Case Report

Indirect evidence of intravesical ureterocele on ^{99m}Tc-diethylene triamine pentaacetic acid scan

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ABSTRACT

Ureterocele is a common ureteric anomaly detected in pediatric population. Ureterocele diagnosis and evaluation need a variety of radiological methods. We report a case of 5-year-old female child sent for ^{99m}Tc-diethylene triamine pentaacetic acid scan for evaluation of glomerular filtration rate and excretory function of kidneys in view of right-sided hydroureteronephrosis and pyonephrosis with percutaneous tube *in situ*. Incidental photopenia was noted in the urinary bladder. On ultrasonography of abdomen cause of this photopenia was found to be an intravesical ureterocele.

Keywords: ^{99m}Tc-diethylene triamine pentaacetic acid scan, intravesical ureterocele, photopenia

INTRODUCTION

Ureterocele is a congenital urinary abnormality characterized by the presence of an intrabladder hernia or cystic ballooning of the lower end of a ureter lying between the mucosa and muscle of the bladder. The abnormality leads to urinary retention and recurrent urinary tract infection (UTI), which can cause irreversible damage to the kidney. This abnormality can be suspected in the fetus by antenatal ultrasonography (USG) and confirmed by other X-ray investigations after birth.[1]

The incidence of ureterocele is variable with the highest rate of 1:500 and it is generally found in females with duplex system association (95%).[2,3] Ureteroceles can have different clinical presentations, such as antenatal hydronephrosis, UTI, vesicoureteral reflux (VUR), bladder outlet obstruction, prolapsed urethral mass, etc.[4] Ureterocele diagnosis and thorough evaluation needs a variety of radiological methods. USG and voiding cystourethrography (VCUG) are essential initial procedures for a child suspected of having a ureteral anomaly.[2,4,5]

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CASE REPORT

A 5-year-old female child was referred to our department for ^{99m}Tc-diethylene triamine pentaacetic acid (DTPA) scan. She was a follow-up case of right-sided hydroureteronephrosis with pyonephrosis with percutaneous tube (PCN) insertion done on the right side. Patient's blood urea and serum creatinine were 29 and 1.3 mg/dL, respectively. Urine routine microscopy revealed 14–16 pus cells per high power field. USG of the abdomen revealed left-sided mild hydroureteronephrosis and gross enlargement of the right kidney, reaching up to lower abdomen with dilated pelvis and ureter. The child was referred for evaluation of glomerular filtration rate and excretory function of kidneys. ^{99m}Tc-DTPA scan was done in our department with right PCN tube *in situ*. PCN tube was clamped during the acquisition of dynamic and prevoid static image and clamp released thereafter.

On ^{99m}Tc-DTPA scan, left kidney showed good perfusion and adequate cortical radiotracer concentration followed by good drainage into dilated ureter. Right kidney showed reduced perfusion and poor cortical radiotracer concentration [Figure 1]. Right ureter and right pelvicalyceal system (PCS) were visualized in the postvoid image (indirect evidence of

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VUR) [Figure 2b, thin arrow]. Retention of radiotracer was noted in dilated PCS and dilated ureter in delayed static images acquired till 4 h [Figure 2c and d]. Faint visualization of radiotracer was noted through the PCN tube after removal of clamp [Figure 2b, bold arrow]. A large photopenia was noted in the suprapubic region in the urinary bladder (UB) during dynamic [Figure 1] as well as delayed static images acquired till 4 h [Figure 2a-d]. This prompted us to investigate the case further. An USG of the abdomen was done in the radiology department of our hospital to find out the cause of this persistent photopenia in the UB. USG of the abdomen showed evidence of left-sided mild hydroureteronephrosis and grossly enlarged hydronephrotic right kidney with dilated right ureter and an intracystic ureterocele arising from the right side [Figure 3a and b].

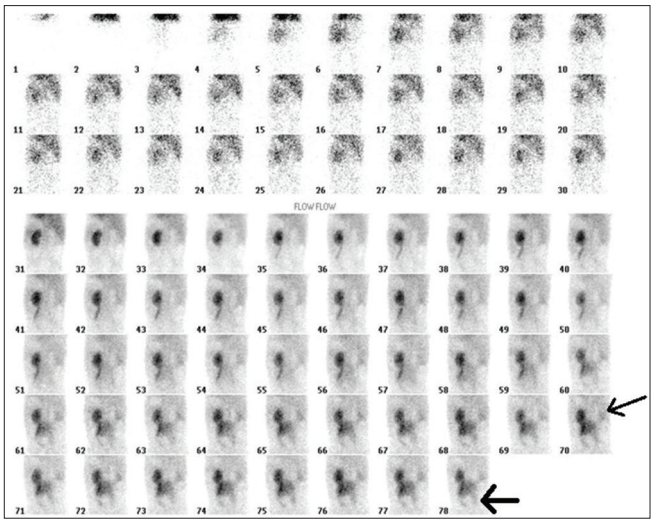

Figure 1: Perfusion and dynamic images of ^{99m}Tc-diethylene triamine pentaacetic acid scan scintigraphy, posterior view with percutaneous clamp *in situ*, showing good perfusion and adequate cortical function and good drainage of left kidney. Right kidney showing poor perfusion and poor cortical function (thin arrow). Photopenia noted in the urinary bladder (bold arrow)

