

# Relevance of Autopsy As a Diagnostic Tool in Present: Times A Study

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## ABSTRACT

**Background:** Autopsy rates have been declining world-wide; the ever-increasing availability of advanced diagnostic tests, complex legal procedure, and fear of medico-legal lawsuits appear to be some of the contributing factors. Clinical judgment errors however have shown no decline and continue to remain a source of concern. Mortality and morbidity data statistics become relevant in framing health policies only when validated by corresponding autopsy studies. The present study was conducted to ascertain the utility of autopsy as a modern diagnostic tool.

**Methods:** A prospective study of hundred consecutive cases of medico-legal autopsies received in the Pathology Department was carried out for their demographic characteristics with a comparative analysis between the initial cause of death and final autopsy diagnosis. The utility of autopsy in discovering hitherto unknown incidental pathologies was also evaluated.

**Results:** In 17.6 % of cases, the final cause of death was revealed only after autopsy. It proved especially beneficial in discovering latent cardiac illnesses, occult visceral bleed sites, and undiagnosed respiratory and infectious pathologies. Hitherto unknown incidental findings which were not directly responsible for death but nevertheless enhance our understanding of different pathologic processes were found in 16.5 % of cases.

**Conclusion:** The study confirmed the utility of autopsy as an important diagnostic tool in revealing the true cause of death and contributing to our understanding of evolution of different disease processes. Simplifying the legal procedure will encourage more autopsies, stirring the clinician's interest and involvement in autopsy studies.

*Keywords: Autopsy; Cause of Death*

## Introduction

Autopsy studies are the most authentic means to confirm cause of mortality and evaluate ante mortem diagnosis made on the basis of clinical opinion and laboratory investigations. . It improves accuracy of medical auditing.

[1] Each country has its own laws of land regarding the procedure that needs to be followed in conducting an autopsy. In India, the concept of medico-legal autopsy has been mentioned in the sections 174 and 176 of criminal procedure and is mostly done when there is a cause of doubt or suspicion regarding the cause of death. A postmortem examination can be conducted only after a written request has been made by the police, or by the order of the court.

Availability of an ever increasing number of advanced, modern diagnostic tests with clinicians increasingly laying their faith in them to make a diagnosis, the complexity of the legal procedure involved in ordering an autopsy, compounded by the fear of autopsy revealing hitherto unknown findings/complications triggering law-suits are some of the reasons alienating clinicians from autopsy discussions. This declining trend in autopsy rates has been observed world-wide.[2] However, studies comparing

accuracy of the clinical diagnosis over different eras have shown no decline in the clinical judgment errors.[3, 4, 5, 6, 7, 8]

The present study was conducted as an extension of the debate regarding relevance of autopsy in clinical practice and its role in unraveling hitherto unknown facts and gain insight into the morbidity patterns of various diseases.

## Aims & Objectives

1. To analyze the utility of autopsy in arriving at the cause of death, 2. To ascertain the extent to which autopsy provided information that was hitherto unknown. [Incidental findings]

## Materials And Methods

Hundred consecutive cases that were received for medico legal autopsy histopathology at the Department of Pathology in a Medical College set-up were analyzed. In each case important information regarding age, sex, available clinical findings, suspected cause of death and postmortem findings were obtained from postmortem papers. Representative tissue specimens received from Brain, Lungs, Liver, Spleen, Kidneys and Whole Heart were studied. For whole heart dissection the inflow-outflow method was used. [9] All the tissue specimens were studied grossly and

microscopically for different histomorphological changes. The formalin fixed, processed, paraffin tissue blocks were sectioned and stained with routine Hematoxylin and Eosin staining; Special stains were used when required. Nine cases were found autolysed and unsuitable for any definite diagnosis.

The findings on the autopsy table and the different histopathological features of the representative tissue specimens were analyzed to arrive at a final decision regarding cause of death; a comparative analysis between the initial basic cause of death which warranted autopsy and the final autopsy diagnosis was done according to Cordazzi et al.<sup>[3]</sup>

The study was approved by the institutional review board.

## Results

The majority of cases fell between the third and fourth decade, with males outnumbering females in a ratio of 2.4: 1. (Figures 1, 2) The cause of death as stated in the

postmortem papers which warranted the autopsy were varied and are represented incidence wise in % in the **Figure-3**. Death due to sudden, unknown cause followed by underlying chronic illnesses, suspected poisoning, cardiac causes and trauma were found to be the top five reasons.

