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Pediatric Urolithiasis in Children: Diagnosis and Management

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Abstract

Introduction: Pediatric urolithiasis remains endemic in low-resource countries affecting children <1 to 15 years. This study aimed to investigate the diagnosis and the treatment options of pediatric urolithiasis and compare that with the literature.

Materials and methods: This study retrospectively evaluated patients who had been diagnosed with urolithiasis in the in department of pediatric emergency and reanimation and the department of pediatric surgery in Hedi Chaker hospital in Sfax between 2001 and 2016.

Results: Over 16 years period, we diagnosed and managed 78 children with urolithiasis. 44 were male (56%) and 34 were female (44%). The median age was 54 months (4 to 144 months). Family history of urolithiasis was found in 23 patients (29.5%). The diagnosis of urolithiasis was made after Urinary tract infection in 23 (29.5%), abdominal pain in 16 (20.5%), Hematuria in 9 (11.5%), nephritic colic in 8 (10.5%), dysuria in 11(14%) and after antenatal diagnosis of malformative uropathies in 11 (14%) patients. The treatment were surgery in 32, medical in 30, LEC and endoscopy in 8 patients. The mean of follow up was 36 months and we had 11 recurrent urolithiasis.

Conclusion: Pediatric urolithiasis remains a devastating health problem. Their management requires more exploration especially in the etiology research for a best management.

Keywords: Pediatric; Urolithiasis; Children

Introduction

Pediatric urolithiasis remains endemic in low-resource countries affecting children <1 to 15 years [1]. Urolithiasis in children should not be underestimated because of associated significant morbidity and higher recurrence rate as compared to adults [2]. This study aimed to present our diagnostic and treatment options for pediatric urolithiasis.

Materials and Methods

This study retrospectively evaluated patients who had been diagnosed with urolithiasis in the in department of pediatric emergency and reanimation and the department of pediatric surgery in Hedi Chaker hospital in Sfax between 2001 and 2016. Different information concerning sex, age, occupation of parents, the circumstances of discovery, the personal history, family history, location the number of urolithiases and the method of elimination of the urolithiasis. The explorations included biology; radiology of urinary tract combining ultrasound, urography intravenous and retrograde cystography in patients with suspicion of malformative uropathies, as well as a cytobacteriological examination of urine was collected and analysed.

Results

Over 16 years period, we diagnosed and managed 78 children with urolithiasis. 44 were male (56%) and 34 were female (44%). The median age was 54 months (4 to 144 months). Family history of urolithiasis was found in 23 patients (29.5%). The diagnosis of urolithiasis was made after Urinary tract infection in 23 (29.5%), abdominal pain in 16 (20.5%), Hematuria in 9 (11.5%), nephritic colic in 8 (10.5%), dysuria in 11(14%) and after antenatal diagnosis of malformative uropathies in 11 (14%) patients. Urinary tract infection was present (positive cytobacteriological examination of urine) in 32 cases (42%) of cases. All patients had PUT and Ultrasound exam. CT scan was made in 26 patients, intravenous urography was made in 20 patients and retrograde cystography was made in 19 patients who had suspicion of malformative uropathies. Urolithiasis was unique in 48 cases and multiple in 30 cases. It was renal urolithiasis in 38, ureteral in 30 and vesical in 10 patients. The treatment were surgery in 32, medical in 30, LEC and endoscopy in 8 patients and emission was spontaneous for the 8 other patients. Surgical treatment was first intention in 22 patients who had macrocalculi, and in the other 10 patients it was after failure of medical treatment, endoscopic or LEC. For the patients who had medical treatment it was either hyperhydration alone or hyperhydration with Cardox[*]. Only 44 patients of all patients had metabolic analyses, and we found Hypercalciuria in 31 patients, hyperoxaluria in 10 patients, hyperuricosuria in 5 patients, hyperphophaturia in 4 patients and cystinuria in one patient. These metabolic disorders were combined in more than 50% of patients with metabolic disorder. The etiology of

urolithiasis was malformative uropathies in 19%, urinary tract infection 15%, metabolic in 46% and idiopathic in 20% of patients. In the 15 patients with malformative uropathies we had 9 with diagnosis of megaureter, 4 with diagnosis of ureteropelvic junction syndrome and 2 with diagnosis of vesicoureteral reflux. The mean of follow up was 36 months and we had 11 recurrent urolithiasis.

