Vesical Calculi in Children: Study of their Nutritional Status


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Abstract

Background: To evaluate the nutritional status of children with bladder stones as a possible etiology of so-called primary or endemic bladder calculi.

Methods: In this descriptive study 52 children having bladder stones were enrolled according to specified criteria. Nutritional status was assessed according to weight for height or length deficit. Nutritional status assessment was carried out according to weight for height or length deficit, taking standard deviation to classify mild, moderate and severe malnutrition, corresponding to -1 Z-score, -2 Z or -3 Z-score with National centre for Health Statistics (NCHS).

Results: Of the total 187 paediatric admissions, number of children with vesical calculi was 52 (27.8%). Malnutrition was detected in 57.6%. Nutritional deficiencies were found in 25 patients (83.3%) with idiopathic stone disease. Three patients (10%) revealed anatomical abnormalities, 01 patient (3.3%) had metabolic and 01 patient (3.3%) had associated neurological abnormalities.

Conclusion: Imbalanced nutrition is the principal risk factor for paediatric bladder calculi.

Key Words: Vesical calculi, Metabolic Diseases, Malnutrition, Child

Introduction

Urolithiasis is the 3rd most common urological disease. Its occurrence varies in different parts of the world. Childhood urolithiasis is the most common paediatric urological disease in Pakistan. In the absence of obstruction, infection or neurological disease, bladder stones are considered endemic in developing countries. In Western countries bladder calculi have disappeared due to improvement in nutrition, judicious use of antibiotics and antenatal diagnosis of bladder neck obstruction with its early treatment.1-3

In developed world, if an otherwise healthy person is found to have a bladder stone, a complete urological evaluation is undertaken to find a cause for urinary stasis. Examples include benign prostatic hypertrophy, urethral strictures, neurogenic bladder and bladder neck contracture. A clearly defined bladder stone belt has been identified crossing Northern sub-continent, Eastern Europe, Middle East and Thailand.4

The incidence of primary bladder calculi has been steadily decreasing since 19th century because of improved nutrition and infection control. In developing and less developed countries, primary bladder calculi affect children and are more common among boys.

In Pakistan, bladder calculi are endemic in rural areas and poor localities of big cities. The paediatric patients with renal and ureteric stone have increased due to available facilities for ESWL, dialysis and transplantation for children with calculus renal failure.5 Reports from Ethiopia by Johnson showed a significant increase in bladder stones in male children of low socio-economic class who lived on little most and staple carbohydrate similar to our children.6

Patients and Methods

This study of nutritional status of paediatric patients having vesical calculi was carried out from August, 2006 to July, 2010. All Paediatric patients who presented to Emergency and Out Patient Department with lower urinary tract symptoms were evaluated by detailed history, physical examination, laboratory and radiological investigations and a convenience sample of 52 pediatric patients having vesical calculi was taken. Data of these patients revealed useful information regarding nutritional status, metabolic abnormalities, urinary tract infection, anatomical and functional status of renal tract. All the information was recorded on specially designed proforma.

Nutritional status was assessed according to weight for height or length deficit taking standard deviation to classify mild, moderate or severe malnutrition.

Paediatric patients having lower urinary tract symptoms were initially screened by x-ray (KUB), USG (abdomen) and urine R/E in emergency and out-patient department for the presence of bladder stones. Paediatric patients having bladder calculi were
evaluated further regarding underlying risk factors like bladder outlet obstruction, metabolic abnormalities, functional bladder disorders and other etiologies by radiological (e.g. MCU, IVU) and biochemical (e.g. serum uric acid and Ca, 24 hr urinary Ca, uric acid) means. Cysto-urethroscopy was also performed (e.g posterior urethral valves, urethral strictures). In children having functional bladder disorders urodynamic studies were also done. After complete evaluation vesicolithotomy was performed & stones removed were sent for chemical analysis. Patients were routinely followed up after 3 months.

