

Kidney Stone In A 7-Year Old Girl

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SUMMARY

A 7-year old girl presented with abdominal pain of 1 year duration radiating to the flank. The pain did not respond to antibiotics until the patient presented at the Olabisi Onabanjo University Teaching Hospital. Physical examination and radiologic investigations led to the diagnosis of renal calculus at the pelvi-ureteric junction and causing obstructive uropathy. Surgical intervention was delayed due to the preference of the patient's father for lithotripsy, which is not available in Nigeria. The patient subsequently experienced a 1 year delay before travelling to India for lithotripsy, with resultant worsening of the renal symptoms.

Key Words: Renal calculus, radiological imaging, children.

INTRODUCTION

Renal stones are reportedly rare in children, but remain a significant health problem amongst the adult population. The true incidence remains unknown, and differs from one geographic location to the other. It is more common in geographical areas such as India, Pakistan, and the Middle East, than in West and East Africa¹. The wide geographic variation in the incidence of lithiasis is related to climatic, dietary, and socioeconomic factors. Approximately 7% of urinary calculi occur in children younger than 16 years of age.² The incidence in Nigeria is unknown, while it is estimated to be two children per million per annum in the UK, and 1 per 1000 to 1 per 7600 of pediatric hospital admissions in Turkey and the far East^{1,3}.

The causes of urolithiasis vary from one country to the other, ranging from metabolic derangement to urinary tract infection due to

urea splitting organisms. The cause may also be idiopathic and are often located in the upper urinary tract⁴. The formation of stones is dependent on various factors which include urinary pH, urinary flow rate, urinary concentration of stone forming ions, the balance between promoter and inhibitory factors of crystallization, and anatomic factors favouring stasis.^(1&2) The clinical symptoms include intermittent loin pain, often radiating to the pelvis and corresponding to periods of obstruction of urine flow. The latter increases the pressure in the collecting system. Gross or microscopic hematuria is also a common presentation²

Investigation of renal stone includes urinalysis of freshly voided urine to identify pyuria, hematuria and crystals. A spot urine collection can be used to determine the excretion of a substance in the urine by comparing it to the concentration of creatinine in the urine. Traditionally, the second morning urine sample is used to determine the calcium and magnesium excretion and is fairly representative of a 24 hour calcium/creatinine concentration. A chemical analysis of the stone can also be done. Imaging studies include plain radiography, intravenous urography, which is said to provide the most comprehensive structural assessment of the urinary tract,^{3,4} and ultrasonography². The management could either be conservative, with fluid and antibiotics, or surgical. In the past, open surgery was popular but recently lithotripsy is used to crush the stones for easy excretion.

The prognosis is dependent on several factors. This case is being presented to alert the pediatricians to the likelihood of renal stone complicating urinary tract infections in our environment, and the usefulness of imaging modality both in the clinical work up and the follow-up, in order to reduce delay in

management. It is also presented to alert the general practitioners about the danger of delay in not insisting on the management options that are easily available in the environment.

CASE REPORT

Miss A.T is a 6 year old girl, who was referred to our children out-patient clinic on the 29th of October 2007 with the complaint of recurrent abdominal pain of 1year duration.

She was said to have been healthy until October 2006 when she complained of abdominal pain which was localized to the right flank. The pain was colicky in nature and did not radiate to any other part of the body. It was severe enough to disorganize her routine. There was history of painful urination though there was no urgency. The pain was accompanied by passage of dark colored urine with no associated fever or prior use of drugs. She is not a known sickle cell anemia patient. At that time, she was seen at a hospital where she was treated with antibiotic (Augmentin) as an outpatient. The symptoms apparently abated.

Subsequently, the pain had been recurring at intervals. Each episode usually resolved with a course of antibiotics (augmentin or ofloxacin or ceftriaxone). However, three weeks before presentation at our facility on a preliminary diagnosis of left renal calculus she had another episode. At presentation the pain was radiating to her pelvis, and sometimes to the left lower limb and was stabbing in nature. Miss A.T does not like to drink water though claims she made urine well and the urine was not malodorous. She was not on any supplemental medication and she had never been hospitalized in the past.

Patient's father is a 57 year old secondary school certificate holder and businessman. Her mother is a secondary school certificate holder. She has three other siblings with no similar illness or family history of renal disease.

Examination at presentation showed a healthy but anxious looking girl who was afebrile (36.8 °C). She was well hydrated, anicteric with no significant peripheral lymphadenopathy, pallor, pedal or facial edema. She weighed 25kg. The vital signs were basically normal. The abdominal examination revealed tenderness in the suprapubic area, the right and left lumbar regions respectively. The left kidney was bi-manually

ballotable and acutely tender. The right kidney was not bi-manually ballotable. The liver and spleen were not palpably enlarged and there was no demonstrable ascites. The bowel sounds were normoactive.

A clinical impression of nephrolithiasis, to rule out peri-nephric abscess was made.

Abdominal ultra sound showed kidneys in normal position, the right measuring 95.1mm and the left 104.4mm. There was hydrocalycoes bilaterally, worse on the left (Figure 2). The pelvis was also dilated on the left up to the pelvi-ureteric junction where a crescentic echogenic mass with distant acoustic shadow was seen consistent with a calculus. (Figure 2).

