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Chronic Pyelonephritis

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Definition of chronic pyelonephritis

- Chronic pyelonephritis is a chronic relapsing inflammatory destruction of renal tissue (chronic tubulo-interstitial nephritis) and is usually caused by relapsing ascending urinary tract infections (acute pyelonephritis).

Epidemiology of chronic pyelonephritis

- The proportion of chronic pyelonephritis as a cause of end-stage renal disease in children is up to 20%, but it has a declining tendency.

Pathology of Chronic Pyelonephritis

- Small kidney with a nodular surface and cicatricial retractions
- Lost demarcation of cortex and medulla in affected areas of the kidney.
- Initial renal scars are frequently found at the poles.
- Irregular pyelocaliceal system (blunt or dilated calyces)
- Histologic changes are nonspecific: infiltrates of lymphocytes, fibrosis and atrophic tubules with hyaline casts.

Etiology of Chronic Pyelonephritis



Relapsing Acute Pyelonephritis:

Recurrent acute pyelonephritis in childhood results in renal scarring. New renal scars develop seldom after the age of 5 years, but are possible until puberty. The frequency of febrile urinary tract infections in children correlates with the severity of the scarring and the risk of chronic pyelonephritis. See also section acute pyelonephritis.

Vesicoureteral Reflux:

Since vesicoureteral reflux (VUR) causes recurrent urinary tract infections, VUR is also an important risk factor for chronic pyelonephritis (reflux nephropathy). The severity of chronic pyelonephritis correlates with the severity of vesicoureteral reflux and reflux nephropathy is a common cause of end-stage renal disease in children.

In some cases, however, severe vesicoureteral reflux does not lead to chronic pyelonephritis. In animal experiments, only vesicoureteral reflux with infected urine causes renal scarring, sterile reflux is not harmful. This finding was confirmed in human clinical trials and is the basis for successful antibiotic prophylaxis in vesicoureteral reflux.

Neurogenic Bladder Dysfunction:

Neurogenic bladder dysfunction may lead, comparable to vesicoureteral reflux, to chronic pyelonephritis by ascending infections and intrarenal reflux. Important risk factors are high bladder pressures in the storage phase or during micturition.

Other Risk Factors:

Diabetes mellitus, nephrolithiasis, chronic catheterization.

Pathophysiology of Chronic Pyelonephritis

- **Ask-Upmark Kidney:**
- The Ask-Upmark kidney is a special form of chronic pyelonephritis with an activated renin-angiotensin-aldosterone system (RAAS). The RAAS activation leads to secondary hyperaldosteronism and severe arterial hypertension which results in further vascular injury and progressive renal insufficiency.
- **Renal Insufficiency:**
- Chronic pyelonephritis with bilateral involvement and severe scarring may lead to chronic renal failure.

Signs and Symptoms of Chronic Pyelonephritis

- In general, chronic pyelonephritis is asymptomatic in the absence of acute infection.
- History: risk factors are recurrent episodes of febrile urinary tract infections in childhood, neurogenic bladder disorders and vesicoureteral reflux.
- Complications: severe bilateral chronic pyelonephritis causes arterial hypertension, anemia and symptoms of uremia.

Diagnostic Work-up of Chronic Pyelonephritis

- [Urine analysis](#): leukocyturia, [proteinuria](#), decreased urine concentration after thirst trial.
- Laboratory tests: elevated creatinine concentration.
- [Renal ultrasound](#): small kidneys, focally thin echogenic cortex.
- Intravenous urography: blunt and deformed calyces with a thin cortex.
- Voiding cystourethrogram: for the confirmation or exclusion of vesicourethral reflux.
- Renal scintigraphy: static DMSA renal scintigraphy is the most sensitive method for the detection of parenchymal scarring of the kidney.
- Urodynamics: for the detection or exclusion of neurogenic bladder dysfunction.

Treatment of Chronic Pyelonephritis

- The cornerstones of treatment in chronic pyelonephritis are the consequent antibiotic therapy of urinary tract infections and the treatment of all above mentioned risk factors (vesicoureteral reflux, neurogenic bladder dysfunction, arterial hypertension).
- Indication for nephrectomy: unilateral manifestation of chronic pyelonephritis with organ dysfunction to control recurrent urinary tract infection or arterial hypertension.

References

- <http://www.urology-textbook.com/chronic-pyelonephritis.html>
- <https://www.msmanuals.com/professional/genitourinary-disorders/urinary-tract-infections-utis/chronic-pyelonephritis>