



International Journal of Case Reports (ISSN:2572-8776)



The Effectiveness of Extracorporeal Shock Wave In Pediatric Renal Stones

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ABSTRACT

Introduction: Renal stones are endemic in low income countries among children below 15 years old. This should not be underestimated due to high association with other morbidity and highly recurrence rate when compared with adults. **Objective** : To explore the Effectiveness of Extracorporeal Shock Wave In Pediatric Renal Stones. **Methodology:** Study the case of a child girl reported with renal stone, clinical and laboratory data were obtained , Radiological investigations as US and CT were done, The patient underwent dj stent, then patient received one session of Extracorporeal Shock Wave 4000 us guided storz eswl Lithotripsy for urinary Stones then uralyt-u pediatric dose and allpourinol 100 mg once daily then start to passing stones gravels. **Results:** Follow up by CT for the patient after 3 months revealed no stone, renal scan split function from 12 to 18%. **Conclusion:** Renal stones could be presented even among pediatric group even with negative family history. Ultrasound is the first choice imaging modality for diagnosis of suspected renal stones , CT could be used for follow up. Dihydroxyadenine stones could be missed during routine diagnosis of renal stones so imaging is mandatory and stones analysis should be done.

Keywords: Extracorporeal Shock Wave, Pediatric Renal Stones

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How to cite this article:

Ali Dawas Alshahrani, Saleh mohammad alghamdi, Ali Saad Alshahrani, Ahmed Youssef Abouelyazid. The Effectiveness of Extracorporeal Shock Wave In Pediatric Renal Stones. International Journal of Case Reports, 2019 4:64

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Introduction

Renal stones are endemic in low income countries among children below 15 years old. This should not be underestimated due to high association with other morbidity and highly recurrence rate when compared with adults (1).

The consistency of urolithiasis composed of different organic and inorganic biominerals with amorphous or crystalline structure (2). Stones' composition comprises nearly of 40% to 65% of calcium oxalate, 14% to 30% of calcium phosphate, 10% to 20% of struvite, 5% to 10% of cystine, and 1% to 4% of uric acid. Rare comprise of xanthine, or 2,8-dihydroxyadenine (3).

Case description

The case of a child girl reported with renal stone who was the single sibling of her family, no previous medical problems except for recurrent urinary tract infection. Negative family history of urolithiasis was noted, presented with flank pain.

Laboratory examination revealed the following: hemoglobin: 18.3 g/dl, white blood cell count, 6300/IL. MCV: 65.03 FL, MCH: 19.88 PG, serum phosphorus: 5.1 mg/dL, serum calcium 10.2 mg/dl, serum uric acid: 3.7 mg/dl and serum creatinine: 0.53 m/dl. Urine analysis showed; hematuria, slightly turbid urine, PH: 6 24 hour urine volume 1000 ml/day and 24 hour urinary protein excretion: 231 mg/day. Microbiology report revealed no bacterial growth

Urinary ultrasonography(US) and abdominal computed tomography (CT) showed multiple stones in the right kidney of different sizes causing mild hydronephrosis and mild renal atrophic changes with grad I nephropathy. Dimercaptosuccinic acid scan revealed good and uniform cortical tracer uptake by the left kidney and reduced cortical tracer uptake is noted by the right kidney, split renal function of the right kidney was 12% and split renal function of the left kidney was 88%. Stone analysis performed by Fourier transform

infrared spectroscopy revealed 2,8 dihydroxyadenine stone.

The patient underwent dj stent, then patient received one session of Extracorporeal Shock Wave 4000 us guided storz eswl Lithotripsy for urinary Stones then uralyt-u pediatric dose and allpourinol 100 mg once daily then start to passing stones gravels. Follow up by CT for the patient after 3 months revealed no stone, renal scan split function from 12 to 18%. (Figure 1)

Discussion:

Renal stones could be discovered even among pediatric age group (3). It is increasing in some world regions when compared to adults and the incidence increase from one year to the next and more predominant among boys than girls (4).

The most common presenting symptoms of urolithiasis in children are abdominal or flank pain, dysuria, oliguria, hematuria, sterile pyuria, urinary tract infection and vomiting (5). In this regard, our case report the girl was presented with hematuria and flank pain.

Calcium oxalate stones are radiolucent and the main difference from uric acid stones which are also radiolucent and have identical chemical reactivity. While 2, 8-dihydroxyadenine stones are soft and friable with an irregular surface whereas urate stones are hard and difficult to break, with smooth surface, and faint yellow color (6).

Hematuria either Macroscopic or microscopic may be presented in up to 90% of children with urolithiasis. Positive family history is very common in most children with urolithiasis (5), and considered an important factor in diagnosis of the urolithiasis (7), however, in our case there was negative family history of urolithiasis.

The problem of Conventional radiography which may missed small even radio-opaque stones in the kidney or ureter and gives no information about possible obstruction (8). So Ultrasonography is first choice imaging modality for diagnosis of suspected pediatric urolithiasis

(7). It is also recommended by the European Association of Urology and American Urological Association as the initial diagnostic imaging of choice for suspected urolithiasis in children (9). The reasons are a lack of familiarity with DHA stones among clinicians/pathologists, the absence of practice of routine stone analysis and confusion of DHA stone with uric acid and/or xanthine stones as these are

radiolucent. Although the identification of DHA on a stone analysis is highly suggestive, there can be a false identification of DHA as a kidney stone component by infrared and ultraviolet spectrophotometry and/or X-ray crystallography. Birefringent Maltese cross pattern as seen under polarized light microscopy represent either lipid particles, DHA crystals, or starch (latex gloves) (10).



Figure 1 U.S pre eswl show right renal stone 1.8 cm & B- CT Plane f/u post eswl and uraly-tu show right dj stent in place and residual stone

By searching in data bases and health records, this is the first case to be reported in a child from Kingdom of Saudi Arabia. Possible Causes of under reporting due to the lack of awareness of this disorder or inadequate patients evaluation for renal stones, or missed diagnosis where DHA crystals in urine analysis are confused with urate or oxalate, and the wrong diagnosis of radiolucent DHA stones as uric acid stones (11).

The 2,8-dihydroxyadenine (DHA) stones are rare forms of urolithiasis that occurs in patients with adenine phosphoribosyl transferase (APRT) deficiency. Standard chemical and thermogravimetric analysis does not differentiate DHA stones from uric acid or xanthine stones, and either infrared or ultraviolet spectroscopy is required to make the diagnosis (12).

Conclusion:

Renal stones could be presented even among pediatric group even with negative family history.

Ultrasound is the first choice imaging modality for diagnosis of suspected renal stones , CT could be used for follow up. Dihydroxyadenine stones could be missed during routine diagnosis of renal stones so imaging is mandatory and stones analysis should be done.

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