A comparison between the initial basic cause of death and the final autopsy diagnosis arrived revealed a consensus between ante mortem and postmortem opinion in 54.9 % with autopsy exclusively clinching the final cause of death in 17.6 %. It revealed important, hitherto unknown facts (incidental findings) in 16.5 %. Nine cases that were autolysed preventing a definite opinion were excluded. (**Table-1**)

Many interesting findings which though not directly related to the cause of death but nevertheless have a significance of their own in studying the natural progression and morbidity patterns of various diseases were detected on tissue histopathology, some of them presented in a tabulated form in **Table-2**.

**Table 1: Basic causes of death: correlation between initial diagnosis and autopsy findings:**

TYPE OF CORRELATION	NO. OF CASES	[%]
Correct diagnosis confirmed at autopsy	50	54.9
Autopsy added important data not suspected earlier	15	16.5
Diagnosis revealed only at autopsy	16	17.6
Autopsy diagnosis unclear	10	11
<b>TOTAL NUMBER</b>	<b>91*</b>	

\*Nine cases found to be autolysed completely were excluded.

**Table 2: Some Incidental Findings On Autopsy.**

AGE(Years)/SEX	HISTORY/INDICATION FOR AUTOPSY	HISTOPATHOLOGY FINDING
38/M	Suspected poisoning	Emphysema
48/F	Suspected poisoning	Silicosis
40/M	Suspected poisoning	Chronic pyelonephritis
63/M	Suspected poisoning	Chronic glomerulonephritis
35/M	Cardiac cause	Asbestosis
55/F	Cardiac cause	Polycystic kidney disease
32/M	Trauma	Pulmonary tuberculosis
51/F	Trauma	Chronic pyelonephritis
19/F	Hanging	Multisystemic [lung, liver and heart] non-caseating epithelioid granulomas
6/F	Snake bite	Bronchopneumonia
45/M	Acute alcohol intoxication	Chronic pyelonephritis
55/F	Sudden death	Acute pneumonia
32/M	Sudden death	Hepatic cirrhosis