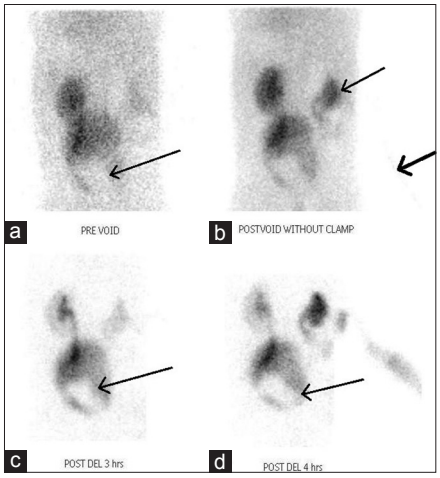

Figure 2: (a) Prevoid static image with right PCN clamp *in situ*. Photopenia noted in the urinary bladder (arrow marked). (b) Postvoid static image after releasing clamp from the PCN tube. Right ureter and right pelvicalyceal system visualization is noted suggesting indirect evidence of vesico-ureteric reflux (thin arrow). Faint visualization of tracer is noted through the PCN tube (bold arrow). (c and d) 3 and 4 h delayed static images showing persistent photopenia in the urinary bladder (arrow marked)

DISCUSSION

According to literature, 90% of the patients with ureterocele are diagnosed before the age of 3 years.[6] Most of the patients with ureterocele are classically diagnosed during the investigation for UTI, asymptomatic hydronephrosis, and abdominal mass.[4] Although the age of diagnosis is decreasing, UTI is still the most common clinical presentation of ureterocele in 50% of the patients promoting physician to make the thorough evaluation of the urinary system.[2,6] The whole nephronourinary system could have already been negatively affected at the time of diagnosis. In our case, the ipsilateral kidney had a poor cortical function. USG is an easy method to perform, noninvasive, and probably the best imaging modality for making the diagnosis.[3] USG scan is able to catch the lesions which are not obvious on VCUG.[4] VCUG is used for ureterocele diagnosis and detection of VUR. Reflux can occur in the ipsilateral lower pole in almost half of the patients, but the contralateral system is also affected at a rate of 25%.[2-4,7]

The ^{99m}Tc-Dimercapto succinic acid (DMSA) scan should be undertaken routinely to assess the distribution of function in the duplex kidney and for detecting and follow-up of scarred tissue and nonfunctioning upper poles in cases of ureterocele.[2,5,8,9]

Günsar *et al*.[10] did a study on pediatric ureteroceles in 19 patients, on the diagnosis, management and treatment options. USG showed cystic lesion in the UB in 13 out of 17 patients. Intravenous urography showed ureterocele in 8 out of 12 patients. VCUG was able to detect VUR in 13 out of 17 patients (33%). DMSA scintigraphy showed ipsilateral renal scarring and nonfunctioning upper pole images in 7 out of 13 patients. Computed tomography and MAG_3 scintigraphy were done only in one patient for differential diagnosis of hydronephrotic mass and obstruction.

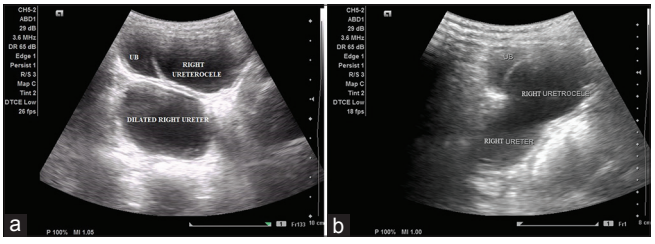

Figure 3: (a and b) Ultrasonography images depicting right ureterocele within the urinary bladder (UB) and dilated distal right ureter

Chowdhary *et al*.[11] did a study on the management of 36 patients with varied presentation of complicated ureteroceles. USG, micturating cystourethrogram, isotope renogram were done preoperatively in all the babies. In one of the cases, DTPA scan showed nonfunctioning kidney on the side of ureterocele. Initial USG was unable to detect ureterocele in most of the cases in this

study. They said that unless the USG is done in well-hydrated, cooperative patient, ureterocele is likely to be missed on USG. Hence, an intravenous pyelogram, radioisotope renogram, and micturating cystourethrogram are invaluable in the complete understanding of ureterocele.

In our patient also, the diagnosis of ureterocele was missed on initial USG. Photopenia was noted in the UB on our scan, and this prompted us to investigate the patient further. Possible causes for photopenic defects in the UB on nuclear scintigraphic studies include bladder papilloma, bladder polyp, carcinoma bladder, bladder calculus, foreign body in UB, intravesical ureterocele, etc. Repeat USG revealed the cause of photopenia in UB in our case to be an intravesical ureterocele.

On reviewing the literature we found that ^{99m}Tc-DTPA scan is useful in the evaluation of renal function in patient with known ureteroceles.[11] However, in our case on finding the photopenia in the UB on ^{99m}Tc-DTPA scan, intravesical ureterocele was detected on USG.

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Conflicts of interest

There are no conflicts of interest.

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