Original Article

Spectrum of Renal Lesions in Autopsy Cases: A Histopathological Study at a Tertiary Care Centre

Dishang Bhavsar[1,*], Viral Bhanvdiya[1], Kajal Chaudhary[1], Darshni Kotecha[1], Urvi Parikh[1], Anjali Prajapati[1]

[1]Department of Pathology, BJ Medical College, Ahmedabad, Gujarat, India

***Correspondence:** drb.bhavsar@gmail.com

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Abstract

Aims: To investigate the prevalence and histopathological spectrum of renal lesions in autopsy cases at a tertiary care center to identify subclinical and unsuspected renal diseases.

Methods: A retrospective descriptive study of 420 autopsy cases was conducted between January and December 2023. Renal tissues were fixed in 10% neutral buffered formalin, embedded in paraffin, and stained with hematoxylin and eosin (H&E) for microscopic evaluation.

Results: Definitive renal pathology was identified in 140 cases (33.33%). Tubulointerstitial lesions were the most frequent findings (45%), with acute kidney injury (AKI) accounting for 38.57% of pathological cases. Other incidental findings included simple cysts (7.85%), glomerulosclerosis (5%), renal infarction (1.42%), and metastatic carcinoma (0.71%).

Conclusions: Autopsy remains a critical tool for identifying silent renal pathologies, such as subclinical AKI and incidental malignancies, which contribute to improved clinicopathological correlation and quality assurance.

Keywords: acute kidney injury; autopsy; glomerulosclerosis; histopathology; renal lesions; tubulointerstitial diseases

Introduction

Autopsy continues to be regarded as the gold standard for determining the true burden of disease within a population. Despite advances in diagnostic imaging and laboratory investigations, a significant proportion of pathological conditions remain undetected during life. Renal diseases, in particular, often follow an insidious course and may not manifest clinically until advanced stages are reached.[1, 2]

Histopathological examination of renal tissue obtained during autopsy provides a unique opportunity to identify silent renal pathology, systemic diseases with renal involvement, and complications arising from trauma, poisoning, infections, or chronic illnesses. Autopsy studies have consistently demonstrated a wide spectrum of renal lesions ranging from mild degenerative changes to severe destructive pathology.

The present study was undertaken to document the spectrum of renal lesions observed in autopsy cases at a tertiary care centre in western India and to correlate these findings with existing literature.

Despite advancements in modern imaging and molecular diagnostics, the clinical autopsy remains an invaluable tool for quality assurance. It frequently reveals 'clinically silent' renal pathologies that bypass standard diagnostic thresholds, providing a critical feedback loop for clinicians to improve ante-mortem management of renal disease.

Materials and Methods

Ethics: As this was an autopsy-based study, an application to institutional ethical committee has been given for waiver of individual informed consent was granted. IEC approval details

Approval letter: No. IEC (Academics) /Pathology 07/Dr. D.Bhavsar/2025

Date: 24/09/2025

Study design and setting

This retrospective descriptive study was conducted in the Autopsy Section of the Department of Pathology, B. J. Medical College, Ahmedabad, between January 2023 and December 2023.

Sample size

Total autopsies conducted: 630, Exclusion criteria: Cases without kidneys: 161, Autolysed specimens: 49, Final sample with renal tissue: 420 cases

Sample processing

Tissue fixation in 10% neutral buffered formalin. Routine paraffin embedding. Sectioning at 3–5 μm. Staining with hematoxylin and eosin (H&E). Microscopic evaluation using standard histopathological criteria.