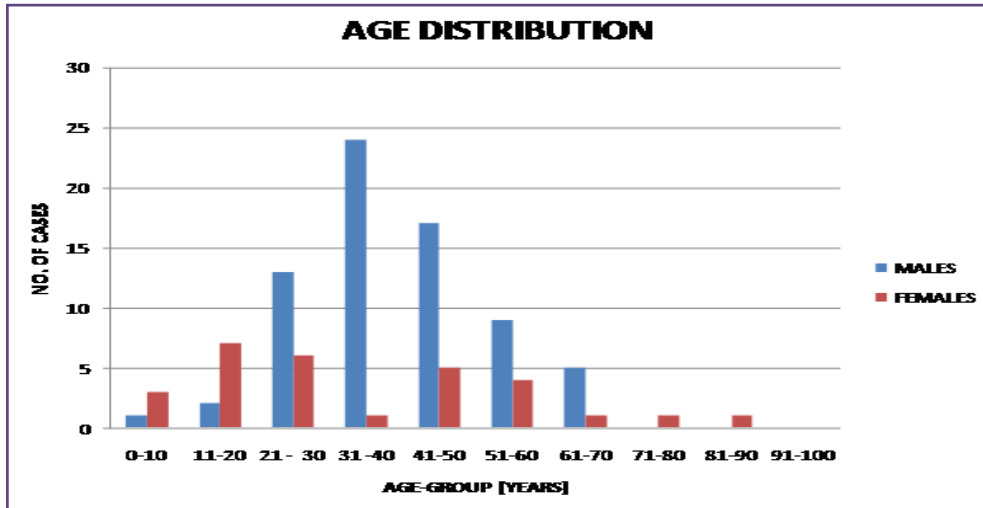


Fig. 1

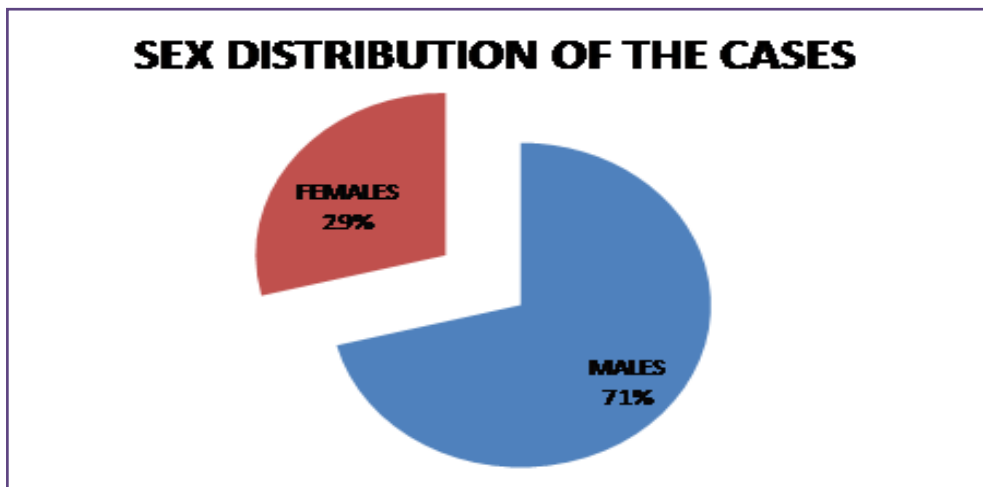


Fig. 2

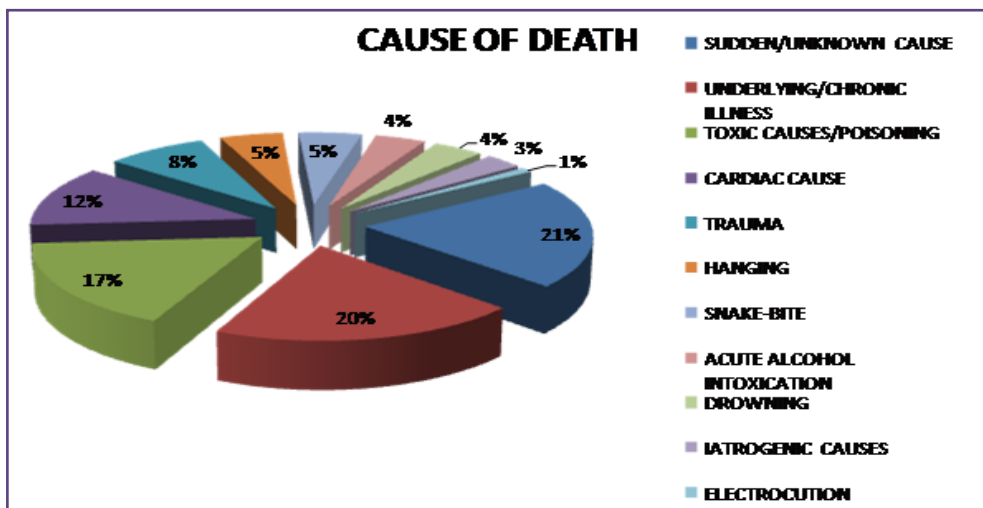


Fig. 3

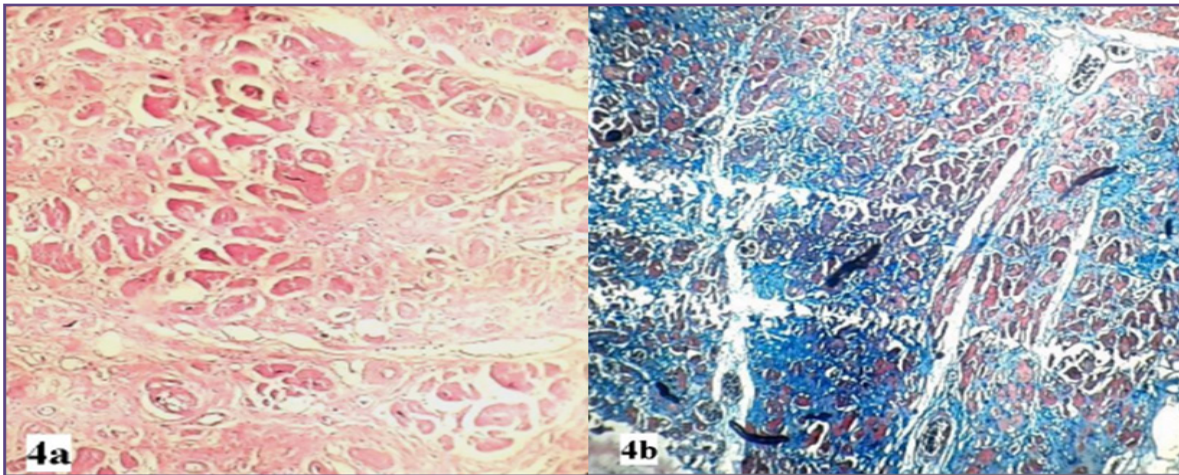


Fig. 4: Showing variability in myocyte size, myocyte loss, interstitial fibrosis in a case of sudden death in a young male with a heavy, large, flabby heart [ 4a-H&E, 40x; 4b- Masson trichrome, 40x ].

