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Histopathological Effect of Several Stages of Chronic Kidney Disease

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Annotation: This investigation was done to study the histopathology feature of several stages of chronic kidney disease. In this cross-sectional research, individuals who undergone radical nephrectomy are included. For each patient, we gathered clinical information both before and after surgery as well as a sample of kidney tissue from the cortex and medulla that was taken at least three centimeters away from the mass but was not affected by the tumor. samples were collected for histological analysis. Following surgery, a kidney tissue sample was taken that measured about 2 * 1.5 cm included both the medulla and cortex (at minimum 3 cm from the tumor). In accordance with accepted practices, all samples were embedded in paraffin and fixed in buffered formalin. Hematoxylin and eosin were used to stain kidney slices that were four microns thick. The present study showed that score 1 was significantly higher than other scores, also stage 2 showed significantly higher than another stages. In histological examination, glomerulosclerosis, extensive tubular atrophy, and interstitial fibrosis appeared among the different stages.

Inconclusion, CKD with stage 2 showed significantly higher than another stages.

Keywords: Histology, chronic, stages, scores, kidney.

Introduction:

More than 15 years ago, the categorization for chronic kidney disease (CKD) was first suggested (1, 2). The approach was created to simplify the diagnosis and prevention of renal disorders by grouping various concepts, such as renal insufficiency, renal dysfunction, as well as chronic renal failure (3, 4).

The complexity of chronic renal disease was usefully simplified by the classification. It consequently gained enormous global popularity. Albuminuria was added to the classification as a new criterion in 2012 (5).

However, the CKD categorization has come under fire due to the use of an estimated glomerular filtration rate (eGFR) and the absence of a histological foundation in the phases of renal disease .(6)

Formula-based estimates of GFR have a broad range of accuracy when reflecting true renal function, which can result in incorrectly classifying patients into advanced or early stages of CKD (7). However, there is currently a lack of conclusive evidence in this field. However, it is widely accepted that kidney histology at lower than higher stages of CKD is worse in terms of chronic lesions (8, 9).

This investigation was done to study the histological feature of several stages of CKD.

Materials and Methods:

In this cross-sectional research, individuals who undergone radical nephrectomy are included. For each patient, we collected clinical data before and after surgery, and we obtained a biopsy of tumor-free kidney cortex and medulla located at least three centimeters from the mass. samples were collected for histological analysis, and the procedure was carried out in accordance with (10). A kidney tissue sample consisting of the medulla and cortex was removed after surgery and measured around 2 * 1.5 cm (at minimum three cm from the tumor). In accordance with accepted practices, all samples were embedded in paraffin and fixed in buffered formalin. Hematoxylin and eosin and Trichrome Masson were used to stain kidney slices that were four microns thick.

Both samples were assessed for each individual patient using the score for chronic lesions that was reported by (11).

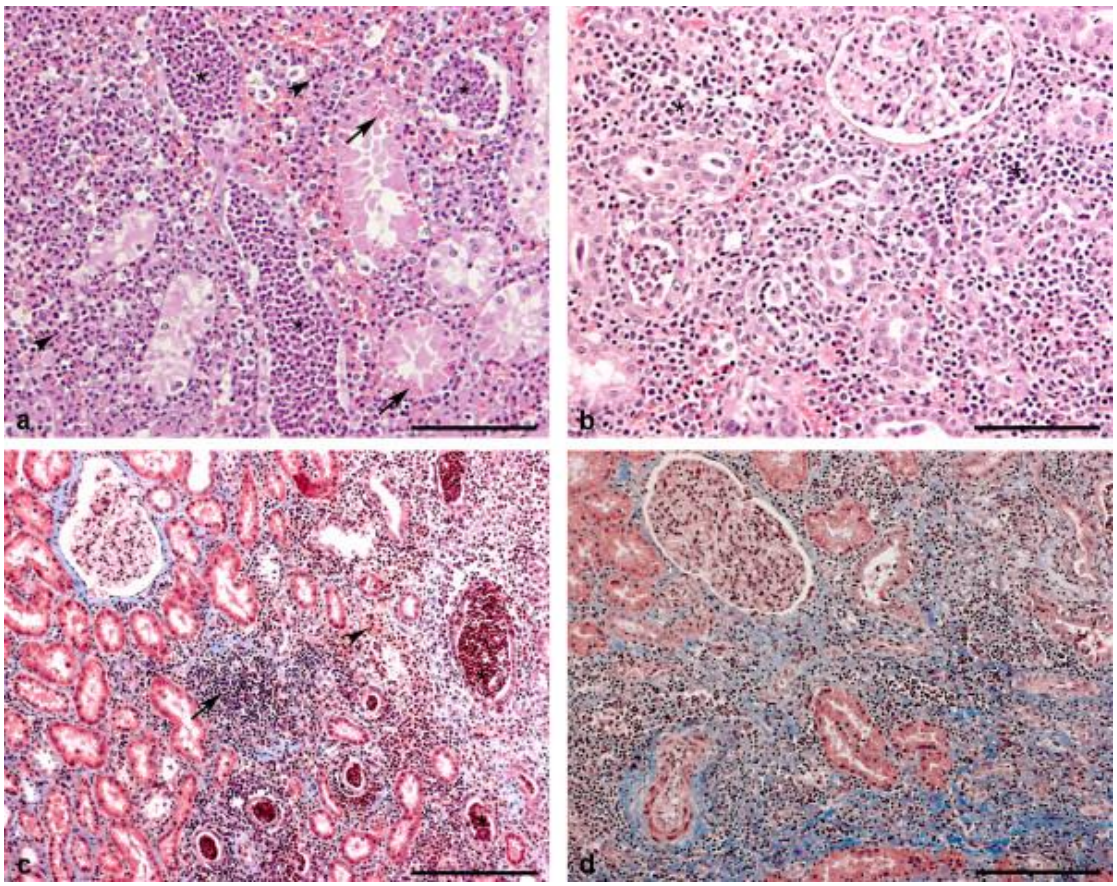
Results:

