

The evaluation of pathomorphological changes of intact by neoplastic process kidney parenchyma in patients with renal cell cancer

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Abstract

In modern onco-urology one of the most pressing problem remains the issue of the relationship between development and progression of chronic kidney disease in patients with renal cell carcinoma (RCC). Chronic kidney disease (CKD) is a graded and independent risk factor for substantial comorbidity and death. The objective was to investigate the pathomorphological features of intact by neoplastic process renal parenchyma in patients with RCC. The study enrolled 24 adult cases of RCC treated with nephrectomy. For the pathomorphological study, the sample of intact by neoplastic process parenchyma of the removed kidney was cut and fixed in 10% of the formaldehyde buffered solution. Sections of paraffin blocks were stained with hematoxylin eosin according to the standard technique. In addition, the pathomorphological changes of the intact by neoplastic process renal parenchyma were evaluated, as well as the presence of urinary syndrome, the level of creatinine, and the glomerular filtration rate (GFR) using the Cockcroft – Golta formula. In a result of the pathomorphological analysis of the intact renal parenchyma of the surgically removed kidney, we observed that the renal tubules have a single layer epithelium. Epithelial cells

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are cubic or cylindrical, with one clear, bright core. In the Shumlansky – Bowman's capsules there is shrinkage and decrease in the size of glomeruli. Thickened membranes of tubules and glomeruli due to hyalinosis. In conclusion, the presence of RCC contributes to the development of perifocal inflammatory changes in the intact by neoplastic process renal parenchyma, which in turn leads to a disturbance of protein and carbohydrate metabolism in the ultra-structure of the organ.

Introduction

In modern onco-urology one of the most pressing problem remains the issue of the relationship between development and progression of chronic kidney disease in patients with renal cell carcinoma (RCC). Chronic kidney disease (CKD) is a graded and independent risk factor for substantial comorbidity and death [1,2,8]. CKD and cancer are connected in a number of ways in both directions: cancer can cause CKD either directly or indirectly through the adverse effects of therapies; CKD may, conversely, be a risk factor for cancer; and both may be associated because they share common risk factors, often toxins [4, 5, 6].

Early detection and timely treatment of RCC on the one hand significantly improves the cancer-specific survival of this group of patients, but the influence of the neoplastic process on the unaffected part of the kidney, the development of various pathomorphological changes, the progression of chronic kidney disease in this contingent of patients to date remains unexplained and at some point is a debatable issue [3,7].

Objective: to investigate the pathomorphological features of intact by neoplastic process renal parenchyma in patients with RCC.

Material and methods of the study

The study enrolled 24 adult cases of RCC treated with nephrectomy. For the pathomorphological study, the sample of intact by neoplastic process parenchyma of the removed kidney was cut and fixed in 10% of the formaldehyde buffered solution. Sections of paraffin blocks were stained with hematoxylin eosin according to the standard technique.

In all cases the local spread of the tumor according to the TNM system was classified as T₃. There were no cases with regional lymph nodes or distant metastases (N₀ M₀). The grades of the RCC's were distributed as follows: 11 (45,8%) – G₁, 8 (33,4%) – G₂, 5 (20,8%) – G₃.

In addition, the pathomorphological changes of the intact by neoplastic process renal parenchyma were evaluated, as well as the presence of urinary syndrome, the level of creatinine, and the glomerular filtration rate (GFR) using the Cockcroft – Goltz formula.

The assessment of the urinary syndrome, creatinine levels, and GFR were determined both before and after 1 month after surgical treatment.

Table 1.

Distribution of patients by the stage of chronic renal failure according to the NKF-KDOQI*

Stage CRF	the number of patients (n – 24)
1 st. GFR ≥ 90 ml./min./1,73 m ²	0 (0%)
2 st. GFR 60 – 89 ml./min./1,73 m ²	17 (70, 8%)
3 st. GFR 30 – 59 ml./min./1,73 m ²	5 (20, 8%)
4 st. GFR 15 – 29 ml./min./1,73 m ²	2 (8, 4%)
5 st. GFR < 15 ml./min./1,73 m ²	0 (0%)

* National Kidney Foundation – Kidney Disease Outcomes Quality Initiative

Results and discussion

In a result of the pathomorphological analysis of the intact renal parenchyma of the surgically removed kidney, we observed that the renal tubules have a single layer epithelium. Epithelial cells are cubic or cylindrical, with one clear, bright core. Enlargement of the distal and proximal tubules, although sometimes tubules are noticeably narrowed. In the lumen of the proximal tubules, protein «cylinders» are visible – a sign of a of the protein metabolism disruption.