Discussion

Urolithiasis can be discovered in all pediatric age groups [3]. In some regions of the world the prevalence of pediatric urolithiasis has significantly increased in a way that it is comparable to that of adults [4]. In our region the diagnosis of urolithiasis in children increases from one year to the next. In the first decade of life, it is more prevalent in boys while in the second decade, it is female-predominant [5].

The most common presentations of urolithiasis in children are abdominal or flank pain, dysuria, vomiting, oliguria, hematuria, sterile pyuria and urinary tract infection [6,7]. Macroscopic or microscopic hematuria may be detected in up to 90% of children with urolithiasis [8]. In our series the urinary tract infection and the abdominal pain are the more condition for diagnosis of urolithiasis in children (Table 1). Positive family history is observed in most children with urolithiasis [6,7]. 29.5% of our patients had family history of urolithiasis witch was an important factor in diagnosis of the urolithiasis and the etiological investigation [9].

Total number	**78 cases**
Gender: Male/Female	44/34
Age (Months)	4-144 (Median 54)
Family history of urolithiasis	23 (29.5%)
circumstance of discovery of urolithiasis: - Urinary tract infection -abdominal pain -Hematuria -nephritic colic -Dysuria -antenatal diagnosis of malformative uropathies	23 (29.5%) 16 (20.5%) 9 (11.5%) 8 (10.5%) 11 (14%) 11(14%)
Unique/Multiple	48/30
Treatment: -Surgery -Medical -LEC or Endoscopy	32 (41%) 30 (38%) 8 (10.5%)

Table 1: Demographic characteristics of urolithiasis in children.

Conventional radiography may not detect small even radio-opaque stones in the kidney or ureter and yields no information about possible obstruction [10]. Ultrasonography is suggested as the primary imaging modality for diagnosis of suspected pediatric urolithiasis [9] The European Association of Urology and American Urological Association both recommend ultrasound as the initial diagnostic imaging of choice for suspected urolithiasis in children [11,12]. Our entire patient had conventional radiography and ultrasound. With ultrasound the diagnosis of urolithiasis was made in more than 80% of our patients. Intravenous pyelography exposes the patient to the risk of radiocontrast agents [9]. In last years our use of intravenous pyelography significantly decreased. While CT is still considered the gold standard in adults, for children and adolescents, CT should be reserved for cases where stone disease is highly suspected despite a negative ultrasound or prior to invasive surgery for preoperative planning when a stone is identified on ultrasound [13]. CT found an indication more and more in our patients especially with the increase of complex form of uropathie.

Hypercalciuria and hypocitraturia are the most commonly reported metabolic abnormalities in patients with urolithiasis [3]. Hypercalciuria was the most metabolic disorder founded in our patients and combined metabolic disorders were the most presentation.

Spontaneous renal stone passing may occur in 51.21% of the affected children [9]. While the majority of studies on the use of medical expulsion therapy have been performed in adult patients, the success of alpha-blockers and calcium-channel blockers in facilitating stone passage, reducing analgesic use, and increased cost-effectiveness compared to analgesics alone, has led to the use of both in the pediatric population [14]. Surgical intervention is estimated to be necessary in 22 to 60% of children with nephrolithiasis [15]. In our series medical expulsion therapy and surgery were used almost equitably however the medical expulsion finds more and more indications and good results.

Long term conservative therapy, consisting of dietary manipulations, adequate fluid intake and in special conditions appropriate drug therapy, is effective for prevention of stone recurrence in most of the patients [16]. Primary and secondary prevention should be well done to avoid serious complications such as renal insufficiency.

Conclusion

Pediatric urolithiasis remains a devastating health problem. Their management requires more exploration especially in the etiology research for a best management. And his care requires collaboration between pediatrician and pediatric surgeon.

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