The initial Intravenous pyelography showed radiolucent calculus with minimal left upper renal tract obstructive changes to the pelvi-ureteric junction (Figure 3), seen as calyceal dilatation with pelvi-ureteric fullness extending to the area of the radiolucent calculus within the ureter. Urinalysis and urinary microscopy culture and sensitivity done at presentation revealed a urinary pH of 8.0, specific gravity of 1.010 and absence of pus cell, crystals, casts and protein. Urine culture yielded no organism. Electrolyte, urea, creatinine, and serum Calcium were normal. She was placed on parenteral ceftriazone 100mg/kg (1gm) daily for 1 week, mist potassium citrate 10ml twice daily in equal amount of water for 5 days, and tablet tramadol at a dose of 1mg/kg (25mg twice daily). She was encouraged to take fluids of about 3 -4 Litres daily.

At the end of 1 week of treatment all the symptoms abated. The Pediatric surgical team was invited to review her. Lithotripsy was suggested and was preferred by the patient's family, but could not be done in Nigeria. A follow up review in the hospital after about a year of not being able to travel for the lithotripsy resulted in a recurrence of patients clinical symptoms, necessitating another round of investigations including ultrasound and intravenous pyelography. The result showed a worsening of the radiologic findings in form of bigger calculus on the plain radiograph as well as the ultrasonography. The pyelographic radiographs showed a delayed nephrographic phase as well as persistent nephrogram even in the 24 hour film.

The left kidney was now much bigger than the right kidney (Figure 4). Interestingly though, parents still preferred the lithotripsy to the surgical intervention which was easily available in the environment. The patient eventually traveled to India for the lithotripsy and has now been lost to follow-up.

Figure 1: Plain abdominal X-Ray with arrow showing the oval shaped calculus



Figure 2: Ultrasonograph showing the left kidney with crescentic shaped echogenic calculus at the pelvi-ureteric junction with distant acoustic enhancement.

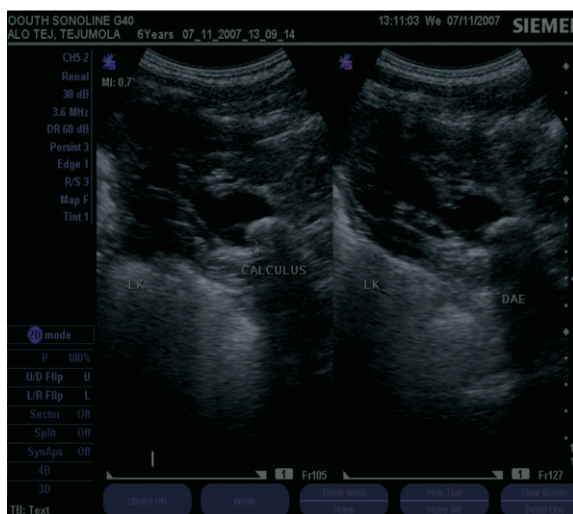


Figure3: The initial Intravenous Pyelography with arrow pointing at the calculus situated at the pelvi-ureteric junction, causing obstructive changes in the pelvi-caliceal system

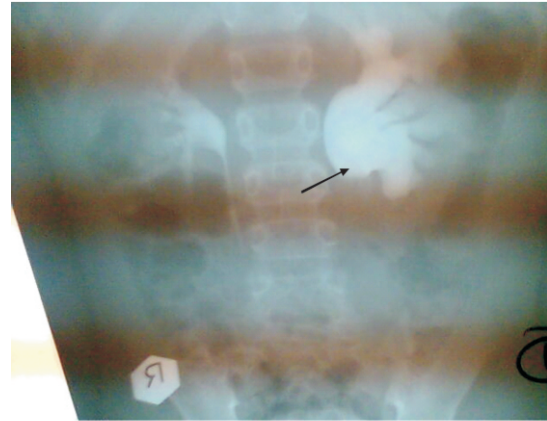


Figure 4: The Pyelography one year later showing bilaterally enlarged kidneys, worse on the left, with persistent nephrogram in the 2-hour delayed radiograph.



DISCUSSION:

Renal stones have been reportedly rare in children. It has been found in 20% of newborns with predominant cause in them being urinary tract infection and metabolic problems⁸. More paediatric females were affected in the study in Iceland children. The age of the patient in this report is in consonance with reported age range age of 2 months in 14.9 years in⁹. It is

however, lower than the reported age of 15 years by Ibadin *et al*¹⁰.

In this patient, no metabolic problem was discovered and the precipitating factor is probably an underlying urinary tract infection, although no microorganism was isolated from the urine culture. This may be due to recurrent use of antibiotics prior to presentation at our facility. Similarly, the urinary pH of 8 is also highly suggestive of urea splitting organism. The initial ultrasound done on this patient showed a crescentic echogenic mass at the pelvi-ureteric junction with the dilatation stopping at the stone site (Figure 2). Distal to the stone, there is ureteric collapse, which is the diagnostic feature. This thus confirmed the finding of Darge & Heidemeier⁶ in their studies that ultrasound plays a central role in the diagnostic imaging of the urinary tract.

Similarly, this case has proved the ascertainment of Smelie⁷ that intravenous urography (IVU) provides the most comprehensive structural assessment of the urinary tract in that the radiological renal appearances approximate closely to the morphology of the normal kidney in the first study, while the follow up study gave a more graphic situation of both the insulted kidney and the structural changes of the stone. This case also confirms previous reports that unilateral kidney stones are commoner than bilateral ones. However, at her second presentation about one year later, the IVU showed a larger kidney with a poor renal function as shown by the delayed opacification of the left kidney and persistent nephrogram (Figure 4).

Early intervention would have prevented a deterioration of renal function. It is unknown how many children with urinary tract infection have similar complications, hence we advocate preventive nephrology and where possible, encouraging the patient and parents to accept the use of the easily available treatment option (surgical intervention), rather than wait for more expensive, but modern option with the risk of developing further urinary tract complications which may be costly to the child's health in future.

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