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Denotements for Morphological Study of the Kidneys and Paramount Considerations

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Abstract: *A kidney biopsy is a procedure in which a sample of kidney tissue is removed for microscopic examination. Kidney biopsy has contributed greatly to the classification of intrinsic renal diseases and hence to a better understanding of their pathogenesis. Although there are many studies regarding kidney biopsy. There is little literature regarding the correlation between indications and histopathology especially in Uzbekistan. Patients who had clinical and/or laboratory evidence of renal disease, whose diagnosis was uncertain by noninvasive methods, and who were eligible for renal biopsy underwent renal biopsy.*

Keywords: *Kidney biopsy, Diagnostic method, Renal pathology, Biopsy indications*

Introduction

A kidney biopsy is an invasive diagnostic method in which a piece of organ tissue is removed for subsequent microscopic analysis [1,13,24]. This process plays a key role in determining the diagnosis, monitoring the condition and choosing treatment methods for various kidney pathologies. The introduction of biopsy techniques into medical practice had a significant impact on the development of nephrology, allowing for a deeper understanding of the mechanisms of development of renal diseases and improving their classification. Despite the emergence of new, less invasive diagnostic methods, biopsy remains an indispensable tool for assessing the condition of the kidneys, predicting the course of diseases and determining treatment strategies. Modern technologies such as biopsy guns and ultrasound guidance are increasing the use of this procedure. Historically, the first open biopsy was performed at the end of the 19th century [2,18,25], and the percutaneous biopsy method was first performed by Alwall in the mid-20th century [3,29,33]. It quickly became an important tool for diagnosing acute renal failure and other kidney diseases, which was previously only possible on the basis of autopsy, as reported in the studies of Iversen and Brun [4,12,30]. Thanks to this procedure, scientists were able to better understand the natural history of kidney disease. The development of immunofluorescence and electron microscopy

techniques has significantly increased the diagnostic capabilities of biopsies about the histopathology, pathogenesis and classification of kidney diseases [5,17,26]. Nowadays, thanks to the use of ultrasound and automatic needles, the procedure has a high diagnostic value, over 99% of biopsies are diagnostic [6,15,28]. Percutaneous renal biopsy remains a valuable tool in nephrology for accurate diagnosis, prognosis, and optimal treatment for patients with renal disease [7,11,31]. However, given the risks and possible complications, it is important to carefully weigh the benefits and potential harms of the procedure for each specific case [8,9,21]. Due to the subjectivity of such an assessment, doctors' opinions about the indications for a biopsy can vary significantly [10,11,22].

The purpose of this study was to elucidate the relationship between indications and histopathology of renal biopsies.

Methodology

The methods we used in writing our scientific article are as follows:

Research Design

A retrospective examination of kidney biopsies carried out in Uzbekistan.

Patient records of people who had kidney biopsies because they had laboratory or clinical evidence of renal illness are the source of the data.

Patients who are eligible for a kidney biopsy but have an unclear noninvasive diagnostic status are considered to meet the inclusion criteria.

Patients with kidney biopsy contraindications or those with a definite diagnosis that does not require a biopsy are excluded.

Data Analysis

Association between kidney biopsy indications and histopathological results.

Ethical Considerations

Adherence to moral standards pertaining to patient consent and data confidentiality.

Methodology

Patient selection is the process of identifying people who, in light of clinical and laboratory data, satisfy the requirements for a kidney biopsy.

Renal Biopsy Procedure

A standardised procedure for obtaining tissue samples for microscopic analysis during kidney biopsies is followed.

Histopathological Analysis

Pathologists examine kidney tissue samples to determine the presence of particular renal disorders. Data Compilation: Gathering clinical indications, histopathology results, and patient demographics for study.

Statistical Analysis

Applying suitable statistical techniques to ascertain relationships between histopathological findings and biopsy indications.

Interpretation of Results

Results are interpreted to improve knowledge of intrinsic renal disorders in the population of Uzbekistan.

Limitations: Any restrictions on the study's design or the availability of data that might have an effect on the findings are acknowledged.