Tissue sections were stained with routine Hematoxylin and Eosin (H&E). While special stains like Periodic Acid-Schiff (PAS), Masson's Trichrome, and Gomori Methenamine Silver (GMS) were considered—particularly for diagnosing tuberculosis and metastatic carcinoma—primary diagnoses were established based on definitive histomorphological features on H&E. Acute Kidney Injury (AKI) was identified by tubular epithelial thinning, loss of brush borders, and luminal ectasia. Glomerulosclerosis was diagnosed by the presence of global or segmental collapse of the glomerular tuft with increased collagenous matrix. The severity was semi-quantitatively graded based on the percentage of parenchyma involved: Mild ($<$25%), Moderate (25–50%), and Severe ($>$50%). While this severity grading was used for internal descriptive analysis and to categorize the extent of damage, the final histological diagnosis of AKI was recorded independently of the severity score to ensure consistency with standard clinical reporting.

Data analysis

Morphological patterns were documented and classified. Lesions were grouped as: Tubulointerstitial, Glomerular, Vascular, Cystic, Infectious, Neoplastic.

Collected data were analysed by Microsoft Excel version 2021 where descriptive analysis was done along-with the diagrams also made. To ensure diagnostic quality and minimize inter-observer variability, all slides were independently reviewed by two senior pathologists. In cases of disagreement, a consensus was reached using a multi-head microscope. Data analysis was performed using Jamovi 2.5.3. Descriptive statistics were used for prevalence, and categorical variables were compared using the Chi-square test ($p < 0.05$ was considered significant).

Results

Overall Prevalence- 33.33% showed definitive renal pathology. Gender distribution- Males and females were 81.19% and 18.81% respectively. Age distribution- Highest prevalence was observed in the 31–50 year age group (45.47%).

Discussion

The present autopsy-based study highlights the significant burden of silent renal pathology in the general population. Nearly one-third of the autopsy cases demonstrated renal lesions, many of which were not clinically suspected during life. The

Table 1: Distribution of major renal lesions (n=140).

Lesion	No. of cases	Percentage (%)
Acute Kidney Injury	54	38.57
Tubulointerstitial lesions	63	45
Simple renal cyst	11	7.85
Glomerulosclerosis	7	5
Renal Infarction	2	1.42
Acute pyelonephritis	2	1.42
Chronic Glomerulonephritis	1	0.71
Tuberculous pyelonephritis	1	0.71
Metastatic Carcinoma	1	0.71

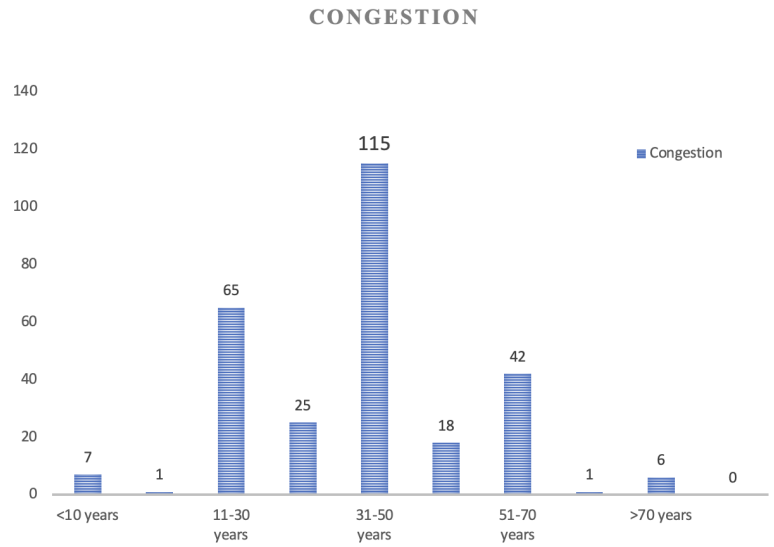

Figure 1: Frequency of congestion as post mortem finding according to age.

