

Histomorphological spectrum and prevalence of various kidney lesions: an autopsy study at the tertiary care center

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Abstract

Background: For establishing cell and organ culture as well as xenotransplantation, autopsy assists in identifying the normal as well as diseased human tissue for morphologic studies. It also helps in discovering new diseases and evaluating the toxic effects of drugs and therapies. Kidneys are also affected by chronic inflammatory lesions, neoplasms, toxic effects of various drugs, and metabolic disorders. **Aim and objective:** To evaluate histomorphological spectrum and prevalence of various kidney lesions in patients with chronic kidney disease (CKD) from autopsy specimen. **Material and method:** Three hundred and eighty autopsies were studied in two years after gross pathological examination. Tissue sections were examined with hematoxylin and eosin stain. Based on gross and microscopic examination lesions were categorized into glomerular, vascular, tubular, and interstitial lesions. **Result:** The majority of the specimens were from male (78.4%) patients. The mean age was 55.61 ± 10.57 years. The most common lesions were of cloudy swelling [47 (12.3%)] followed by 36 (9.4%) cases of changes of CKD mainly at the subcortical region, 35 (9.21%) cases with CPN, 27 (7.1%) case of acute tubular necrosis and 9 (2.3%) case of tubulointerstitial disease. **Conclusion:** Glomerular and interstitial fibrosis lesions, the inflammatory chronic infiltrate, as well as vascular lesions are commonly occurring lesions in patients with CKD.

Keywords: autopsy study, chronic kidney disease, kidney lesions, arteriosclerosis

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Introduction

Autopsy not only helps in finding the cause and manner of death but also provides invaluable information in the interest of public health. By identifying risks and monitoring disease trends also help in the diagnosis of undiagnosed or misdiagnosed various diseases irrespective of the underlying cause of death, which may or may not be related cause of death [1,2]. Chronic kidney disease (CKD), which nearly doubled as a cause of death worldwide between 1990 and 2010 and was the 18th highest cause of death worldwide in 2010, falls into this category of diseases. CKD is a large and growing health care concern, but its epidemiology is not well understood [3]. Renal diseases are a large deal of morbidity with a huge medical and financial burden. The kidneys are often affected by chronic inflammatory lesions, neoplasm, toxic effects of various drugs, and metabolic disorders. Chronic kidney disease (CKD) is now recognized as a major global public health problem and is an independent risk factor for cardiovascular disease [4]. In many developed countries, the prevalence of CKD approaches 15% of the adult population, and continues to rise predominantly due to diabetes, alcohol, obesity, and hypertension [6]. The development of chronic kidney disease is insidious, and etiologies such as diabetes and hypertension are often underdiagnosed at the population level, presentation with kidney disease is typically late [7]. Autopsy kidney specimens are a rich source of renal pathology and their evaluation gives valuable information about the ice-berg of various renal pathology. Ultimately, our understanding of how kidney disease

contributes to morbidity and mortality. Updated epidemiological studies evaluating the spectrum of kidney diseases that lead to CKD are needed to improve patient care, disease prevention, and public health interventions. The presence of renal pathological abnormalities also represents important diagnostic criteria for various kidney pathology. Since the forensic postmortem examination involves the microscopic examination of the kidney, we tried to evaluate various pathology based on the microscopic results of an autopsy.

Material and method

A retrospective autopsy study was conducted on kidney specimens of 380 routine autopsies received for two years from January 2016 to December 2017 in the Department of Pathology, Autopsy section, of a tertiary care hospital. All the autopsy subjects irrespective of age, sex, and cause of death were included in the study. Pediatric age groups were excluded. Examination of both kidneys grossly and microscopically was done. The medical and clinical history were traced. The specimens were fixed in 10% formalin, weighed and dimensions were measured. Grossly kidneys were examined for color, volume (contracted or enlarged kidney), presence of scarring, fibrosis, cyst, hemorrhage, necrosis, and findings were recorded. Irrespective of the presence or absence of morphologically demonstrable lesions, a minimum of two sections per kidney were studied (total 4 sections per autopsy). After routine processing and paraffin embedding, 4-micrometer sections were taken. All the histological sections were stained in H and E stain and mounted. All the histological sections were examined microscopically, and findings are recorded. All the data analysis was performed using IBM SPSS ver. 20 software. Frequency distribution and cross-tabulation were performed to prepare the tables. All the data are expressed as numbers and percentages.

