RPSG & KDARs Collaborative

The RPSG

The Renal Patient Support Group

Pyelonephritis (PN)/
Acute Pyelonephritis (APN)

Pyelonephritis

It is a infectious, inflammatory process that begins in the lower urinary tract and move up to on or both kidneys via the ureters, involving the renal parenchyma.

If it is not treated, it can cause renal damage (renal hydroplasia), sepsis and, potential risk of renal scarring.

The most common causative agents are Gram-negative bacteria, with most cases due to *Escherichia coli.* Other less common pathogens: *Proteus, Klebsielle, Pseudomonas, Enterococci,* and *Staphylococci.*

The presence of fever is an indicator of renal involvement.

Febrile urinary tract infection (fUTI) is a alternative name for APN.

One of the most serious bacterial illnesses during childhood.

In older paediatics, APN may result from voiding disturbances, including hyperactivity and dysfunctional bladder emptying.

Acute Pyelonephritis (APN)

Acute Uncomplicated	Acute Complicated
• Mild to moderate illness in patients without morbidity disease • Majority of cases occur in women ages 18 to 40 years	• Patients have an underlying condition that increases risk of therapy failing • Pregnancy, renal transplant, AKI, CKD, functional or anatomical urinary tract abnormality

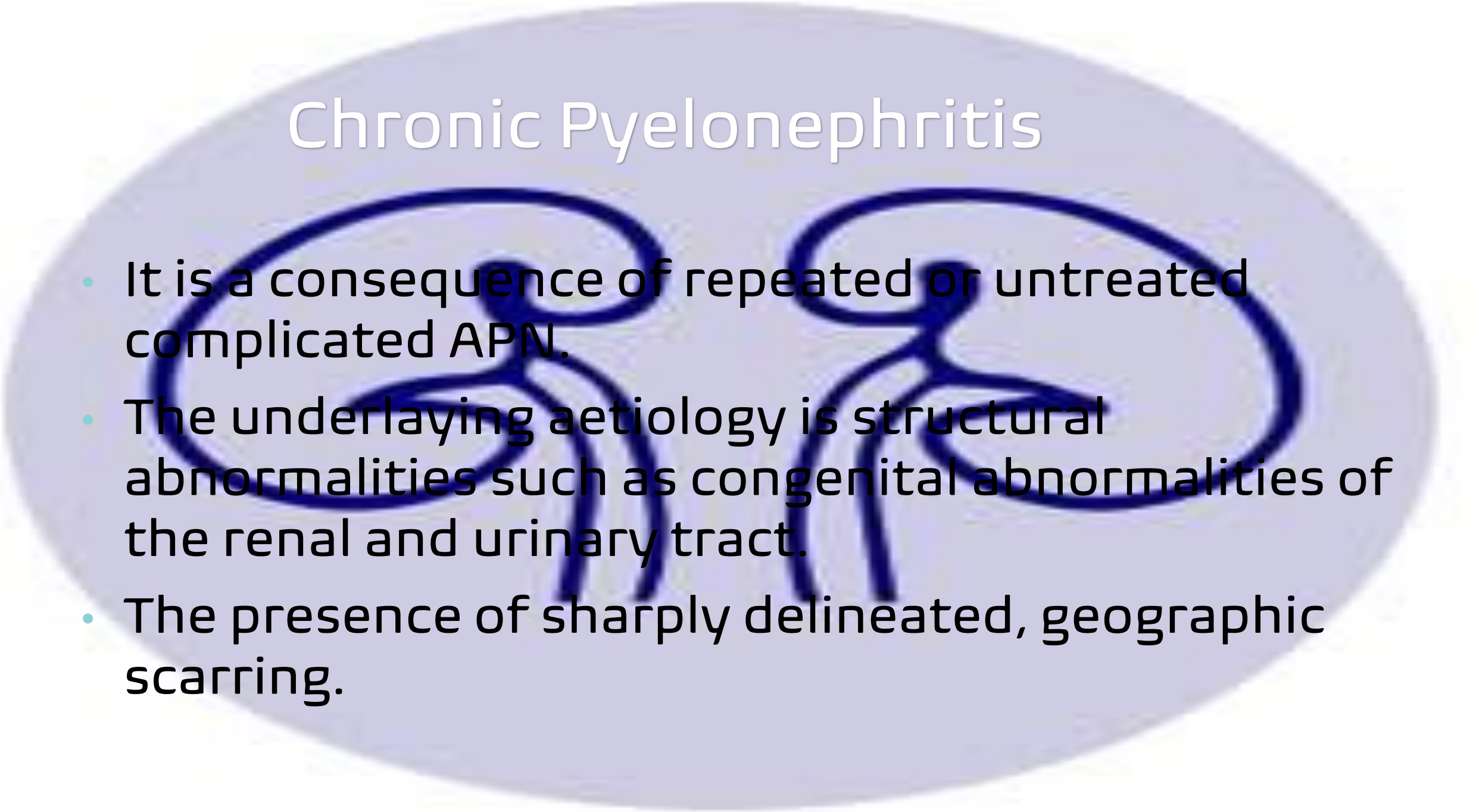
Aetiology

Most cases of APN result from the entrance of organisms through the urethra and periurethral tissues into the bladder, with subsequent invasion of renal pathohysiology.

