

**RADIOLOGY****IMAGING IN URINARY TRACT INFECTION****\*Vijayalakshmi G****\*\*Balaji S****\*\*\*Raveendran J****\*\*\*Abirami Mahadevan**

Urinary tract infection (UTI) is a clinical diagnosis and confirmation is done with urine analysis and culture. The role of radiology, as we have seen in earlier issues, is to rule out obstructive and congenital anomalies that predispose to urinary tract infection. This is why all children less than 2 years with UTI are advised ultrasound abdomen for study of the urinary tract, which is a very simple investigation. Another important radiological investigation is the micturating cystourethrogram for ruling out vesico-ureteric reflux. Though it is the gold standard for diagnosis and grading of vesico-ureteric reflux (VUR), it carries the risk of inducing UTI and also means much discomfort for the patient. Therefore it is reserved for recurrent UTI, atypical UTI, family history of VUR and when there is ureteric dilation in the ultrasound in the absence of obstructive abnormalities. Sometimes the indications may be expanded to male children and all children with UTI who are less than 5 years.

Dimercapto succinic acid (DMSA) is another investigation, role of which in UTI is not clear. In acute pyelonephritis inflamed areas are seen as cold areas or photopenic areas. False negative scans may occur if infection is confined to the medulla and has not yet reached the cortex or due to immature renal tubular function in infants less than 3 months. The cold areas may resolve, usually in 3 months, or persist if irreversible scarring has occurred. Consequently the timing of the scan is 3 to 6 months after infection. The MCU is done 4 weeks after UTI has subsided as transient VUR may sometimes be seen during infection and because it is an invasive test.

\* Professor

\*\* Associate Professor

\*\*\* Assistant Professor,

Department of Pediatric Radiology,  
Institute of Child Health and Hospital for Children,  
Madras Medical College, Chennai.

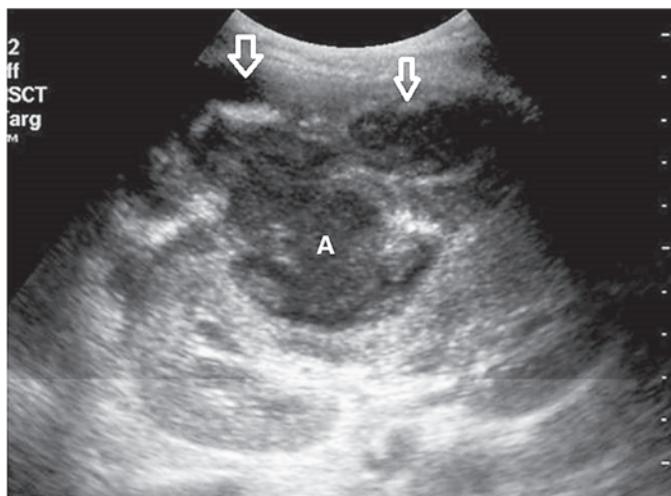
email : drviji.rad@gmail.com

Ultrasound is best done 2 weeks after an attack of UTI as toxin from E.coli, which is the commonest organism, can cause dilatation of the collecting system.

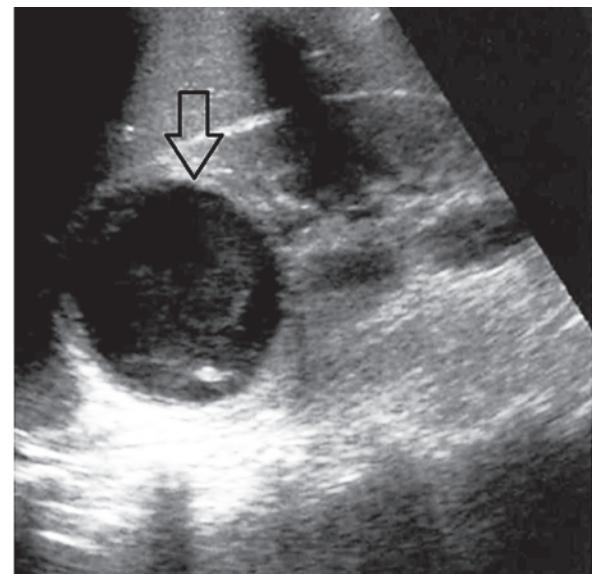
However, ultrasound is urgently required in the presence of continued spiking of temperature, loin mass or tenderness or rising creatinine to assess the status of the kidneys and development of complications. In acute pyelonephritis, the kidneys can appear normal or maybe mildly enlarged with or without a mild increase in parenchymal echogenicity and loss of corticomedullary differentiation. These findings are due to tissue edema. Movement with respiration may be reduced. Sometimes focal inflammation and vasospasm can cause a hypoechoic lesion that can be mistaken for a mass. But, unlike a mass there is reduced vascularity which is more easily appreciated with power Doppler. Abscess formation can also be a complication of pyelonephritis (Fig.1) shows multiple small abscesses in an enlarged kidney. (Fig.2) shows an abscess in the mid segment of the kidney which has perforated the capsule to collect in the perinephric space that has to be drained. A cyst in the upper pole (Fig.3) is a common finding. If infected, they develop