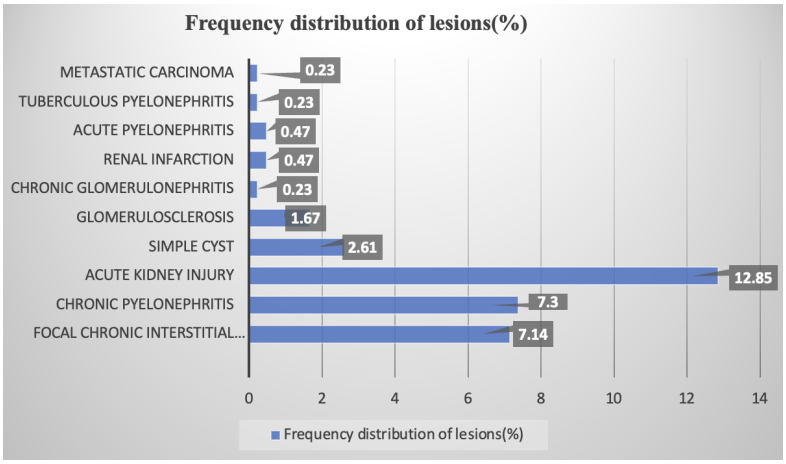

Figure 2: Frequency distribution of lesions (%).

predominance of tubulointerstitial lesions, particularly acute kidney injury, reflects the impact of systemic insults such as sepsis, hypovolemia, shock, and toxic exposures.[4] These findings are consistent with previous autopsy studies and underscore the vulnerability of renal tissue to systemic disease processes.

Simple renal cysts and glomerulosclerosis were frequently encountered incidental findings, likely representing age-related degenerative changes and chronic ischemic or hypertensive injury. Such lesions often remain clinically silent and are underdiagnosed during life. The identification of tuberculous pyelonephritis without overt pulmonary disease supports existing literature suggesting that renal tuberculosis may manifest long after primary infection.[5] Additionally, the detection of metastatic carcinoma to the kidney emphasizes the role of autopsy in revealing unsuspected secondary malignancies.

The high prevalence of renal lesions found post-mortem, which were often not documented in clinical records, highlights a

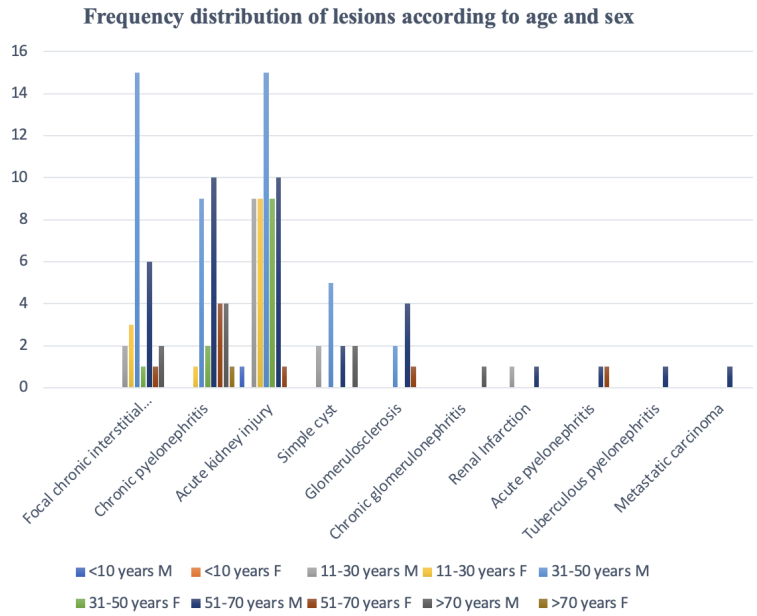

Figure 3: Frequency distribution of lesions according to age and sex.