In the parenchyma there are significant hemorrhages – erythrocytes are located between the tubules and in the lumen of the glomeruli (Fig. 1).

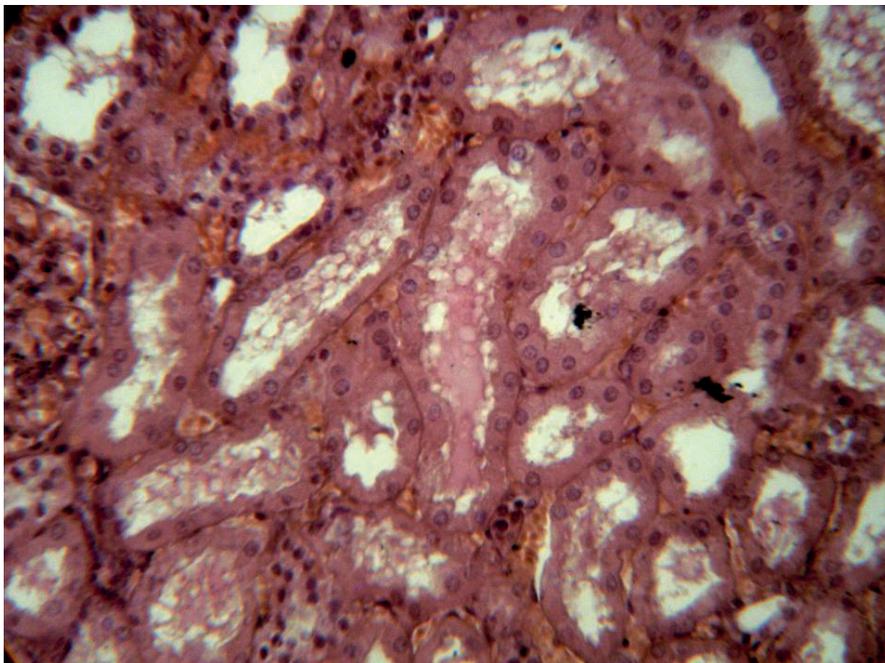


Fig. 1.

In the parenchyma there are significant hemorrhages – erythrocytes are located between the tubules and in the lumen of the glomeruli. Hematoxylin – eosin. Magnification x 400

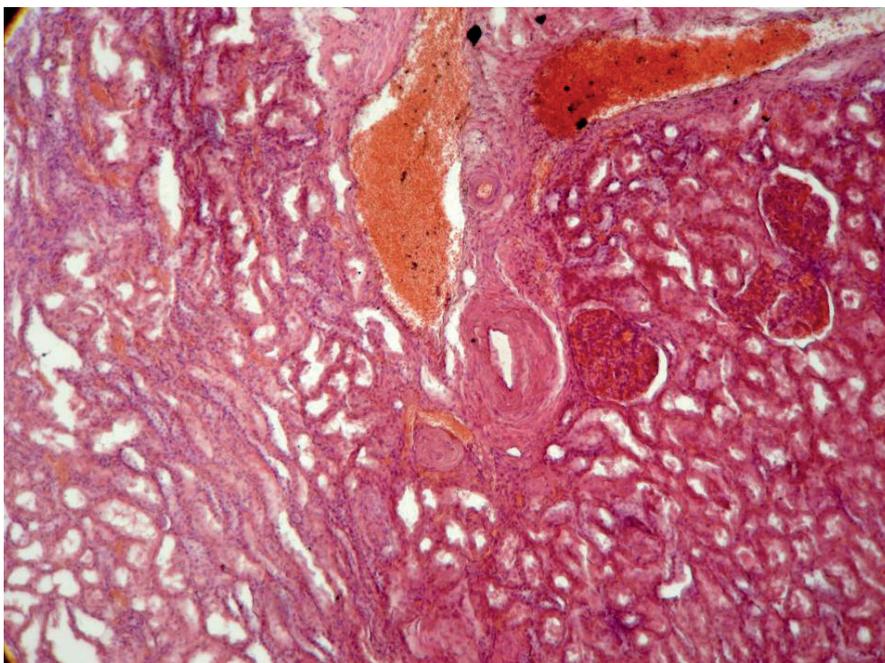


Fig. 2.

