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The role of imaging in Chronic Renal Disease

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Abstract

The Chronic Renal Diseases is associated with increased risk for Chronic Renal Failure. The most common causes are those related with Vascular (bilateral), Glomerular, Tubulo interstitial, and Obstructive origin. Nephrologycal diagnosis means the disease history, physical examination, laboratory tests, scintigraphic examinations, imaging and diagnosis of renal biopic. In renal diseases ultrasound imaging technique represents the first choise examination and its importance lies in the exclusion of urologic pathology, differential diagnosis between acute renal failure and the chronic renal failure, Pursuit disease progress, follow renal biopsies. Ultrasonic images allows examination of the pelvis, evaluation of parenchymal echogenity and renal dimensions, sampling Color Power Doppler signals -evaluating the characteristics of distribution, as well as indicators measuring of the intraparenchimal resistance. Retrograde Pielografi is indicated in doubtful cases of obstruction despite negative ultrasound results. It is not applied in routine due to the potential risk for renal toxicity. Abdomen radiography is used primarily for radio-opaque stones or nephrocalcinosis. Cistouretrograma (VCUG) is the first choice examination for the diagnosis of vesicoureteral reflux. CT is recommended in masses and cysts first verified in ultrasound, it is a sensitive test for identifying renal calculosis and that one with contrast for the renal vein thrombosis, in renal artery stenosis, nonetheless arteriography remains the first choice. Magnetic resonance imaging MRI is indicated in patients , whom can not apply CT with contrast. Percutan Renal biopsy is performed under the ultrasound supervision. It is indicated when renal impairment and / or proteinuria approach to the nephritic threshold and the diagnosis is unclear after several examinations carried out, excluding cases when ultrasonography shows renal reduction, cicatrix and chronic irreversible damage. On the other side Renal Histology in chronic renal disease provides data on basic cause disease. All these data allow us approaching important diagnostic data in many cases, and in other cases the reduction of possible differential diagnoses.

Keywords: *Diagnosis Chronic, Renal Diseases, Imaging examinations*

1. Introduction

Chronic Renal Disease are characterized by a slow filtering of glomerular filtration and decrease the volume under 60 ml / 1.73m^2 over a long period of 3 months. The most important causes of chronic renal diseases are: Diabetes Mellitus, AHT and glomerulonefriteS. [1] Historically, chronic renal disease are classified by anatomic kidney regions involved in damages:

a) Vascular (damage who invlolve disease of big blood vassels as example bilateral renal artery stenosis or small vassels ischemic nephropathy, vasculitis or hemolytic-uremic syndrome).
b) glomerular (primary glomerulonefritis, chronic and secondary)
c) congenital (as example renal polycistic disease)
d) tubulo - interstitial (reflux nephropathy, interstitial tubulo chronic nephritis toxins or drugs, etc.),
e) obstructive (bilateral kidney stones or other diseases of the prostate).

Related to KDOQI (Kidney Disease Outcomes Quality Initiatives) renal chronic disease are clasified in 5 stages:[2]

CKD STAGE	DEFINATION
1	GFR normal or high; some evidence of kidney damage reflected by microalbuminuria, proteinuria, and hematuria as radiological or histological changes
2	Slight decline in GFR (89-60 MI / mm for 1.73 m2) with some cases kidney damage reflected by microalbuminuria, proteinuria and hematuria, as well as radiological or histological changes
3 **A** **B**	GFR 59-30 ml/mm for 1.73 m2 GFR 59 to 45 ml/mm for 1.73 m2 GFR 44 to 30 ml/mm for 1.73 m2
4	GFR 29-15 ml/mm for 1.73 m2
5	GFR <15 MI / min for 1.73 m2; When renal replacement therapy in the form of dialysis or transplantation is considered to sustain life.

Table 1 Classification of CKD based on the GFR as proposed by the Kidney Disease Outcomes QualityInitiative (KDOQI).

1. **The first stage** represents a minor damage to the kidney function, kidney damage with normal glomerular filtration or relatively high. Kidney damage is evidenced through such examinations blood tests, urine tests and imaging data. [3]
2. **The second stage** consists of a slight reduction in glomerular filtration which is associated with kidney damage was also evidenced through the aforementioned examinations.
3. **The third stage** represents a moderate reduction in glomerular filtration which differentiate the international roadmap to 3A and 3B. [4]

4. **The fourth stage** by stage constitutes a serious reduction in glomerular filtration which is oriented towards the replacement of renal replacement therapy.
5. **The fifth stage** is the stage in which renal insufficiency has stabilized and permanent replacement therapy is needed.

2. Epidemiology.

Related to chronic renal disease in 2013 results 956,000 deaths compared to 1990 where there were 409 000 deaths due to these diseases. [5] While the number of deaths in 1978 was only 14,500. In USA in ages over 20 over the period 1999-2004 they were affected with chronic renal disease 16.8% of those age while in. [6] Chronic renal diseases are frequent in pacientwt with HTA and diabetes, smokers, men and other factors of risk.