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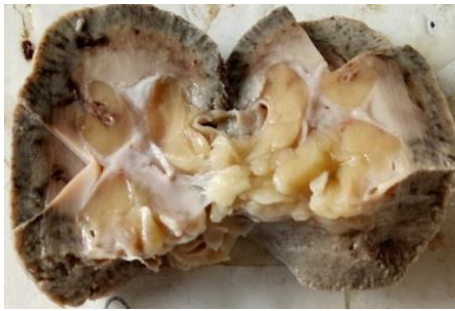


Fig 1: The cut surface of the kidney with marked tubular necrosis

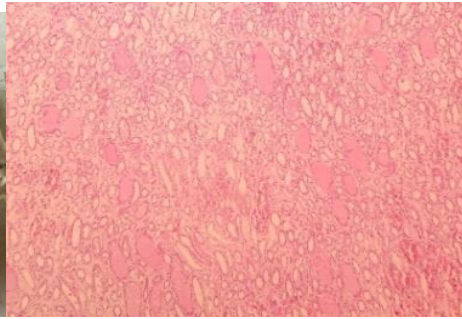


Fig 2: Changes of Acute medullary fatty change with Loss of corticomedullary demarcation

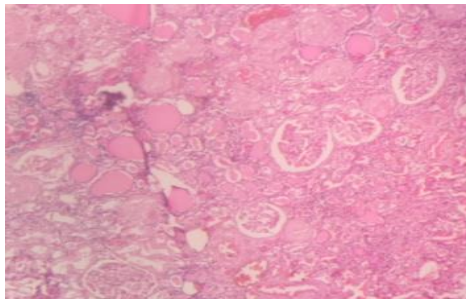


Fig 3: Chronic pyelonephritis

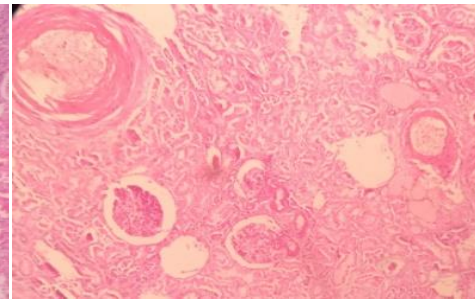


Fig 4: Vasculosclerosis. Tubules show thyroidization. Tubules are surrounded by abundant fibrous tissue and chronic interstitial inflammatory reaction.

Result

In the present study, the gender distribution showed that 298 (78.4%) were males and 82 (21.5%) were females. The mean age of the study cohort was 55.61+ 10.57. Out of 380 routine autopsies received, 298 were males, of that 166 were received in the year 2017 and 132 were received in 2016. Out of 82 female routine autopsies received, 54 were received in the year 2017 and 28 were received in 2016.

Table 1: Distribution of various lesions observed at histopathology examination

Histomorphological finding (n=380)	2016	2017	Total (%)
Cloudy swelling	22	25	47 (12.3)
Chronic pyelonephritis	14	21	35 (9.2)
Acute tubular necrosis	11	16	27 (7.1)
Glomerulo and vasculosclerosis	15	19	34 (8.9)
Tubulointerstitial lesion	00	9	09 (2.3)
Normal	53	62	115(30.2)
Autolysed	11	15	26 (6.8)
Autopsy without kidney specimen	23	21	44 (11.5)
Miscellaneous	1	6	7 (1.8)
Changes of chronic kidney diseases mainly at the subcortical region	10	26	36 (9.4)
Total	160	220	380

