology on Medical Board Autopsies. *Cureus*. 2025 Feb 7; 17(2): e78675. doi: 10.7759/cureus.78675. PMID: 40062106; PMCID: PMC11890611.
2. Autopsy [Internet]. Wikipedia; [cited 2025 Apr 04]. Available from: <https://en.wikipedia.org/wiki/Autopsy>.
3. Histo-Pathology Examination in Medico-legal Autopsy Pros & Cons. *J Indian Acad Forensic Med*, 32(2):128-131.
4. Rao N.G. *Practical Forensic Medicine*. 3rd Edition, 2007:149.
5. Molina D.K., Wood L.E., Frost R.F. Is routine histopathological examination beneficial in all medicolegal autopsies? *Am J Forensic Med Pathol*. 2007; 28: 1-3.
6. Guareschi E.E. The Role of Histology in Forensic Investigations. *Preprints.org* (www.preprints.org) | Not Peer-Reviewed | Posted: 20 March

- 2024 doi:10.20944/preprints202403.1133.v1
7. Mukherjee B., Ropmay, Slong D., et al. (March 23, 2025) Role of Histopathology in Determining the Cause of Death in Medicolegal Autopsies. *Cureus* 17(3): e81055. doi:10.7759/cureus.81055
 8. Banwari M. An erroneous opinion on a cause of death in a forensic autopsy: a case report. *Afr Health Sci.* 2017 Dec; 17(4): 1246-1249. doi: 10.4314/ahs.v17i4.36. PMID: 29937899; PMCID: PMC5870277.
 9. Jhaji K.K., Nibhoria S. et al. A study of histopathological examination in medicolegal Autopsies in Faridkot, Punjab. *Ind. Journal of FMT*: 2013. 7(1): 76-81.
 10. Zenati H. Hydatid peritonitis caused by liver hydatid cyst rupture into the peritoneal cavity: A case report Hanen Zenati. *International Journal of Surgery Case Reports*
 11. Noone P.H. Training in Forensic Histopathology-Significance in Postgraduate Curriculum of Forensic Medicine. *Journal of Evidence Based Medicine and Health Care*. September 2014. 1(7): 595-598.
 12. McDougall, Robert J and Graeme J Duke. "Amniotic Fluid Embolism Syndrome: Case Report and Review." *Anaesthesia and Intensive Care* 23.1995: 735-740.
 13. Schandl C.A., Collins K.A. Maternal Autopsy. In: Collins K.A. editor. *Autopsy performance and reporting*. 2nd ed. Northfield (IL): College of American Pathologists; 2002. p. 135-49.
 14. Hikiji W., Tamura N., Shigeta A., et al. Fatal amniotic fluid embolism with typical pathohistological, histochemical and clinical features. *Forensic Sci Int.* 2013 Mar 10; 226 (1-3): e16-9. PMID: 23273942. <https://doi.org/10.1016/j.forsciint.2012.12.008>.
 15. Role of Histopathological Examination in Medicolegal Autopsies in Unravelling Precise Causes of Mortality. *National Journal of Laboratory Medicine*. 2021 Oct, Vol-10(4): PO01-PO04.