3. Materials and methods:

In this study we have analysed every imaging examination that is used in renal chronic disease. We studied all their priorities and disadvantages that these methods have in their applications.

4. Discussion:

Diagnosis: In renal pathologies diagnosis based on numerous examinations starting first with the physical examinations, laboratory tests and imaging examinations and following renal biopsy. Chronic renal disease, ultrasound is the first imaging examination. It serves to differentiate irreversible terminal format with probability the recovery of those defining dimensions and renal ecogenity hydronephrosis presence. [7, 8] from those with irreversible recovery probability defining dimensions and renal ekogenitetin, presence of hydronephrosysis etc. [7, 8] In renal chronic obstructive disease, ultrasound has a 100% sensitivity for the diagnosis of moderate and severe hydronephrosysis. However, false positive outcomes represent about 26% of cases caused by reflux uretero - vesical, cysts, para pielic cystis, intersections vascular renal pelvis, differential diagnosis cases which carried through the ECHO doppler imaging technique. Parameters assured through ECHO examination are: a) morphological parameters (antero - posterior diameter, interpolar diameter, thickness, parenchymal and ecogenity), b) pathological parameters (cysts, stones, neoplasia and hydronefrosysis), c) functional parameters (vascularization of strength index and speed of blood flow).

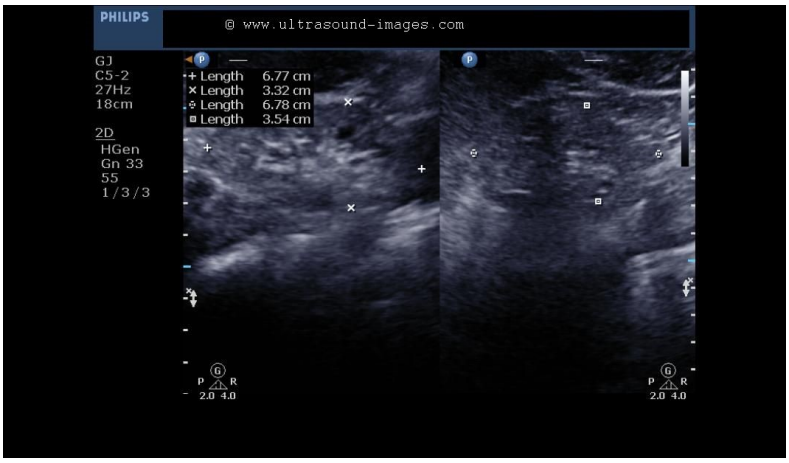
Renal dimensions: Height left kidney average is +/- 1.15 cm 11:10 while the average length of the right kidney 1:35 +/- 10.74 cm. [9.10] lower limit that is included in the normal standard settings is 9cm. [11] Kidney length between 8-9 cm related to the phenotype of the patient specifically with requirements. All lengths of 8 cm kidney article called reduced and can be attributed to chronic renal disease. To refine and differentiate a normal kidney from a chronic nephropathy to assess and renal volume. [12] Normal values kidney volume were 231 +/- 50.5 ml. [13] Reducing the volume of the kidney is a prognostic sign which connects histopathology with rates of atrophy, necrosis, fibrosis and hyperperfusion. [14] The main reason in these cases are glomerulonefritis, nephrosklerosys, nephropatites inherited and last stage of chronic renal heart failure. Patients who have undergone dialysis for a long period of time, besides reducing the

length of the border breaks cortico-medular distinctive and appear due to the cysts. Parenchimes thickness of 15-20 mm are considered normal. Studies refer to the thickness of the longitudinal diameter parenchymes relevant and not so much with the prognosis of the disease. [14] differentiate parenchymal echogenity levels in 4 grades.

Nr.	Echogenity Grades	Description
1	0	Echogenicity Poorer that of the liver Parenchyma
2	1	Echogenicity identical to that of the liver Parenchyma
3	II	Echogenicity more intense that of the liver Parenchyma
4	III	Echogenicity identical to that of the renal sinus