Discussion

In the present study majority of the specimens were from the male population (78.4%) as compared to females (21.5%) with a mean age of 55.61+ 10.57 years. In the present study, 115 specimens were without any significant pathology. This can be comparable with a study conducted by Usta et al on 55 renal autopsies out of which 23 cases exhibited normal histology[8]. It has been observed in the present study that the most common pathological finding was chronic pyelonephritis (n=35 cases). It was also observed that the most common finding was CPN (15.2%). Chronic glomerulosclerosis is accompanied by a tubulointerstitial lesion which is comparable to the study conducted by Patel- Parul correlating etiological factors like Bhavnagar is located in the coastal area of Gujarat and prolonged exposure to hard water which is prone to stone[9]. Ojo et al found chronic pyelonephritis as a cause of CRF in 9% of patients[10]. US Renal Data System had a higher incidence of chronic pyelonephritis,

especially in patients in the third and fourth decades[11]. We observed 9 cases of tubulointerstitial lesions profound at the medulla and sometimes in the renal pelvis. We must mention that these interstitial lesions diminished towards the renal cortex. They may or may not be accompanied by tubular and glomerular changes as seen in CPN. Our work showed that 36 cases with asymptomatic changes mainly at the subcortical region with variable size of interstitial inflammatory infiltrate form vague triangular shape with the base toward renal capsule accompany by some glomeruli fibrosis and hyalinization. We do not know the exact significance of these lesions, but they differ from the lesion caused by CPN. Such types of lesions may be due to underlying chronic diseases like hypertension, diabetes, obesity, alcohol, and smoking. Nephrosclerosis at autopsy is associated with increasing age and is more frequent in blacks than whites[12]. The present study revealed changes of glomerulosclerosis and vasculosclerosis in 34 cases, and it has been observed

atherosclerotic changes in the aorta and coronary of the same patient and most of them are middle-aged as well as splenic vessels also show sclerotic changes. AH is a frequent disease whose prevalence increases with age. Approximately 25% of the general population is affected by AH[13]. Tracy et al. mention that both hyalinization of arterioles and arteriosclerosis tend to increase with age in most visceral organs, both features are exaggerated in the kidneys of hypertensive compared with non-hypertensive subjects.¹⁴ Some observers suggest that renal arteriosclerosis is strongly linked with hypertension[14]. The present study showed 47 cases with cloudy swelling in the kidney, it is more frequently seen in sudden death, due to circulatory collapse such type of finding is there in the kidney. Our study showed that 27 cases are of acute tubular necrosis (ATN) out of which 19 cases showed the ischemic type of ATN and 8 cases are of the toxic type of ATN, which is comparable to Sandhu et al. 27 (22.5%) cases had acute tubular necrosis.¹⁵ Toxic type of ATN may be due to death by taking some pesticide, some poisonous substance, or overdose of drug and snake bite while the ischemic type of ATN due to sudden cardiovascular collapse, or crush injury in a road accident or blunt traumatic abdominal injury. Miscellaneous were 7 cases, 2 cases of diabetic nephropathy, one case of tuberculous nephropathy, one case of leukemic cell infiltration kidney, 2 cases of the cystic lesion, and one case of suppurative nephritis.

Conclusion

Our study revealed that autopsy is a gold standard not only to determine the cause of death but also to give substantial information regarding the prevalence of a particular disease. The analysis of data gives a beautiful spectrum of various kidney pathology, but the study cannot give the actual prevalence of kidney diseases in the population. The present study showed that tubulointerstitial and vascular lesions were more prevalent than the glomerular lesion. Our study highlights the interstitial lesion which might associate with CPN, while others remain unknown etiology. Most commonly we encounter chronic kidney pathology in autopsy specimen rather than acute renal disease.

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