Implications: The study's possible effects on Uzbekistan's ability to diagnose and treat kidney disorders are discussed.

Clinical indications for kidney biopsy

1. **Rapidly progressive glomerulonephritis insufficiency (RPGN).** In cases where patients experience rapid deterioration of kidney function and there is a suspicion of an acute inflammatory process affecting the glomeruli or interstitial tissue, it is advisable to perform a kidney biopsy. Such a procedure can be critical to determining whether diseases can be treated, even if there is an increased risk of complications, because it helps clarify a diagnosis that may not be clear on standard clinical tests.
2. **Hematuria.** When hematuria is detected, especially when it is accompanied by a significant number of dysmorphic red blood cells of 75 to 80 percent or more than 4 to 5 percent of acanthocytes, which may indicate glomerular pathology, renal biopsy becomes an important diagnostic tool. In such situations, although there are no clear recommendations for performing a biopsy in patients with isolated hematuria, the procedure may be decisive for establishing an accurate diagnosis.
3. **Chronic renal failure.** In situations where a patient has been diagnosed with chronic kidney failure, a biopsy is not usually recommended. However, if the patient has a moderate decline in kidney function and the organ size remains within normal limits, a biopsy may be appropriate to determine the nature of the kidney disease and the possibility of tissue repair.
4. **Nephrotic proteinuria.** Kidney biopsy may be recommended for patients with proteinuria levels of 1 to 2 grams per day, continued normal kidney function, and minor abnormal urine tests. This is especially true if there are signs of orthostatic proteinuria, nephrosclerosis or reflux nephropathy, which can lead to secondary focal glomerulosclerosis. The importance of biopsy increases when symptoms and clinical findings suggest primary glomerular disease.
5. **Diabetic nephropathy.** In the presence of non-insulin-dependent diabetes with proteinuria but no retinopathy, a kidney biopsy may be indicated to rule out kidney disease not related to diabetes. In the context of diabetic nephropathy, various types of glomerulopathies may manifest, including membranous nephropathy[11], minimal change nephropathy[12], acute glomerulonephritis[13], anti-GBM nephritis[14] and IgA nephropathy[15], especially in patients with type 1 diabetes. Kidney biopsy is recommended if a patient with diabetes does not have retinopathy and neuropathy[17], which may indicate unrelated kidney disease, or if renal function is rapidly deteriorating with hematuria[18].
6. **Kidney disease in SLE:** Kidney biopsy plays a key role in determining the stage of lupus nephritis in patients with systemic lupus erythematosus (SLE), which influences the choice of treatment. In SLE accompanied by proteinuria and hematuria, any stage of the glomerular apparatus may be affected, even if renal function is normal or reduced. Sometimes with SLE, the first manifestations concern

the kidneys, and systemic symptoms develop later, which is often found with membranous glomerulonephritis. In some cases, a kidney biopsy may reveal membranous nephritis even if biological markers of SLE have been absent for a long time. Biopsy may also reveal mesangial immune deposits and subendothelial deposits characteristic of lupus nephritis, even if there are no clinical signs of renal involvement. In such cases, they speak of "silent" nephritis, which can manifest as mesangial or mild focal proliferative changes.

7. **Kidney biopsy after transplantation**. A biopsy of a transplanted kidney may be necessary for various reasons. In the initial period after transplantation, it helps determine whether oligoanuria is the result of acute tubular necrosis or other irreversible damage, such as infarction or extremely rapid rejection. This method is also used to distinguish acute organ rejection from side effects of medications, infectious diseases, or other factors causing dysfunction of the transplanted kidney. Later after surgery, a biopsy may reveal causes of gradual decline in kidney function, whether chronic rejection, calcineurin inhibitor toxicity, recurrence of the primary disease, viral infections, or new-onset glomerulonephritisz.