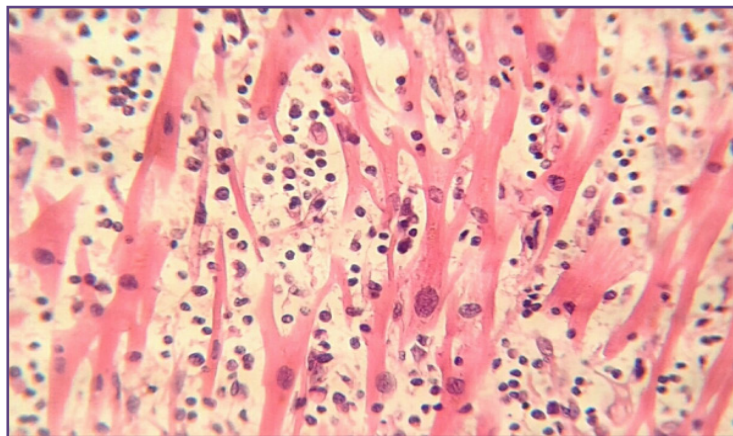


Fig. 5: Myocardium showing dense, mononuclear interstitial infiltrate with myocyte necrosis (= Myocarditis) in a case of suspected infarction [H&E, 40x].

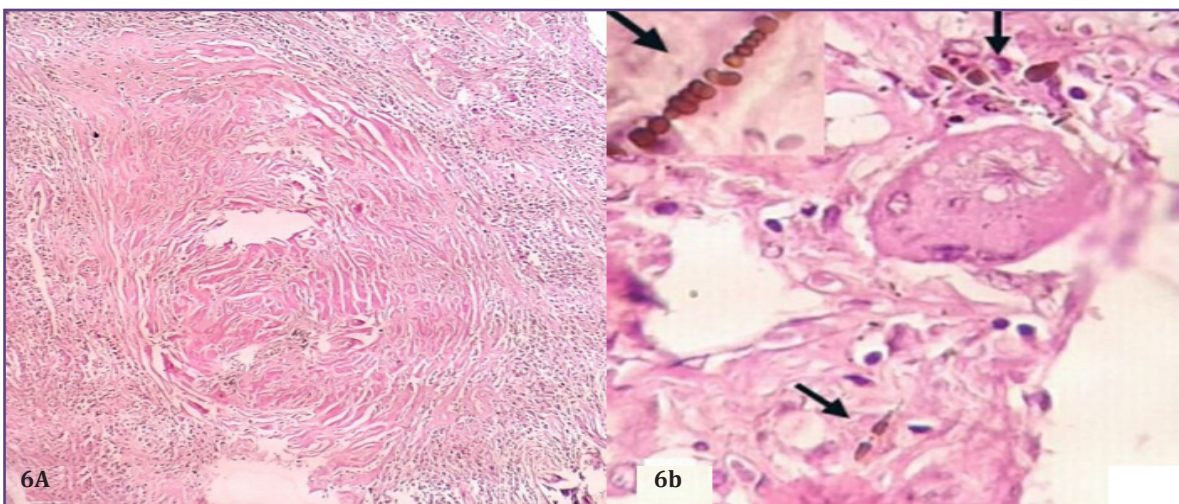


Fig. 6: Incidental findings of occupation induced interstitial lung diseases; 6a- Showing the coalescent collagenous nodules of silicosis [H&E,10x]; 6b- Characteristic ferruginous bodies (also in inset) with giant cell showing asteroid body in asbestosis [H&E,40x].

## Discussion

Analytical study comparing the initial basic cause of death and the final autopsy interpretation revealed a noteworthy agreement [54.9%] between pre and post mortem diagnosis which however was lower than the concordance rates observed by Cordazzi et al in two different periods [72.9% and 79.4% respectively]. In 17.6 % cases, the final diagnosis regarding the cause of death was revealed only after autopsy, comparable to the 25 % found by them.<sup>[3]</sup>

Previously unsuspected cardiac illnesses, the timely diagnosis of which could have averted / postponed sudden demise had they been suspected and treated ante mortem were discovered on autopsy. This was especially true in cases of sudden deaths of unknown cause in young adults. The spectrum of cardiac diseases detected were variable, from cardiomyopathy; cardiac hypertrophy [secondary to untreated essential hypertension]; myocarditis [misdiagnosed as myocardial infarction] to acute myocardial infarction [in a young male suspected of acute alcohol intoxication induced death]. Thus, autopsy proved beneficial in identifying silent cardiac killers. [Figures 4&5]

In cases of sudden unexpected death, a detailed autopsy study helped identify the site / cause of internal bleed or hemorrhages which remained undetected ante mortem [they included cases of ileal perforation, hepatic laceration, extradural hematoma, hemothorax, and cirrhosis with variceal bleed]. Previously misdiagnosed / undiagnosed respiratory illnesses [comprising of cases of atypical pneumonia, chronic obstructive pulmonary disease (COPD), Tuberculosis] which were instrumental in causing death were also revealed on autopsy.

