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Incidental Findings of Renal Lesion in Autopsy Specimens of Kidney – Not Directly Related to the Cause of Death: A Cross-Sectional Study

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ABSTRACT

Background: Autopsy studies still give rare insight into silent kidney disease, especially where imaging or screening is limited. **Objective:** To profile the spectrum and frequency of incidental renal lesions identified at medicolegal autopsy. **Methods:** A cross-sectional study using consecutive sampling was conducted between April 2017 and March 2018 at the police morgue affiliated with R. G. Kar Medical College, Kolkata. All kidneys that appeared grossly abnormal during 786 medicolegal autopsies were retrieved (n = 50) and processed by standard histopathology (H&E and Van Gieson). Lesions were enumerated and categorized; summary statistics were generated. **Results:** The 50 kidneys belonged to 34 males and 16 females (mean age ± SD 58.5 ± 13.2 years. Microscopy revealed 56 separate lesions including simple cortical cysts 39 (69.6 %), granular contracted kidneys 8 (14.3 %), renal calculi 3 (5.4 %), hydronephrosis 3 (5.4 %), autosomal-dominant polycystic kidney disease 1 (1.8 %), capsular leiomyoma 1 (1.8 %), and clear-cell renal cell carcinoma 1 (1.8 %). Most simple cysts (89.7 %) lie in the cortex, and 92.3 % measured under 5 cm. Five granular contracted kidneys also showed simple cysts, and one hydronephrotic kidney contained multiple stones. **Conclusions:** Almost seven out of ten incidental renal lesions found at autopsy were simple cysts, yet important conditions such as polycystic kidney disease, end-stage granular kidneys, and an unsuspected carcinoma were also present. Routine, careful examination of autopsy kidneys can uncover the hidden burden of renal disease and may guide future community-based screening programmes.

KEYWORDS: Adult Polycystic Kidney Disease, Hydronephrosis, Leiomyoma, Renal Cell Carcinoma

INTRODUCTION

Many renal lesions remain clinically silent and may not be detected during life. Autopsy allows direct gross and microscopic examination and therefore can reveal renal abnormalities that were not suspected clinically or on imaging [1, 2]. Even with fewer hospital autopsies, medicolegal autopsies still provide a systematic opportunity to document such incidental renal lesions when careful grossing and histology are performed [1, 3, 4].

In India, reliable estimates for incidence and prevalence are limited and uneven across regions. However, large-scale screening work has reported a community prevalence of nearly 17%, and the national registry has documented a wide variation in aetiology and stage at presentation. [5, 6]

Indian reports have shown that incidental renal pathology is commonly recognised only after this careful approach, highlighting the value of autopsy data to complement clinical and imaging information in these settings [3, 4]. At the same time, because medicolegal autopsies often involve sudden or unnatural deaths, lesion patterns from these series should be viewed as descriptive pathology of that caseload rather than population prevalence estimates [4].

The objective of the study was to describe the spectrum and frequency of incidental renal lesions defined as renal abnormalities not contributing to the cause of death identified at medicolegal autopsy at the police morgue attached to R. G. Kar Medical College.

METHOD

Study design and setting: A descriptive, cross-sectional study was carried out from 1 April 2017 to 31 March 2018 in the police morgue attached to the Department of Forensic Medicine, R. G. Kar Medical College and Hospital, Kolkata. The Institutional Ethics Committee of R. G. Kar Medical College approved the protocol.

Screening, eligibility, and sampling: All medicolegal autopsies performed during the study period (n = 786) were screened. Kidneys were included when they showed any gross abnormality on visual inspection. Kidneys in which the renal lesion was judged to be the direct cause of death (for example, massive renal haemorrhage) were excluded. Consecutive sampling was followed; no eligible case was skipped. In total, 50 kidneys fulfilled the inclusion criteria.

Data collection and gross examination: For each case, age, sex, side of kidney, and cause of death were taken from autopsy records. Kidney weight and dimensions were measured on the day of dissection with a calibrated digital scale and ruler. Gross findings (surface, cyst size and location, stones, hydronephrosis, tumours) were recorded on a pre-designed sheet.

Histopathology: Specimens were fixed in 10% neutral buffered formalin for at least 24 h. Standard blocks included cortex, medulla, pelvis, and any visible lesion. Five-micron sections were stained with haematoxylin–eosin; Van Gieson stain was added for connective-tissue detail. Lesions were classified under light microscopy according to established pathological criteria. All histological slides were reviewed independently by two pathologists; discordant readings were resolved by joint review.