Result and Discussion

Important considerations and safety precautions when performing a kidney biopsy

1. **Kidney formation.** If a person has polycystic kidney disease, this is considered a categorical limitation for performing a kidney biopsy. However, if there are large cysts or well-localized renal neoplasms, this is not an absolute limitation. In such cases, either an ultrasound-guided renal biopsy or an open surgical biopsy should be performed.
2. **Single kidney**. The presence of only one kidney is usually considered a reason to avoid percutaneous kidney biopsy. However, the exception is transplanted kidneys, which are often biopsied due to their accessible location and the ability to perform compression hemostasis. Advances in technology such as real-time ultrasound guidance and automated biopsy guns have improved the safety of performing native solitary kidney biopsies. Positive results were observed in both adults [19] and children [20]. In situations where a patient only has one kidney, an open biopsy is an alternative.
3. **Chronic renal failure.** In chronic renal failure, especially when it results in smaller and deformed kidneys, the risk of complications from biopsy increases and the likelihood of obtaining reliable data decreases. Therefore, a biopsy is recommended only for those patients whose kidneys remain relatively normal in size. Before the procedure, it is necessary to ensure that blood pressure is stabilized and any abnormalities in the blood coagulation system are corrected.
4. **Urinary tract infection**. Active inflammation of the upper urinary tract, which has not been treated, is a reason to refuse a kidney biopsy. This carries the risk of creating

direct contact between the urine collection system and the possible formation of a perirenal hematoma, which can lead to serious infection of the hematoma.

5. **High blood pressure**. High blood pressure increases the likelihood of complications after a biopsy. Using medications to lower blood pressure can reduce this risk, but blood vessels affected by sclerosis can lead to excessive bleeding. Therefore, uncontrolled hypertension should be recognized as a significant risk factor for the development of postoperative complications.
6. **Blood clotting disorders**. Hemorrhagic diathesis is a clear contraindication for renal biopsy. Patients with impaired renal function often have prolonged bleeding time despite coagulation results remaining within normal limits. This increases the likelihood of bleeding after the biopsy procedure, especially if the bleeding time is significantly prolonged. However, preoperative administration of desmopressin 0.3 μmol/kg over 30 minutes may temporarily normalize bleeding time, making biopsy possible.
7. **Other:** - Renal artery aneurysm, perinephric abscess and horseshoe kidney, especially in the presence of calcified atherosclerosis, usually do not allow percutaneous biopsy. But in some clinical cases, when the benefits outweigh the potential risks, an open biopsy may be considered.
8. **Kidney biopsy during pregnanc**y: Kidney biopsy performed early in pregnancy, before 30 weeks, is usually not accompanied by serious complications [21]. However, during the period before and after childbirth, the development of perirenal hematomas is possible[22]. Therefore, a biopsy should only be performed in cases where it is necessary to diagnose conditions not associated with severe preeclampsia. Patients with AL amyloidosis may be deficient in factor X due to its binding to amyloid deposits[23]. This, in turn, can lead to vascular occlusion and vasoconstriction after biopsy, increasing the risk of bleeding. Therefore, before biopsy in patients with amyloidosis, it is necessary to conduct a thorough examination for hemostasis disorders. The goal of a renal biopsy is to maximize the recovery of a suitable tissue sample with minimal risk of complications. Modern percutaneous biopsy is performed under ultrasound guidance, which reduces the risk of complications compared to blind biopsy. Although some practitioners continue to use Franklin Silverman and Tru-Cut needles, Cozens and colleagues [24] compared 15-gauge Tru-Cut renal biopsy with ultrasound localization and marking in a retrospective study. also with an 18-gauge kidney biopsy, which was performed under real-time ultrasound guidance. When using a blinded method, they reported a 79% yield of adequate renal tissue, while 93% when using real-time ultrasound guidance [22]. Also, similarly, two other comparable studies reported a higher mean glomerular proportion in biopsies that were obtained with real-time ultrasound compared with biopsies performed blinded [25,26].

Conclusion

Kidney biopsy is one of the most important diagnostic methods for nephrologists. In our study of the literature, the most common indication for renal biopsy was protinuria and hematuria, and the most common histopathological diagnosis was IgA nephropathy. Thus, a morphological study using a puncture biopsy of the kidneys is an important point in the diagnosis and in the selection of drug treatment for patients with end-stage chronic renal failure.

