
Clinical Patterns and Management of Pediatric Urolithiasis

(A Study of 100 Cases)

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Abstract : A series of 100 cases of pediatric urolithiasis was studied in Government Medical College, Aurangabad from May 1993 to December 1995, according to the clinical patterns of urolithiasis (age, sex, clinical features, site of stones, stone analysis and recurrence). Most of the patients were treated surgically. The age distribution ranged from one year to 13 years. The male to female ratio was 7.1:1. Common symptoms were difficulty in micturation, hematuria and abdominal colic.

Stones were located in bladder in 50 cases, in kidneys in 27 patients, in ureter in 8 cases and in urethra in 9 cases. There was multiple organ involvement in 6 cases. The most common calculi were composed of calcium oxalate followed by mixed oxalate phosphate. Metabolic calculi were rare.

Key words : Pediatric urolithiasis, Incidence, Management.

Introduction

There is world wide and unexplained variation in the incidence, clinical pattern and composition of urinary stones in children. There are great differences in the extent of stone disease in children between the industrialised Western countries on one hand and the Middle East, Asia, Africa, South America on the other hand. The incidence of stone disease in children is 1 to 2 per million population in United States, whereas the disease is still endemic in countries in the Mediterranean area and in India subcontinent. We now report on stone disease in children who were admitted and treated in Government Medical College, Aurangabad.

Material and Methods

One hundred cases of pediatric urolithiasis were admitted in Government Medical College, Aurangabad from May 1993 to December 1995. The data was recorded in these children with regard to age, sex, religion, clinical features, physical findings, urine analysis and urine culture, routine biochemical investigations in view of metabolic evaluation. All cases had complete radiological studies of urinary tract to localize the stone and determine the presence of associated anomalies. According to the final diagnosis, type of operative procedure was decided upon. Complications were noted if occurred. All the calculi were analysed biochemically and a search towards the cause of the stone was attempted.

The youngest and the oldest child was of one year and 13 years respectively. The age distribution in the range of 1-14 years was as shown in the Table 1.

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Table 1

AGE DISTRIBUTION OF THE PATIENTS

Age (Years)	No. of patients (Percentage)
0-1	00.1%
1-5	39.0%
6-10	44.0%
11-14	16.0%
TOTAL	100.0%

There were 86 boys (86%) and 14 girls (14%) in the present series with a ratio of 7.1:1.

Majority of patients were Hindus (55%), followed by Muslims (32%). The Buddhist were 11%. The least were Sikhs (2%) and Christians nil.

The duration of symptoms ranged from few hours to 5 years. Twenty percent of patients had their symptoms for more than one year. Only one patient (1%) gave a previous history of the stone and similarly only one (1%) documented the family history of the stone disease.

The most common clinical feature in the childhood urolithiasis was difficulty in micturation which comprised of burning micturation, dysuria, cry at urination, screaming. It was found in 78 cases, 33 cases had abdominal colic, 23 cases had vague abdominal pain, 21 cases had genital pains, history of hematuria was

obtained in 47 cases, 20 cases fondled with their genitalia. Only 10 cases gave history of passing stones or gravels in urine, 8 patients presented with retention of urine, 2 with anuria and 4 with pyuria. One patient had lump in abdomen. Associated features like fever and vomitings were present in 21 cases each.

Location of stone in the urinary system was as shown in Table 2.

Table 2

Site	No. of Cases	Percentage
Kidney :		
- Single	19	19.0
- Multiple	07	07.0
- Staghorn	01	01.0
	27	27.0
Bladder	50	50.0
Ureter	08	08.0
Urethra	09	09.0
Multiple sites	06	06.0
Total	100	100.00

The relation between the age and site of the stone is shown in the Table 3

Diagnosis was established radiologically by KUB, USG abdomen, IVP. All the patients required surgical interventions as modern facilities like PCNL and ESWL do not exist in our institute.

Table 3

Location	0-1 Years No. (%)	1-5 Years No. (%)	6-10 Years No. (%)	11-14 Years No. (%)	Total No. (%)
Kidney	01 (03.25)	05 (16.35)	16 (51.60)	09 (29.00)	31 (100.0)
Ureter	—	06 (45.15)	02 (15.40)	05 (38.45)	13 (100.0)
Bladder	01 (01.82)	37 (67.30)	13 (23.60)	04 (07.28)	55 (100.0)
Urethra	—	04 (44.45)	07 (33.33)	02 (22.22)	09 (100.0)

NOTE : Stones at multiple sites are here considered according to their individual site in the above Table.

Management of renal stones was carried out by classical surgical procedures as shown in Table 4.