The present study showed that score 1 was significantly higher than other scores, also stage 2 showed significantly higher than another stages (Table 1)

Table 1. Stage of chronic kidney disease and Chronicity Score are used to categorize patients.

Scores	Stage 1	Stage 2	Stage 3	Stage 4-5	Total
Score0	11	12	2	-	25
Score 1	13	14	6	-	33*
Score 2	3	11	9	-	23
Score ≥3	3	5	8	3	19
Total	30	42	25	3	100

In histological examination, glomerulosclerosis, extensive tubular atrophy, and interstitial fibrosis appeared among the different stages (**fig. a,b,c,d**).



(a) stage 1 inflammation. In addition to bleeding, you may also detect interstitial cellular infiltration predominated by neutrophils (arrowheads). Additionally, tubules containing suppurative exudate (denoted by an asterisk) and tubular disintegration are shown. Hyaline droplets are seen in tubular epithelial cells (arrows). Two stains, eosin and hemotoxylin **(b)** Stage 2 inflammation in the kidney (sub-acute lesions). mononuclear cells predominate in the interstitial cellular infiltration (asterisks). eosin and hemotoxylin. **(c)** Imaging of renal inflammation at stage 3 (chronic lesions). Cellular infiltrations consisting of mononuclear cells (arrow) and neutrophils may be seen in the interstitium with edema and bleeding (arrowhead). Similarly, dilated tubules filled with suppurative exudate have been seen (asterisks). There is evidence of mild periglomerular and interstitial fibrosis. Trichrome Masson. **(d)** Kidney biopsy showing severe inflammation (stage 4) (chronic lesions). There is severe perivascular, periglomerular, and interstitial fibrosis. There is also evidence of infiltration of mononuclear cells into the interstitial spaces. Trichrome Masson.

Discussion:

Due to discrepancies between immunofluorescence studies and histological examinations of deposits, the results of the biopsy disqualified the diagnosis of glomerulonephritis. (12)

Eight individuals from El Salvador were the subjects of Wijkstrom's research; their kidney biopsies at the Karolinska University Hospital revealed interstitial fibrosis and mild to moderate tubular atrophy. Additionally, 29% to 78% of individuals had generalized glomerulosclerosis, which was visible. The authors deduced from this that the fibrosis was a result of the glomerular injury. (13) However, given that all of the patients in the study were in late stages of CKD, in which all renal tissue compartments are normally damaged, these histological results were predictable and cannot be used to determine relative order of presentation.

In our study, glomerular injury was discovered in the majority of patients, regardless of employment, including women and younger patients. (12) It becomes more obvious in individuals with stage 3 CKD, indicating the reduced kidney function.

Significant tubulointerstitial damage with areas of tubular atrophy and substantial fibrosis is not seen in the patient with early membranous glomerulopathy; hence, the patient has two diseases at once or the damage was produced by something other than membranous glomerulopathy (such as cancer or medication). The impossible is the only thing we can say for sure (14,15)

The study's glomerulopathy was caused by glomerulosclerosis and nephron loss. (16,17) A compensatory mechanism for glomerular hypertrophy, increased glomerular volume causes glomerulosclerosis and raises blood pressure(18,19)

Areas of atrophy and glomerulosclerosis were found to have mononuclear inflammatory infiltration. Chronic pyelonephritis was not considered a possibility since there was no relevant laboratory, clinical, or imaging history. This is despite the fact that chronic pyelonephritis has a similar pathological presentation (20).

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