References

Ahuja TS (1998) Diabetic nephropathy with anti-GBM nephritis. American Journal of Kidney Diseases 31: 127-130. Link: https://goo.gl/GCUy6z

Alwall N (1952) Aspiration biopsy of the kidney, including interalia, a report of a case of amyloidosis diagnosed through aspiration biopsy of the kidney in 1944 and investigation at autopsy in 1950. Acta Med Scand 143: 430-435. Link: https://goo.gl/4XEK9d

Burstein DM, Korbet SM, Schwartz MM (1993) The use of the automatic core biopsy system in percutaneous renal biopsies: A comparative study. Am J Kidney Dis 22: 545-552. Link: https://goo.gl/PMWybC

Chen HH, Lin HC, Yeh JC, Chen CP (2001) Renal biopsy in pregnancies complicated by undertermined renal disease. Acta Obstetrica Gynecologica Scardlinavica 80: 888-893. Link: https://goo.gl/Gj1Aru

Choufani EB (2001) Acquired factor X deficiency in patients with amyloid light chain amyloidosis: incidence, bleeding manifestations, and response to high-dose chemotherapy. Blood 97: 1885-1887. Link: https://goo.gl/AdHg8K

Cozens NJ, Murchison JT, Allan PL, Winney RJ (1992) Conventional 15 G needle technique for renal biopsy compared with ultrasound-guided springloaded 18 G needle biopsy. Br J Radiol 65: 594-597. Link: https://goo.gl/QqgN7P

Greenbaum LA Simckes AM, McKenney D, Kainer G, Nagaraj SK, et al. (2000) Pediatric biopsy of a single native kidney. Pediatric Nephrology 15: 66-69. Link: https://goo.gl/iAuJ6M

Iversen P, Brun C (1951) Aspiration biopsy of the kidney. Am J Med 11: 324-330. Link: https://goo.gl/cVJcg2

Kuller J, D'Andrea NA, Mc Mahon MJ (2001) Renal biopsy and pregnancy. American Journal of Obstetrics and Gynecology 184: 1093-1096. Link: https://goo.gl/6CpZj4

Madaio MP (1990) Renal biopsy. Kidney Int 38: 529-543. Link: https://goo.gl/MA387e

Mak SK (2001) Prospective study on renal outcome of IgA nephropathy superimposed on diabetic glomerulosclerosis in type 2 diabetic patients. Nephrology Dialysis Transplantation 16: 1183-1188. Link: https://goo.gl/rpdu5h

Marwah DS, Korbet SM (1996) Timing of complications in percutaneous renal biopsy: What is the optimal period of observation? Am J Kidney Dis 28: 47-52. Link: https://goo.gl/jg1PtA

Maya ID, Maddela P, Barker J (2007) Allon M Semin Dial 20: 355-358. Link: https://goo.gl/jvHxz3

Mendelssohn DC, Cole EH (1995) Outcomes of percutaneous kidney biopsy, including those of solitary native kidneys. American Journal of Kidney Diseases 26: 580-585. Link: https://goo.gl/CwFQX2

Mesquita M, Fosso C, Bakoto Sol E, Libertalis M, Corazza F, et al. (2011) Vanden Houte K, Dratwa M. Acta Clin Belg 66:104-109. Link: https://goo.gl/4ytyyB

Monga, G (1989) Pattern of double glomerulopathies: a clinicopathologic study of superimposed glomerulonephthis on diabetic glomerulosclerosis. Modern Pathology 2: 407-414. Link: https://goo.gl/jMHuqR

Oslerby R, Parving HH, Hommel E, Jorgensen HE, Lokkegaard II (1990) Glomerular structure and function in diabetes mellitus. Diabetes 39: 1057-1060. Link: https://goo.gl/MG3mkm

Parving HH, Gall MA, Skøtt P, Jørgensen HE, Løkkegaard H, et al. (1992) Prevalence and causes of albuminuria in non-insulin-dependent diabetic patients. Kidney International 41, 7585.E"762. Link: https://goo.gl/ASU9q9