Data management and analysis: Data were entered into MS Excel and analyzed with MedCalc v11.6. Continuous variables are expressed as mean ± standard deviation (SD), and categorical variables as counts and percentages. Because the objective was descriptive, no hypothesis tests were applied.

RESULT

During the study period, 786 medicolegal autopsies were screened. Fifty grossly abnormal kidneys met the inclusion criteria; none of the deaths was directly attributable to renal disease. The 50 kidneys belonged to 34 males and 16 females. Mean (±SD) age was 58.5 ± 13.2 years. Mean weights were 164.6 ± 30.0 g for left kidneys and 165.5 ± 29.5 g for right kidneys.

Across these 50 kidneys, 56 distinct lesions were identified on histology. Unless stated otherwise, percentages below are lesion-based (denominator = 56) as shown in Table 1.

Spectrum of incidental renal lesions: Simple cortical cysts were the most frequent lesions (69.6%; Figure 2**a–c**). Granular contracted (shrunken scarred) kidneys constituted 14.3% (Figure 5**a–b**). Renal calculi and hydronephrosis accounted for 5.4% each; a representative hydronephrotic kidney with multiple calculi is shown in Figure 2**d**. Single lesions (1.8% each) included autosomal dominant polycystic kidney disease (ADPKD; Figure 1**a–c**), capsular leiomyoma (Figure 3**a–c**), and clear-cell renal cell carcinoma (Figure 4**a–b**). Co-occurrence was observed: five granular contracted kidneys also had simple cysts; one hydronephrotic kidney contained multiple stones (Figure 2 **d**).

Lesion category	Lesions, n	% of lesions
Simple cortical cyst	39	69.6
Granular contracted kidney (shrunken scarred)	8	14.3
Renal calculus	3	5.4
Hydronephrosis	3	5.4
Autosomal dominant polycystic kidney disease	1	1.8
Capsular leiomyoma	1	1.8
Clear-cell renal cell carcinoma	1	1.8
Total	56	100.0

Notes: (i) Five granular contracted kidneys also showed simple cysts. (ii) One case showed hydronephrosis with multiple renal stones.

Table 1: Spectrum of incidental renal lesions (lesion-based, n = 56)

Characteristics of simple cysts (n = 39): Most cysts were cortical and small in size, consistent with simple cortical cysts.

Parameter	Category	n	% of simple cysts
Site	Cortex only	35	89.7
	Medulla only	0	0.0
	Cortico-medullary (combined)	4	10.3
Size	< 2 cm	21	53.8
	2–5 cm	15	38.5
	> 5 cm	3	7.7

Table 2: Simple cysts by site and size

Age and Sex-wise distribution of lesions: Lesions were seen across age groups, with cysts predominating beyond 50 years. The single ADPKD lesion occurred in a middle-aged adult, and the single RCC occurred in an elderly male (Tables 3 and 4).

Lesion category	≤ 50	51–60	61–70	71–80	Total (n)
Simple cyst	9	13	10	7	39
Granular contracted kidney	0	3	2	3	8
Renal stone	3	0	0	0	3
Hydronephro-sis	1	1	1	0	3
Leiomyoma	0	1	0	0	1
Renal cell carcinoma	0	0	1	0	1
ADPKD	1	0	0	0	1
Total	14	18	14	10	56

Note: Age refers to the deceased from whom the kidney was sampled.

Table 3: Distribution of lesions by age group (lesion-based, n = 56)

Lesion category	Male (n = 34)	Female (n = 16)	Total (n)
Simple cyst	20	19	39
Granular contracted kidney	3	5	8
Renal stone	3	0	3
Hydronephrosis	1	2	3
Leiomyoma	0	1	1
Renal cell carcinoma	1	0	1
ADPKD	1	0	1
Total	29	27	56

Note: Sex denotes the sex of the deceased

Table 4: Distribution of lesions by sex (lesion-based, n = 56)

In this consecutive medicolegal autopsy series, two out of three incidental renal lesions were simple cortical cysts (Figure 2**a–c**). Important but less frequent lesions included end-stage shrunken scarred kidneys (Figure 5**a–c**), obstructive pathology with stones and hydronephrosis (Figure 2**d**), and single examples of ADPKD (Figure 1**a–c**), capsular leiomyoma (Figure 3**a–c**), and clear-cell RCC (Figure 4 **a–b**). These observations highlight the value of careful grossing and routine histology in documenting silent renal disease patterns in the autopsy setting.