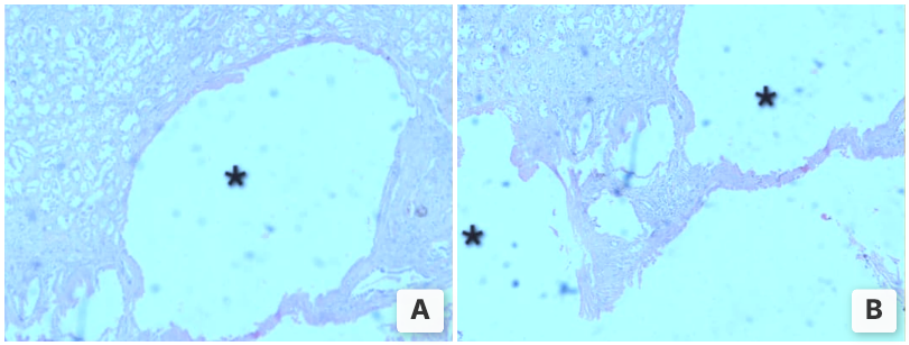

Figure 4: Simple cyst in H&E low power (A and B). Black asterisk showing empty cyst space in renal tissue.

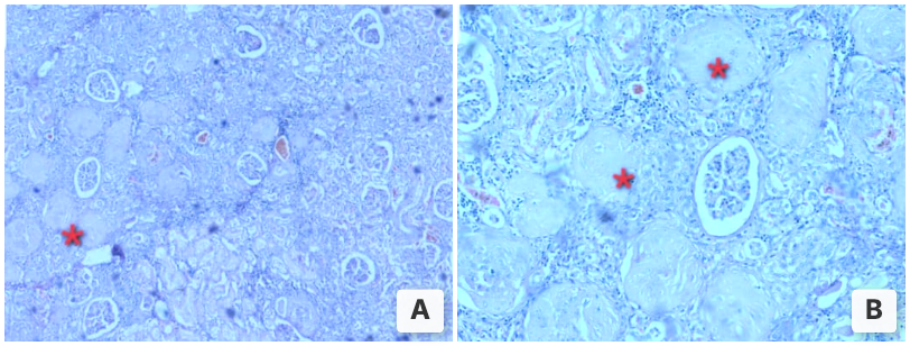

Figure 5: Glomerulosclerosis with inflammation. (A) H&E low power, red asterisk showing sclerosed glomeruli. (B) H&E high power, red asterisk showing sclerosed glomeruli.

significant clinico-pathological dissociation. While our study did not utilize a formal control group of healthy individuals—given the nature of autopsy-based research—the comparison between ante-mortem clinical diagnoses and post-mortem findings serves as a robust internal control.

This comparison demonstrates that standard clinical markers like serum creatinine often fail to capture early or focal tubular injury, emphasizing that histopathology remains the 'gold standard' for identifying unsuspected renal pathology. Our observed prevalence of AKI (31.7%) is consistent with global autopsy studies which report rates ranging from 25% to 40% in hospital-based populations. However, our findings in Western India show a higher frequency of glomerular changes compared to some Western cohorts, likely due to regional differences in the prevalence of chronic infections and environmental factors. These geographic variations highlight the need for localized studies to guide regional public health strategies.