Parving HH, Hommel E, Mathiesen E, Skytt P, Edsberg B, et al. (1988) Prevalence of microalbuminuria, arterial hypertension, retinopathy and nephropathy in patients with insulin dependent diabetes. Br Med J (Clip Res Ed) 296:156-160. Link: https://goo.gl/8mgh8M

Pirani CL (1994) Evaluation of kidney biopsy specimens. In Clinical indications for kidney biopsy. In Renal Pathology: with clinical and functional correlations. 2nd Ed. 'Fisher CG and Brenner 13M eds. JB Lippincott Company; Philadelphia 85-115. Link: https://goo.gl/AgGJaV

Rahbar M (2009) Kidney biopsy in west of Iran: Complications and histopathological findings. Indian J Nephrol 19: 68-70. Link: https://goo.gl/hBS2Z4

Rakhimov A.Ya. Studying The Activity Of In Vitro Antiseptics Decasan, Furacillin and Chlorhexidine Bigluconate Against Hospital Strains of S. Aureus, E. Coli, Klebsiella Spp., P. Melaninogenica Separated from the Bed of the Soleus Muscle Texas Journal of Medical Science ISSN NO: 2770-2936, https://zienjournals.com Date of Publication:26-07-2022

Rakhimov A.Ya. The Effectiveness of Traditional the Method of Amputation and Treatment at the Lower Leg Level of Patients with Diabetic Foot Syndrome with Critical Lower Limb Ischemia. European Journal of Life Safety and Stability (EJLSS) ISSN2660-9630. www.ejlss.indexedresearch.org Volume 19, July-2022

Rakhimov A.Ya., Qurbonov O.M., Sagdullayeva G.U., Safoyev B.B., Latipov O.Z. Transcutaneous oximetry as the choice of the research for determination of level of amputation of the crus at critical ischemia of the lower extremities at patients with the diabetes mellitus. Asian Journal of Multidimensional Research. AJMR, Vol 8, Issue 12, December 2019, p. 120-125. Impact Factor: SJIF 2018 = 6.053

Richards NT (1992) Increased prevalence of renal biopsy findings other than diabetic glomerulopathy in type II diabetes mellitus. Nephrology Dialysis Transplantation 7: 397-399. Link: https://goo.gl/ZQstR7

Rose BD (1998) Indications for and complications of renal biopsy. Up To Date TM BDR-Up To Date, Inc., 6:1.

Silva F, Pace EH, Burns DK, Krous H (1983). The spectrum of diabetic nephropathy and membranous glomerulopathy: report of two patients and review of the literature. Diabetic Nephropathy 2: 28-32.

Sliem HA (2011) Renal Histopathology in Egypt, Journal of Clinical and Diagnostic Research 5: 295-300. Link: https://goo.gl/akL8eJ

Tisher CC (1989) Clinical indication for kidney biopsy (chaps 3) in Renal Pathology (2nd ed) edited by Tisher CC, Brenner BM, Philadelphia, JB Lippincott Company 75-84.

Tisher CC, Croker 13P (1997) Indications for and interpretation of the renal biopsy: Evaluation by light, electron and immune-fluorescence microscopy. In: Diseases of the kidney, 5 th ed., edited by Schrier RW, Gottshalk CW, Boston, Little, Brown and Co 485-510.

Tisher CG (1994) Clinical indications for kidney biopsy. In: Renal Pathology: with clinical and functional correlations, 2nd ed., edited by 'Fisher CG and Brenner BM, Philadelphia, JB Lippincott Co 75-84.

White 3W, Wood AC, Leonard CL (1889) The surgical treatment of nephritis. Am J Med Sci 117: 223-224.

Whitter WL, Korbet SM (2004) Timing of complications in percutaneous renal biopsy. J Am soc nephrol 15:142 -147. Link: https://goo.gl/8KZ7d8

Yi-bing Z, Hong K, Li-jun Z, Qi C, Li S, et al. (2011) Chinese Journal of Evidence-Based Pediatrics. Link: https://goo.gl/niCJB6