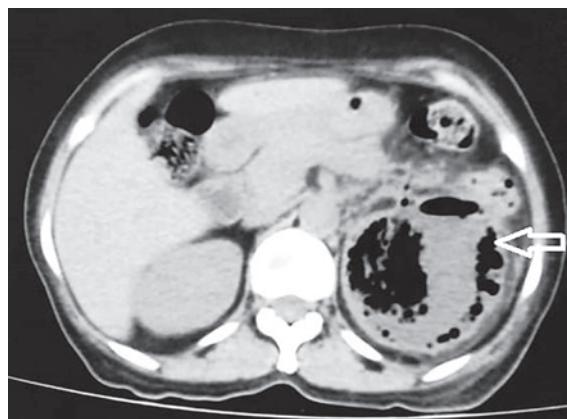
**Fig.1. Multiple small pyemic abscesses in the kidney**



**Fig.2. Abscess (A) in the kidney with perinephric collection (arrows)**



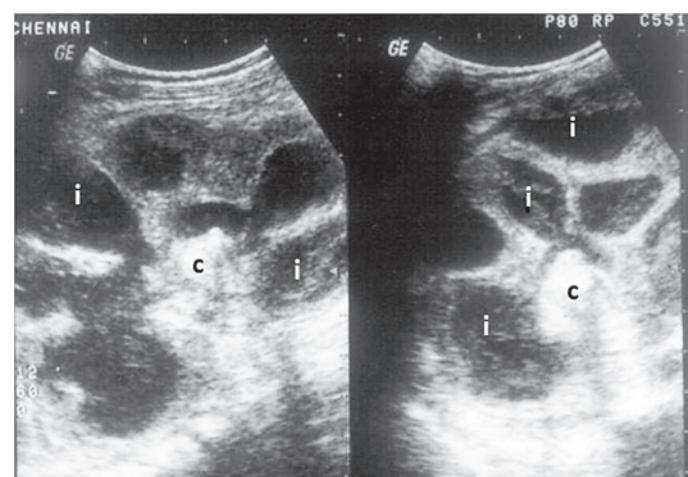
**Fig.3. Infected cyst in the upper pole of the kidney**



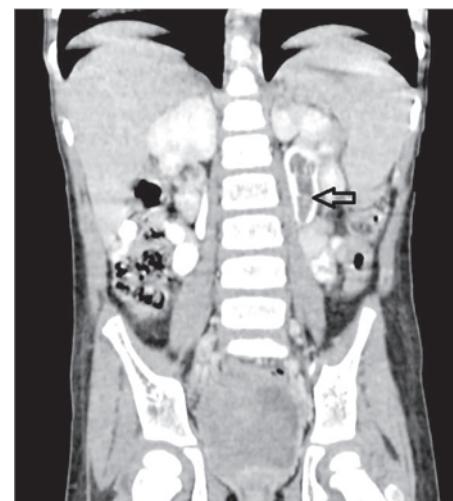
**Fig.4. CT Abdomen-Air in the kidney (arrow) - emphysematous pyelonephritis**

a thick wall, plenty of septations and turbid content. Turbidity of content in the bladder or in a dilated collecting system could be due to infective debris, but they are also seen in nephritis and nephrotic syndrome due to cell debris and with the use of certain drugs that induce crystalluria. Thickening of the urothelium may be seen in pyelonephritis. In CT, abscesses are seen as low attenuation foci that show an enhancing rim on contrast.

There are some special types of pyelonephritis. Emphysematous pyelonephritis is a necrotizing infection of the kidneys characterised by gas formation in the kidneys usually due to *E.coli*, *Klebsiella* and *Proteus mirabilis*. It is seen more often in adults with diabetes mellitus. Ultrasound shows an enlarged kidney with bright echoes that are different from calculi in that the after shadows are not dark and sharp as in calculi but irregular with less bright echoes due to reverberation. CT is the modality of choice as air is seen more clearly as black streaks or collections (Fig.4) or as air-fluid levels in abscesses.