Table 4

Type of operation	No. of cases	Percentage
Pyelolithotomy	16	51.60
Extended pyelolithotomy	03	09.65
Nephrolithotomy	05	16.15
Pyelonephrolithotomy	03	09.65
Nephrostomy	02	06.45
Pyelolithotomy with pyeloplasty	01	03.25
Untreated as follow up	01	03.25
Nephrectomy	—	—
Total	31	100.00

Management of ureteric stone was carried out as shown in Table 5.

Table 5

Management	No. of cases	Percentage
Conservative	01	07.69
Surgical :		
- Ureterolithotomy	10	76.93
- Pyelolithotomy	01	07.69
- Ureterolithotomy with ureteroneocystostomy	01	07.69
Total	13	100.00

All the cases of bladder stones were treated by suprapubic cystolithotomy, including those with multiple organ involvement.

The urethral stones were treated as shown in Table 6.

Table 6

Management	No. of cases	Percentage
Conservative	05	55.55
Urethrostomy	—	—
Suprapubic cystolithotomy	04	100.00
Total	09	100.00

All the stones were analysed biochemically. Calcium oxalate stone forms the majority (61%) followed by mixed oxalate phosphate (15%), calcium phosphate (12%), struvite (7%), uric acid (2%). One stone could not be analysed as the patient of bilateral stone with uraemic was treated by nephrostomy and the stone was not removed in that case.

Over all complication rate was of 20%, consisted mainly of urinary leak in operated cases of bladder stone by suprapubic midline incision when compared to those who were operated by Pfannenstiel incision. Other complications were prolonged urinary leak though flank drains, urinary tract infection and wound gape. Avulsion of left ureter occurred in a case of calculus anuria secondary to bilateral impacted lower ureteric stone with uraemia while performing bilateral ureterolithostomy. It was temporarily treated by primary ureterocutaneostomy followed by Boari's flap.

In our sincere effort to point out the cause of the stone in the pediatric age group with marginally equipped investigatory set up, we could find out the cause in only 38 cases. There were 23% infective stones, 10% metabolic and 5% anatomical stone, 62% were attributed idiopathic variety.

Out of 23 cases of infective stones, 20 had positive urine culture. The most common organism were E. Coli and proteus. Other had insignificant bacteruria with clinical evidence of U.T.I. Of 10 patients of metabolic stones, 2 had hyperuricosuria, and cystiuria, 4 had hypercalcemia and 2 had hyperphosphataemia. Out of 5 anatomical variety of stones, 2 had PUJ obstruction, one with UV junction stricture and 2 with phimosis. Idiopathic cause was attributed to 62 patients with unqualified calciuria and oxalourias, immobilisation and nutritional deficiency.

Discussion

Stones in children age group in the developing country like India, is a very common cause of morbidity.

Age incidence was highest at the age of

5 years and was 59.4% below 10 years and 68.7% in below 15 years (Anderson et al, 1963)¹. Arora et al (1963-64)² collected an epidemiological data from three large hospitals in Delhi and showed that 50% of the patients were children under 15 years of age. Williams and Eckstein (1968)³ suggested that majority of stones in the children occur under 4 years of age with a peak during 2nd and 3rd year. Ghazali et al (1975)⁴ found that 75% of children with urolithiasis were less than 5 years old at the time of diagnosis. Rizvi et al (1985)⁵ showed that there were two peaks of stone occurrence at 6 and 1 years of age respectively. In the present series, maximum cases occurred in the age group 6-10 years i.e. 44%, followed by 39% in 1-5 years, 16% in 11-14 years and 1% in the age group 0-1 year. The first peak was the age of 3 years and 2nd peak at the age of 12 years.

Ghazali et al (1973)⁴ said that males make up 80% of patients of pediatric urolithiasis. Borgmann and Nagel (1982)⁶ noted in their study of pediatric urolithiasis, male to female ratio of 2:1. Balaskar A.C. and Kale N. (1990)⁷ found that 73% were boys and 27% were girls. In the present series, males were 86 and 14 were females with a ratio of 7.1:1.

Anderson et al (1967)¹ found 85% Hindus, 9% Christians and 6% Muslims in patients of childhood urolithiasis. Singh et al (1978) quoted that Hindus were 7 times more likely to develop urinary stones than Muslim and Manipuri tribals, in his study of pediatric urolithiasis among Manipuri children. In the present series, 55% of Hindus, 32% Muslims, 11% Buddhas and 2% Sikhs. No case was found from Christian community.