The utility of autopsy as the sole diagnostic tool in ascertaining the final cause of death was underlined by a case of sudden death after a brief undiagnosed illness of two days, which revealed on histopathology, congested capillaries filled with parasitized red blood cells laden with malarial pigment in the visceral organs.

Autopsy studies provide an insight into the different stages of disease progression, thus helping us know the natural evolution of untreated diseases validating their role as learning tools for research purposes.<sup>[10]</sup> Many interesting incidental findings were revealed in the present study too, which were unrelated to the primary cause of death [Some of which are tabulated in **Table-2**]. Roulson et al found 50 % autopsies revealing findings that were not suspected ante mortem.<sup>[1]</sup>

Occupation induced interstitial lung diseases [Ex- Silicosis, Asbestosis] were found as an incidental finding in a

significant 3.2% in our study which is higher than similar studies on autopsy lung histopathology.<sup>[11]</sup> This could be because of the presence of many stone quarrying factories in the adjoining areas to which our medical college caters. These respiratory illnesses usually present with nonspecific symptoms and are usually misdiagnosed as COPDs, with autopsy studies revealing their true prevalence rate. [Figure 6] Morbidity and mortality statistics, thus acquire accuracy and significance when based on careful autopsies.<sup>[12]</sup> Autopsy helps reveal insidious onset diseases which have vague presentations. A case of death by hanging in a young female, revealed non-caseating epitheloid granulomas in multiple visceral organs [lung, liver, heart], triggering suspicion of sarcoidosis which has significant incidence of neuropsychiatric manifestations like depression.<sup>[13]</sup>

Autopsy studies by revealing the variable histopathological changes that occur in visceral organs in different disease processes facilitate improved understanding, making future diagnosis and correlation simpler. Of the 16 cases showing histological evidence of ischemic heart disease, corresponding lung histopathology revealed pulmonary edema and diffuse alveolar damage in 71.4%, similar to Soiero AM et al,<sup>[14]</sup> reiterating the fact that lungs are secondarily involved in all forms of terminal cardiac events.

In 4 cases, lung histopathology revealed uncommon histopathological finding of cholesterol granulomas. Pulmonary hypertension has been implicated in their pathogenesis, but we did not find the characteristic lung pathology of plexiform arteriopathy though all had associated pulmonary edema and congestion and had died of cardio-respiratory failure, suggesting that apart from pulmonary hypertension certain other contributing factors like long standing severe illness, red blood cells / platelet lysis with release of membrane lipids might be contributing factors for development of these cholesterol granulomas.<sup>[15]</sup> Thus, autopsy exposes and helps a pathologist study rare histopathological entities, which otherwise are seldom encountered. It is, hence, an indispensable tool for its role in undergraduate and postgraduate medical education, the identification and characterization of new diseases and contribution to the understanding of disease pathogenesis.<sup>[16]</sup>

In the present era of rising medical litigation cases with increasing allegations of death due to iatrogenic causes [3 cases in this study], autopsy studies prove beneficial in revealing the truth.

None of the cases studied, revealed incidental neoplastic pathology in the present study; though they were detected to a variable degree in other similar studies. This could

be attributed to the variation in sample sizes, different demographic characteristics, and different study patterns.

Visceral organs in nine cases showed varying degrees of autolytic changes preventing definite diagnosis, emphasizing the need to follow the tissue preservation protocols more stringently. This was specifically troubling in cases of death by drowning, where prolonged body submersion hastened autolysis.

The clinicians' indifference to autopsy, can be mitigated by certain strategies like making the legal procedure less complicated, swift communication of autopsy summaries, renewing their interest and contributing to upgraded medical understanding.

## Conclusion

Despite the rapid technological advancements, arriving at an accurate diagnosis shall always remain a challenge with autopsies continually revealing ante mortem diagnostic shortcomings. Autopsy studies serve in giving the final verdict regarding the cause of death especially those due to silent cardiac illnesses, occult visceral bleeds, undiagnosed infectious and respiratory illnesses. Often, hitherto unknown incidental findings with significant bearings are unveiled, paving way for better understanding of various disease processes. The present study reinforces the role of autopsy as a diagnostic tool that should be treasured and improvised.

## Abbreviations & Symbols:

Chronic obstructive pulmonary disease (COPD)

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