Table 2: Echogenity grades of kidney in Imaging

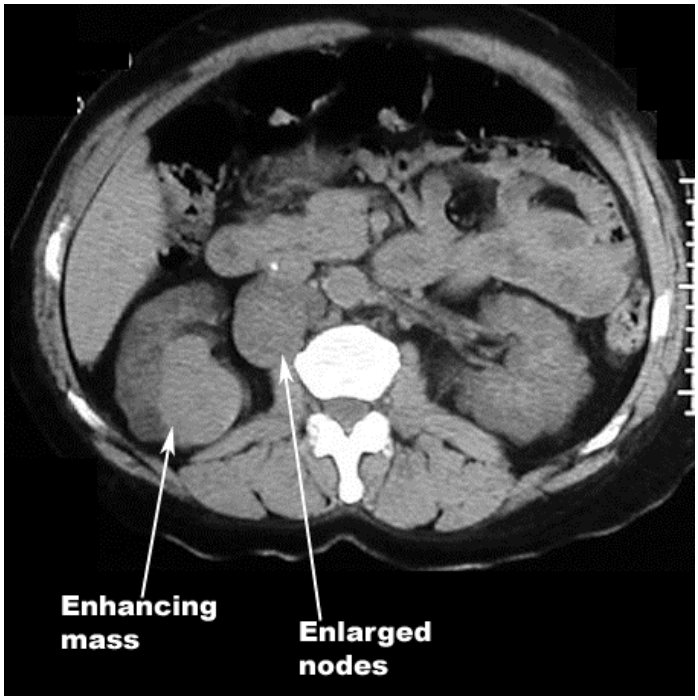
Echogenity of parenchymes varies depending on age and does not entail a change in the different types of renal histopathological lesions. In the case of glomerular schlerosyis, atherosclerosis, their prevalence is related to the degree of echogenity. He can be increased in cases of calcification or its precipitation.



Pic.1.US images in CKD

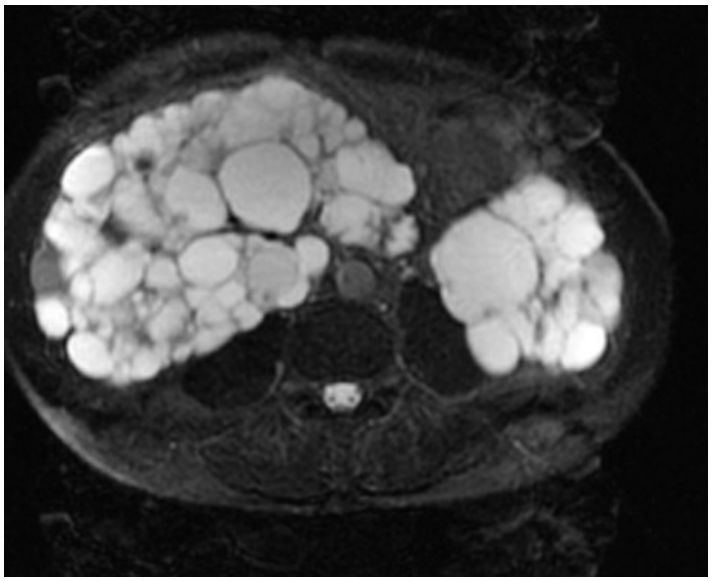
ECHO doppler. Since hypertensive nephropathy represents over 25% of cases of RCHD, imaging methods should focus on the identification by quantitative and qualitative evaluation of renal artery stenosis. Echo doppler data provides morphological and functional vascularization and highlights intraparenchimal reducing blood flow to the kidney. The parameter used for this evaluation is intrarenale resistance index (RI). [16] The normal value of its reference literature is 0.70. [17] Echo doppler perfussion estimates but not enough for the diagnosis of renal stenosis in this case required the application of spiral angio CTor in the case of contraindications angio RM.

The scanner (CT) is used and values higher than ECHO in the study cases of renal cysts and bleeding in patients with Renal Chronich Insufficent, neoplasies on dialysis and to identify papillary necrosis and ureteral stones.



Pic.2.CT images of policistic renal disease and renal cell carcinoma

Shintigrafia sequence Tc - 99 DTPA provides an evaluation of renal function and of return to chronic renal heart failure.



Pic.3.MR images of policistic renal disease

Renal biopsy: nephropaties are used in the pre and post-renal causes are excluded. They are used in renal glomerular pathologies, vascular and tubulo - interstitial.

5. Conclussions:

1. Echo imaging study represents the first choice for the evaluation of patients with chronic renal disease. It contributes to the differentiation of a chronic pathology reversible stage of the terminal through a ekogenitetit, renal size, presence or not hidronefrozes and renal cysts. It is also the most widely used techniques in imaging examination of SRK-ve

2. Echo doppler through RI-values that appear on a special importance in imaging examination of chronic nephropathy.

3. All analyzed imaging techniques combined with other parameters labarotorike physical provide information necessary for determining the origin and orientation of a pathology and pathology diagnosis as accurate.

4. CT is playing a central role in post nefropatite causes renal stones, the periodic evaluation of patients in terminal stage of chronic nephropathy high risk for developing renal cell carcinoma.

5. oriented biopsy through ECHO rarely used but has a huge impact on pathological examination in patients with renal disease glomerular intrinseke as they p.sh, vascular and tubuo - interstitial. Accuracy of this technique is very high.

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