**Fig.5.Xanthogranulomatous pyelonephritis. Note calculus(c) and collections of exudate(i)**



**Fig.6. CT abdomen - Aspergillus cast in renal pelvis (arrow)**

Xanthogranulomatous pyelonephritis is actually an abnormal immune response to subacute bacterial infection. This is also more often seen in diabetics. Though rare it can be seen in children. Classically the kidney is enlarged, there is a large pelvic calculus in a contracted pelvis and there is no excretion on contrast administration. What looks like dilated calyces are actually inflammatory exudates (Fig.5). Rarely it can be focal, or not associated with calculus or seen with renal atrophy.

Tuberculous pyelonephritis occurs with hematogenous seedling. Initially there is papillary necrosis which manifests as an enlarged calyx. The calyx can further dilate

due to the propensity for fibrosis causing infundibular stricture. Calcification is seen very often in tuberculosis.

Fig.6 is that of a child whose left renal pelvis shows an aspergillus cast seen as a filling defect. This can occur in the immunocompetent also. They usually follow instrumentation and need to be removed surgically. Invasive aspergillosis is seen in grossly immunosuppressed patients.

Though it is generally agreed upon that radiological evaluation in urinary infection does not always have an impact on treatment, targeted imaging in specific clinical situations is necessary.

## CLIPPINGS

### *Classification of the cutaneous manifestations of COVID 19.*

Dermatologists carried out a nationwide case collection survey of images and clinical data of 375 patients during peak of the COVID-19 pandemic in Spain. Patients with most severe disease were excluded. Using a consensus they described clinical patterns and the association of these patterns with patient demographics, the timing in relation to symptoms of the disease, the severity and the prognosis. The strength of the study is that the description of clinical patterns has been done by experts based only on morphology. The 5 clinical patterns included pseudo-chilblain (19%), other vesicular eruptions (9%), urticarial lesions (19%), other maculopapules (47%) and livedo or necrosis (6%). There were also reports of increased numbers of herpes zoster cases in patients with COVID-19. While Pseudo-chilblain lesions tended to affect younger patients with less severe disease, vesicular lesions appeared more in middle-aged patients with intermediate severity of disease. Urticarial, maculopapular and livedoid/necrotic lesions were all associated with more severe disease. A mortality rate of 10% was noted in the livedoid/necrotic group. They suggest that further research could be improved by having more tests to confirm COVID-19 and to exclude other infections, and utility of this classification should be confirmed in clinical use.

**Casas CG, Català AG, Carretero, Hernández GC, Rodríguez Jiménez P, Fernández Nieto D, et al. Classification of the cutaneous manifestations of COVID 19. Br J Dermatol 2020 Apr 29 doi: 10.1111/bjd.19163 [Epub ahead of print].**

### *Gastrointestinal features in children with COVID-19: an observation of varied presentation in eight children.*

Eight children were referred for pediatric surgical review over an 8-day period (April 25-May 2, 2020). They presented with fever, abdominal pain, diarrhea and vomiting presenting at a single centre in the UK. The working diagnosis was of systemic sepsis based on raised blood inflammatory markers thought to be secondary to suspected appendicitis. All patients apart from one presented with markedly elevated CRP. USG/CT was done and the findings were lymphadenopathy and presence of inflammatory fat throughout the mesentery, with thickening of the terminal ileum and non-inflamed appendix. One child had a severe inflammatory response and myocarditis. Three other developed systemic inflammatory response and haemodynamic instability requiring inotropes. Two among eight were SARS-CoV-2 PCR was negative, but strongly suspected because of the similarity of their clinical presentation and imaging. They were treated with immunoglobulin and steroid treatment for atypical Kawasaki disease.

No patients have died. Given the convincing nature of clinical findings for appendicitis in children with COVID-19, we stress the importance of abdominal imaging and a swab for SARS-CoV-2 PCR in all children with clinically suspected appendicitis, before surgical intervention. It is important to stress the need to visualise the appendix through ultrasound, CT or both.

**Tullie L, Ford K, Bisharat M, Watson T, Thakkar H, Mullassery D. Gastrointestinal features in children with COVID-19: an observation of varied presentation in eight children. Lancet Child Adolesc Health 2020 Published Online May 19, 2020 [https://doi.org/10.1016/S2352-4642\(20\)30165-6](https://doi.org/10.1016/S2352-4642(20)30165-6).**