Urine flow usually prevents infection, washing out the bacteria penetrating into the urinary tract.

The most important condition associated with AP is the presence of anatomical, renal, and urinary tract abnormalities, such as VUR.

Chronic Pyelonephritis



- It is a consequence of repeated or untreated complicated APN.
- The underlaying aetiology is structural abnormalities such as congenital abnormalities of the renal and urinary tract.
- The presence of sharply delineated, geographic scarring.

Clinical Diagnosis

History and Physical examination are the most helpful tools for diagnosing AP

History	Physical Examination
• Lower urinary tract symptoms (e.g. frequency, urgency, dysuria), • Upper urinary tract symptoms, • Constitutional symptoms, • Gastrointestinal symptoms,	• Fever • Costovertebral angle tenderness, • Tachycardia • Hypertension

Diagnostics	Characteristics
Urinalysis	- Urine dipstick testing, - Microscopic urinalysis - positive leukocyte esterase test - Microscopic haematuria or pyuria, or white blood cell casts
Urine Culture	- In all patients with suspected AP - Asymptomatic patients after therapy or if symptoms repeat within 2 weeks of treatment - Urine culture growing $>10^5$ colony-forming units/ml of urine
Imaging	- If symptoms do not improve or there is a recurrence - The AAP guidelines suggest performing a routine renal and bladder US after first AP, while VCUG is recommended only if hydronephrosis, scarring, or other anomalies are detected with US. - DMSA scanning is not recommended.
Blood Cultures	- Usually obtained from patients with AP who are ill enough to warrant hospital admission - Peripheral blood smear showing leucocytosis
Supplementary	- basic metabolic panel: assess renal function, - Lipase Screening - Transaminase Investigation

Treatment

Short treatment with intravenous antibiotics (up to 4 days) followed by oral therapy.

Guidelines for the treatment of childhood APN, recommend oral antibiotics for the treatment of paediatrics >2 months of age, unless the child is seriously ill and unable to tolerate oral antibiotics.

Oral antibiotic administration is recommended in the outpatients setting.

Hospital admission for intravenous therapy is recommended for paediatrics.

There is no gold standard antibiotic treatment - can vary between countries.

Empirical antibiotic treatment should be started soon after AP is suspected (urinalysis and symptoms).

Steroid therapy proposed for prevention of scarring.

Recurrence and Prevention

Identifying major risk can allows for the implementation of preventive measures to reduce the risk of recurrences and preserve renal function in paediatrics.

Factors associated with recurrences are white race, age between 3 and 5, and grade IV and V VUR

Risk factors associated with recurrence were family history of UTI, dysfunctional voiding syndrome, poor fluid intake, and functional stool retention.

Antibiotic prophylaxis used to prevent recurrence in paediatrics after APN, especially when VUR where has been detected.

Antibiotic prophylaxis has been associated with an increased risk of resistant bacteria.

Clinical Manifestations

Symptoms of APN in paediatric patients is variable and is influenced by the age of the child, the virulence of the organism, and the inflammatory immune response.

- Fever (38.5^{0}C and over)
- Dysuria
- Malodorous and cloudy urine
- Urinary incontinence

Paediatrics <2-3 months

- Labile temperature
- Slow feeding and poor weight gain
- Irritability
- Lethargy
- Hypotony
- Abdominal pain,
- Nausea and vomiting

Paediatrics with ambiguous symptoms have been reported to be at higher risk of complications (Sepsis, meningitis).

Summary

- Oral and intravenous antibiotics are equally effective in most paediatrics.
- Prenatal ultrasonography has revealed that major renal damage in paeditrics is frequently related to the presence of urologic abnormalities.
- Antibiotic therapies help in resolving acute infections without complications.
- The long-term outcome of APN is mostly related to the appearance of renal scarring.
- A minority of paediatrics (0.4%) have deterioration of renal function to CKD after a APN diagnosis, and so it is pertinent for health professionals to follow-up.

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