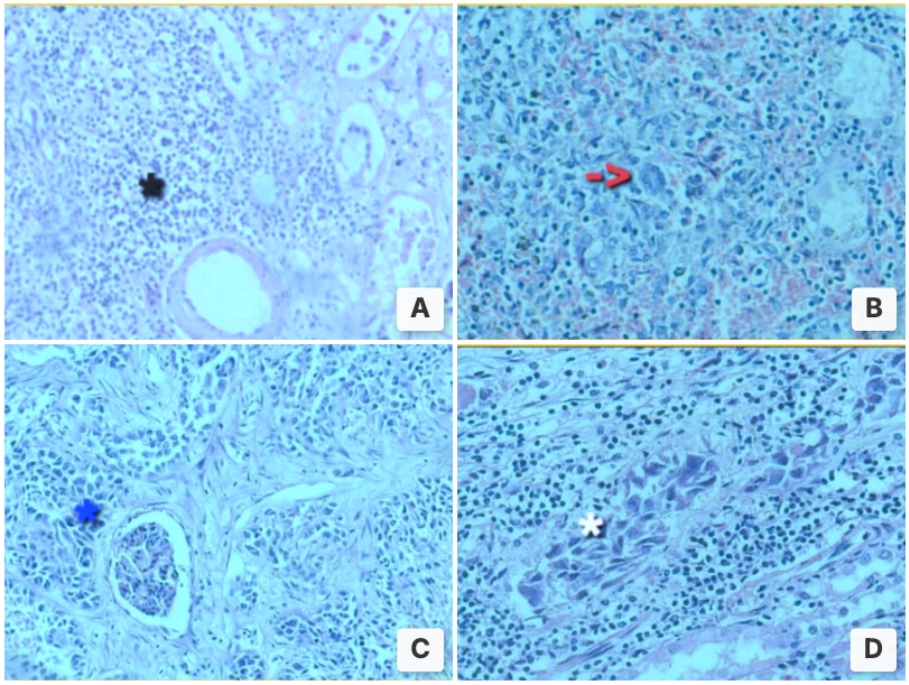

Figure 6: (A) Lymphocytic infiltrate in H&E medium power, black asterisk showing small round cells with blue nucleus i.e. lymphocytes. (B) Tuberculous pyelonephritis in H&E medium power, red arrow showing Langhans giant cell. (C & D) Metastatic carcinoma in H&E.

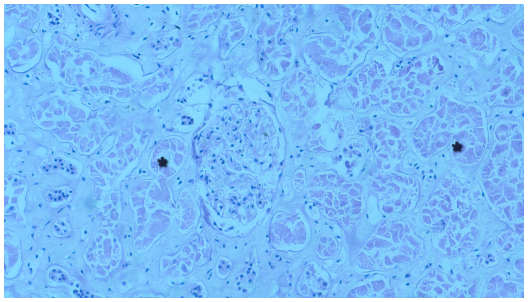

Figure 7: Acute kidney injury in H&E high power. Black asterisk shows tubules with loss of brush border and necrosis.

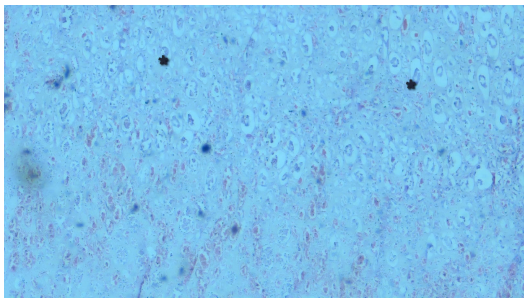

Figure 8: Renal infarction in H&E low power. Black asterisk showing infarcted ghosts of glomeruli and tubules with presence of coagulative necrosis.

Limitations of the study

While this study provides significant insights into renal pathology, it is not without limitations. Firstly, the study is confined to a single-center experience in Western India, which may reflect specific regional demographics and disease prevalence, potentially limiting its generalizability to other geographic or ethnic populations. Secondly, being an autopsy-based study, there is an inherent selection bias, as findings are limited to the most severe cases resulting in mortality. Thirdly, the lack of comprehensive longitudinal ante-mortem clinical data for every case restricted our ability to perform a full clinico-pathological correlation for all minor lesions. Finally, the use of standard H&E staining was the primary modality; the addition of advanced molecular markers might have yielded deeper insights into the pathophysiology of the observed lesions.

Conclusion

This study reveals a high incidence of undiagnosed renal lesions, particularly AKI and age-related sclerosis, in Western India. The take-home message for clinicians is that renal structural damage is often more extensive than biochemical markers suggest. This study reinforces the role of the pathologist in identifying systemic disease impacts on the kidney, emphasizing that the autopsy remains a vital instrument for clinical auditing and public health surveillance.

Abbreviations: AKI: Acute Kidney Injury; H&E: Hematoxylin and Eosin; PAS: Periodic Acid-Schiff; GMS: Gomori Methenamine Silver; IEC: Institutional Ethics Committee.

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Competing Interests: None.

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