Nutritional status assessment was carried out according to weight for height or length deficit, taking standard deviation to classify mild, moderate and severe malnutrition, corresponding to -1 Z-score, -2 Z or -3 Z-score with National centre for Health Statistics (NCHS). WHO Normalized values for weight for height and height for length as reference values proved very useful in detecting and classifying malnutrition. 7

Results

Out of all 187 children admitted, 52(27.8%) had vesical calculi, 23(12.3%) had upper tract stones, remaining 112 patients (59.9%) were admitted for reasons other than stone disease. Mean age of the patients was 4.90 years (range 2y-14y). Of 52 patients 46 were boys and 6 were girls with male to female ratio 8:1. In nutritional status 56.69% were malnourished. Low protein intake was found in 66.6% (Table 1). Nutritional deficiencies were found in 83.3% patients with idiopathic stone disease (Table2)

<table>
<thead>
<tr>
<th>Table 1: Vesical calculi in children: Nutritional status</th>
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<tr>
<td>Characteristic</td>
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<tr>
<td>-------------------------------------------------------</td>
</tr>
<tr>
<td><strong>Resident</strong></td>
</tr>
<tr>
<td>Urban</td>
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<tr>
<td>Rural</td>
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<tr>
<td><strong>Nutritional Status</strong></td>
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<tr>
<td>Exclusively breast fed</td>
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<tr>
<td>Mainly fed on oranges and green vegetables</td>
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<tr>
<td>Low protein intake</td>
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<tr>
<td>Low calcium intake</td>
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All the 30 families of malnourished children belonged to very low socioeconomic class. Of the 52 patients with vesical calculi, families of 28 patients (53.8%) had a per capita income of less than Rs. 20,000/- year. 40 patients (76.9%) out of the total 52 patients were from urban areas though from poor localities whereas 12 patients (23.1%) came from rural areas of district Rawalpindi. Thirty patients who had Nutritional deficiencies had some form of underlying pathology. Out of 9 patients with anatomical abnormalities 03 patients (10%) had mild degree of malnutrition. Of the 7 patients with metabolic abnormalities, only 1 patient (3.3%) had malnutrition. This patient had previous history of bilateral renal stones for which he was operated (pyelolithotomies).

<table>
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<th>Table 2: Vesical calculi in children: Degree of malnutrition</th>
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<tr>
<td>Nature of underlying pathology</td>
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<td>Idiopathic stone disease</td>
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<tr>
<td>Anatomical abnormalities</td>
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<tr>
<td>Metabolic abnormalities</td>
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<td>Neurological abnormalities</td>
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Figure 1: A big vesical calculus retrieved from a malnourished child.

Discussion

Open vesicolithotomy is generally considered an easy procedure and is carried out even at peripheral centres. It ultimately leads to a low referral of such cases from the peripheral area, as compared to referrals for other urological ailments. The cases in our study mainly presented from poor localities of urban areas of Rawalpindi city and from near peripheral areas. This trend is quite similar to trends in some other parts of the country. 3

Pakistan is amongst the poorest nations with yearly income of less than $500 per capita and more than 40%
of population living below the line of poverty. Although our unit is the largest urological unit in the district, we receive a less proportion of patients with vesical calculi probably due to non-availability of minimally invasive methods of treatment of vesical calculi and their availability might increases number of referrals of children with vesical calculi as evident by studies at a Karachi institute. In spite of such low referrals, paediatric urolithiasis is the most common urological ailment in children admitted in our unit, which is comparable to other studies. Present study showed a higher frequency of nutritional imbalances which is similar to studies carried out in Western parts of India. Dietary and medical management can help reduce risk factors by two-thirds resulting in recurrence rates of about 1%.

A total of 30 cases (57.6%) were identified with idiopathic stone disease. This trend is comparable to similar studies carried out in other parts of our country that showed that endemic bladder calculi still constitute a major workload of paediatric urology in Pakistan. In our study, a significant number of bladder stones were seen in families of low socio-economic status, making contribution of malnutrition and imbalanced nutrition more likely. The trends are similar to studies carried out in Ethiopia and Nigeria.

Conclusions
1. Bladder calculi disease is the most common paediatric urological ailment in Pakistan.
2. Malnutrition and poverty contribute to the formation of such calculi in patients in whom bladder outlet obstruction, infection and neurological abnormalities are absent.
3. Educating health personnel and mothers on proper infant feeding and weaning at proper age and manner would identify and eliminate the risk factors for endemic bladder calculi and will also minimize their recurrence.

References