A historical trend away from bladder stones, as endemic prior to 20th century, to the upper tract calculi, was noted in last few decades, whenever the country becomes industrialised and diet becomes more nutritious. Balaskar and Kale (1990)⁷ noted 49% patients of renal stones, 26.5% of bladder stone, 16.7% of ureteric stone, 8.2% of patients had multiple organ involvement. Androulakakis P.A. et al (1990)

in their study of pediatric urolithiasis in Greece, found 65.95% patients of renal stones, 4.54% of ureteric stones, 2.27% of bladder stones and urethral stones each, 24.97% patients had multiple organ involvement. Dajani A.M. et al (1988)⁹ found 84.6% patients having upper tract calculi, 17.3% of bladder stones, 11.5% of urethral stones. In the present series, 25% patients were of renal stones, 8% of ureteric stones, 50% of bladder stones and 9% of urethral stones, 6% of patients had multiple organ involvement. It was clear that lower tract calculi were more common in India.

Surgical treatment was carried out in all the cases. All the classical procedures were adopted. The only notable point was none of the patient required nephrectomy as against 7% incidence of nephrectomy in study of Bennet and Colondy (1978)¹⁰.

In India, calcium oxalate stones were 86.1% in the analysed stones (Sharma R.J. et al 1989)¹¹, Dajani A.M. (1988)⁹ found 59.3% calcium oxalate stones, 29.6% uric acid stones. Balaskar and Kale (1990)⁷ found maximum incidence of calcium phosphate (61.7%) stones and struvite stones 30.6%, in childhood lithiasis. In the present series, 61% were calcium oxalate stones, 15% mixed oxalate phosphate, 12% calcium phosphate, 7% struvite, 2% uric acid and 2% cystine calculi. One stone was not analysed.

In a series of 270 cases studied by Diamon D.A. et al (1990)¹², 60% were infection related stones, 27% idiopathic, 10% anatomical and 3% metabolic stones. Dajani A.M. (1988) commented that about 46% were infective, 20% due to anatomical disturbances, 25.4% due to metabolic derangements. Rest of them were idiopathic stones. In the present series, we could attribute causes of stones in the children in 38% cases. 23% were infection related stone, 10% were due to metabolic disturbances, 5% due to anatomical disturbance, 62% were attributed to idiopathic variety which comprised cases of oxalourias and calciurias immobilisation and nutritional deficiencies.

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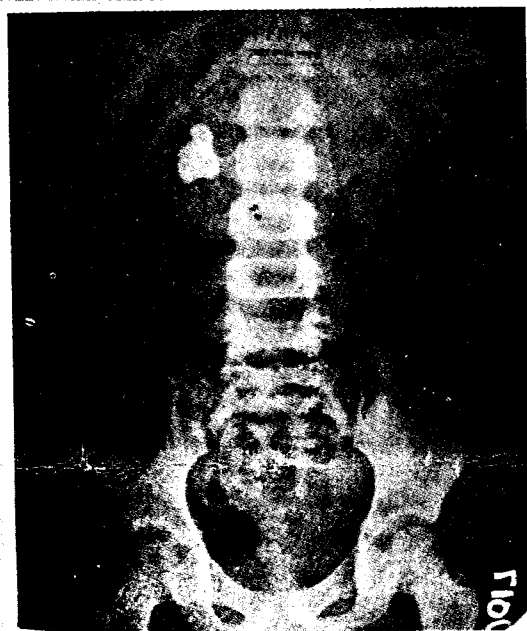


Fig. 1 : X-ray KUB showing right staghorn calculus

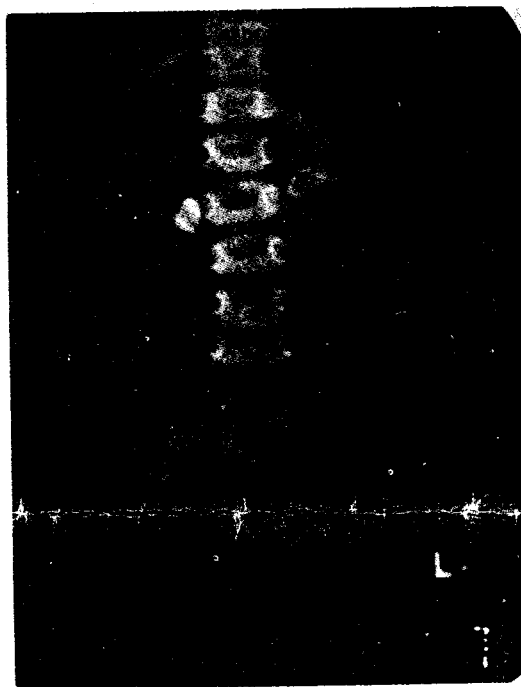


Fig. 2 : X-ray KUB showing bilateral renal stone