Granular cylinders in the lumen of the tubules. Hematoxylin-eosin. Magnification x 100

Parenchyma has pathological changes – appearance of connective tissue and fibrous changes; intervertebral edema. Absence of a clear division into cortical and cerebral matter. Near the blood vessels, focal lymphocytic infiltration is observed. The walls of the vessels and arteries are thickened, hyalineized.

In the Shumlansky – Bowman's capsules there is shrinkage and decrease in the size of glomeruli.

Thickened membranes of tubules and glomeruli due to hyalinosis. They look bright pink. Epithelial cells are light, large, with signs of hydrothermal dystrophy. Also visible cystic expansion of the tubules. (Fig. 3)

The histological structure of the organ is not clear due to swelling of the parenchyma and tubules. The margins of Shumlansky – Bowman's capsules are blurred, not clear. Individual glomeruli in the capsule fill almost the entire space, cells are enlarged in size, light, the boundaries between them are not followed, with signs of edema. Enlargement of the proximal tubules is narrowed. In the lumen of capsules visible protein beans.

Direct and convoluted tubules have epithelium, enlarged in size. Enlarged tubules are narrowed, almost absent. In the lumen of the distal tubules, grainy cylinders are visible.

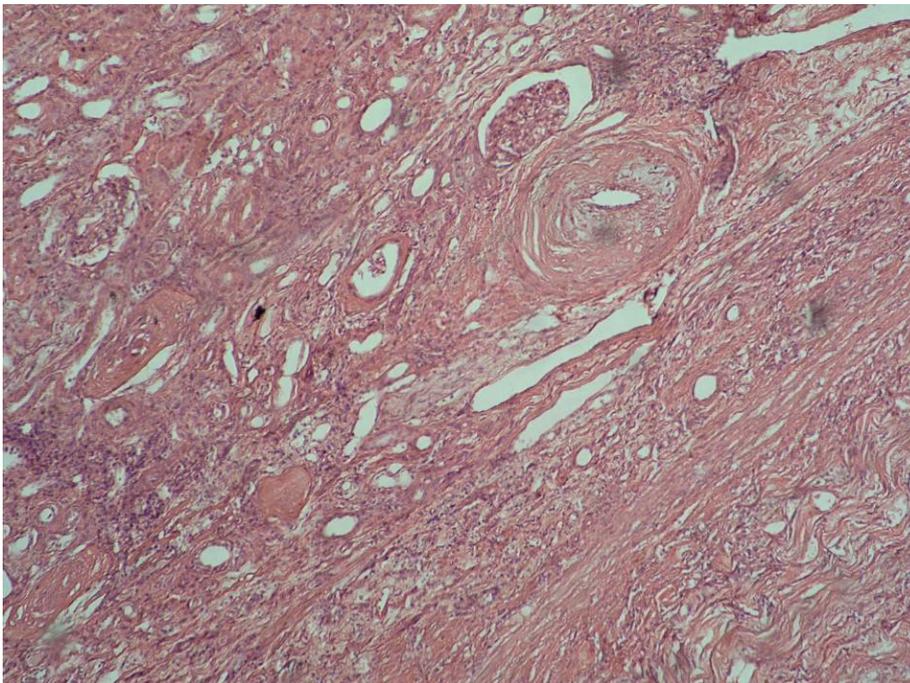


Fig. 3. Cystic expansion of the tubules. Hematoxylin-eosin. Magnification x 400

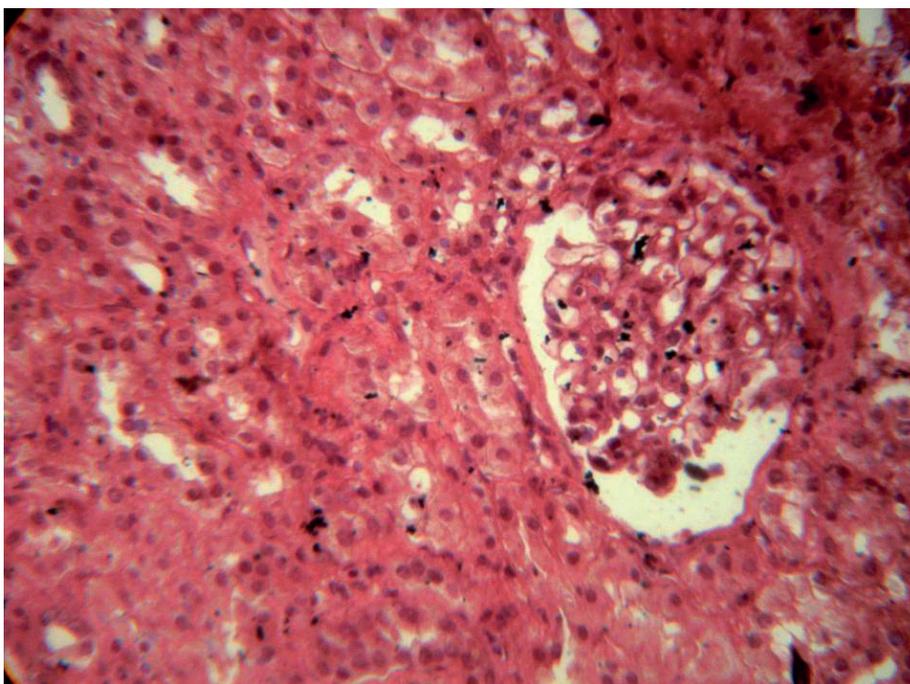


Fig. 4. In the stroma of the body noticeable focal lymphocytic infiltration. Hematoxylin-eosin. Magnification x 400

In the kidneys, there are signs of increased blood flow to the blood vessels. Notable hemorrhages – red blood cells are unevenly located in the parenchyma. The walls of vessels are noticeably thickened. In addition, in the stroma of the body noticeable focal lymphocytic infiltration.

Conclusions