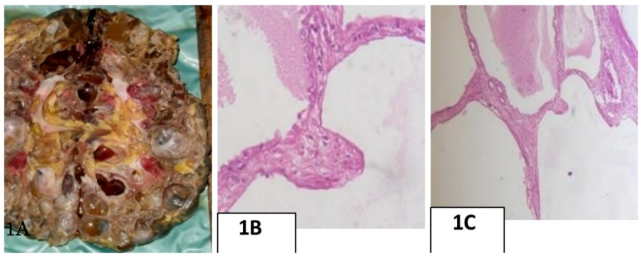

Figure 1: Single examples of ADPKD (a–c). A case of polycystic kidney disease (PCKD) having cysts of varying sizes and shapes. a: Cut surface of PCKD with multiple cysts in both cortex and medulla. b: Multiple cysts with compressed intervening renal parenchyma (H&E, Magnification- 100x). c: Cuboidal and flattened epithelium in two adjoining cysts—in a case of PCKD (H&E, mag- 400x)

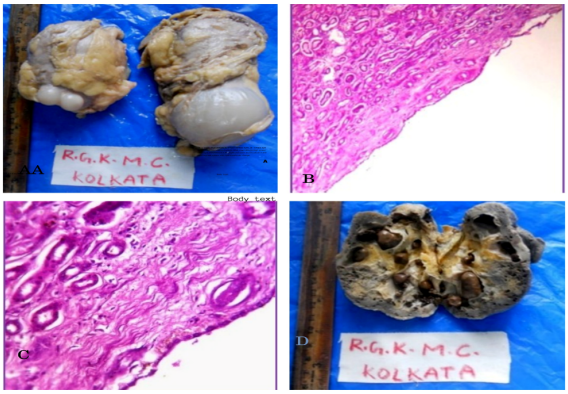

Figure 2: Incidental renal lesions were simple cortical cysts (a–d). a: Bilateral involvement by simple cortical cysts. b: Simple cyst lined by low cuboidal epithelium (H&E, mag-100x,). C: High power view-right side (400x) N. d: Multiple chocolate brown calculi in the pelvicalyceal system with hydronephrotic change

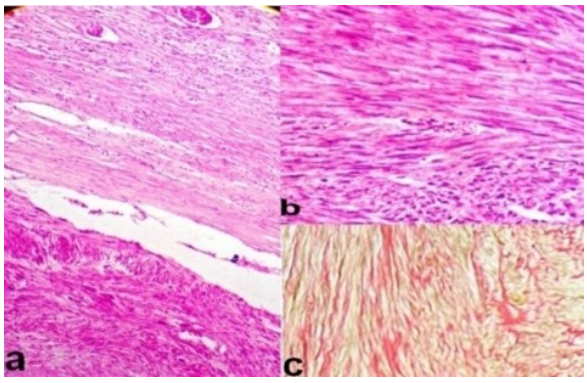

Figure 3: Capsular leiomyoma (a–c): Solid grayish-white, encapsulated leiomyoma at the upper pole of the kidney. Photomicrograph. a: Smooth muscle fibres arranged in interlacing fascicles and bundles, two glomeruli in the upper corner (H&E, mag-100x). b: High power view (H&E, 400x). c: Van Gieson-stained section depicts yellow colored smooth muscle (inset)

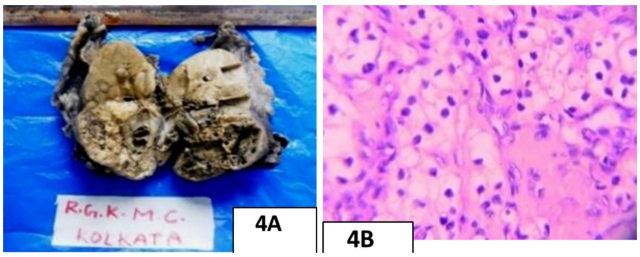

Figure 4: Clear-cell Renal cell carcinoma (RCC) (a–b). a: A golden yellow mass at the lower pole with hemorrhage, necrosis, and cystic degeneration in a renal cell carcinoma. b: Acinar pattern of RCC with polygonal cells, abundant clear cytoplasm and slightly pleomorphic round nuclei - nuclear grading-II (H&E, 400x)

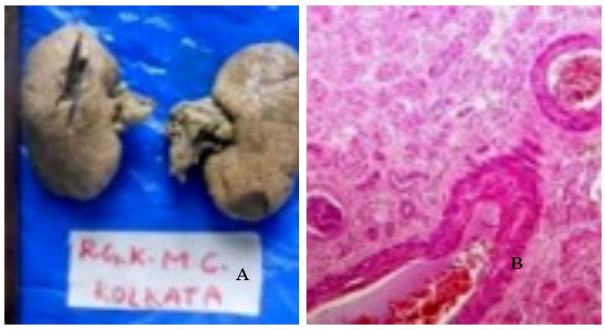

Figure 5: End-stage shrunken scarred kidneys (a–b). a: Gross appearance of granular contracted kidneys. b: Myointimal hyperplasia (arrow) in concentric fashion in the renal arteries in end-stage renal disease (granular contracted kidney): H&E,100x

DISCUSSION

This series documents 56 incidental renal lesions in 50 grossly abnormal kidneys from consecutive medicolegal autopsies. Two patterns are notable. First, simple cortical cysts formed about two-thirds of all lesions, with most measuring under 5 cm. Secondly, important but less frequent entities such as end-stage shrunken scarred kidneys, autosomal dominant polycystic kidney disease (ADPKD), and a clear-cell renal cell carcinoma (RCC) were also identified. Co-existence was common, especially simple cysts within shrunken scarred kidneys. These findings support the value of systematic grossing and histology in autopsy work, as stressed by Oliver et al. and by Indian autopsy experience from Patel et al. and Gouda et al. [1, 3, 4].

Simple cortical cysts are recognised as common, usually cortical, and often asymptomatic in standard pathology texts. Robbins (Alpers et al.) describes their cortical predilection and incidental detection on microscopy, which is in line with the present series [7]. The single ADPKD showed enlarged, cyst-laden kidneys with the expected epithelial linings; Rosai and Ackerman's Surgical Pathology outlines these features and their variability across patients [8].

Renal leiomyoma is rare. Steiner et al. described two patterns—minute capsular lesions found incidentally and larger masses that may be symptomatic [9]. Nagar et al. and Lee et al. reported capsular tumours confirmed on microscopy and characterised on imaging, respectively [10, 11]. The leiomyoma here was recognised only at autopsy and confirmed histologically, which fits within this benign spectrum. Additional descriptions by Kho et al. also emphasise smooth-muscle differentiation on histology and immunohistochemistry [12].

Regarding RCC, Chiong et al. noted that renal tumours are often detected incidentally in contemporary practice [13]. In clinicopathological cohorts, Dall'Oglio et al. found smaller size and better survival among incidentally detected RCCs compared with symptomatic tumours [14], and Porena et al. reported earlier stage at ultrasound-based detection in incidental cases [15]. The single small clear-cell RCC in this series is consistent with those observations.

Stones and hydronephrosis together reflected obstructive pathology. Robbins (Alpers et al.) summarises hydronephrosis as progressive dilatation with cortical thinning due to outflow block [7]. Calcium-based stones are the commonest worldwide; Coe et al. and Pak provide concise overviews of composition and epidemiology, which broadly align with the unilateral, male-predominant stones seen here [16, 17].

Shrunken scarred kidneys represent end-stage change. Although dialysis cohorts are not directly comparable to medicolegal autopsies, Ratcliffe et al. showed that acquired cystic disease is frequent in end-stage kidneys on dialysis, which makes the co-existence of cysts with scarring biologically plausible [18]. The present cases were not known dialysis patients; therefore, this is a descriptive comparison only.

Limitations: Medicolegal autopsies are performed for sudden or unnatural deaths and male-skewed in our setting; therefore, lesion frequencies should be read as descriptive pathology of the autopsy caseload, not as community prevalence. These data complement Indian surveillance gaps noted by Agarwal et al., Rajapurkar et al., and Singh et al. [2, 5, 6]. The small sample and the inclusion of only grossly abnormal kidneys also limit generalisability.

CONCLUSION

In this medicolegal autopsy series, 56 incidental renal lesions were identified across 50 grossly abnormal kidneys. Simple cortical cysts were the most common lesions (39/56), followed by shrunken scarred (granular contracted) kidneys (8/56). Renal stones and hydronephrosis were less frequent (3/56 each). Single lesions included autosomal dominant polycystic kidney disease, a capsular leiomyoma, and a clear-cell renal cell carcinoma, highlighting that important lesions may remain silent in life.

These findings describe the autopsy caseload and should not be read as community prevalence. Nevertheless, systematic grossing and routine histology of autopsy kidneys

provide useful feedback for clinical audit and can guide future work on timely detection and care pathways. Multicentre studies with imaging–autopsy correlation and standardised reporting would strengthen generalisability.

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