In all patients with the RCC, before the initial treatment, there were signs of urinary syndrome, however, the GFR did not exceed 90 ml/min.

The presence of RCC contributes to the development of perifocal inflammatory changes in the intact by neoplastic process renal parenchyma, which in turn leads to a disturbance of protein and carbohydrate metabolism in the ultrastructure of the organ.

The level of progression of pathomorphological changes in the intact by the neoplastic process renal part depends on the localization of the tumor.

References

1. Staxovskij Э.А., Vojlenko O.A., Vukalovych P.S. Cytoreduktyvnaya rezekcyia pochky v lechenyy metastaticheskoho pochechno-kletochnoho raka. *Klynycheskaya Onkologiya* 2012; 7(3): 1–4
2. Mytsyk Y, Dosenko V, Skrzypczyk MA, Pasichnyk S et al. Potential clinical applications of microRNAs as biomarkers of renal cell carcinoma. *Cent European J Urol* 2018; 71: 295-303.
3. Padmanabhan A, Gohil S, Gadgil NM, Sachdeva P. Chronic renal failure: An autopsy study. *Saudi Journal of Kidney Diseases and Transplantation* 2017; 28(3): 545-551.
4. Ron T, Gansevoort Ricardo, Correa-Rotter, Brenda R, Hemmelgarn et al. Chronic kidney disease and cardiovascular risk: epidemiology, mechanisms, and prevention. *The Lancet*. Volume 2013; 382(9889): 339-352.
5. S Levey, Coresh J. Chronic kidney disease. *The Lancet* 2012; 379(9811): 165-180.
6. Stengel B. Chronic kidney disease and cancer: a troubling connection. *Send to J Nephrol* 2010; 23(3): 253-62
7. Schwarz AU, Buzello M, Ritz E, Stein G et al. Morphology of coronary atherosclerotic lesions in patients with end-stage renal failure. *Nephrology Dialysis Transplantation* 2000; 15(2): 218–223.
8. William C Huang, Andrew S Levey, Angel M Serio et al. Chronic kidney disease after nephrectomy in patients with renal cortical tumours: a retrospective cohort study. *Lancet Oncol*. 2006 Sep; 7(9): 735–740.