

# BLADDER STONES IN CHILDHOOD : A DESCRIPTIVE STUDY IN A RURAL SETTING IN SARAVAN PROVINCE, LAO PDR

Somphou Sayasone<sup>1</sup>, Peter Odermatt<sup>1</sup>, Keomanivanh Khammanivong<sup>1</sup>,  
Sisongkham Phomluangsy<sup>1</sup>, Chau Van Vinh<sup>1</sup>, Htar Myint Thin<sup>2</sup> and Michel Strobel<sup>1</sup>

<sup>1</sup>Institut de la Francophonie pour la Médecine Tropicale, Vientiane;

<sup>2</sup>Enteraide Médicale Internationale, Saravane, Lao PDR

**Abstract.** The aim of the study was to describe clinical cases of childhood bladder stones and associated risk factors. Forty children (9 girls), aged 1-14-years old, (means 4.7±0.5 years), who underwent surgical stone removal in the Saravane Provincial Hospital during a 13-month period, were included. Bladder stone removal accounted for 55% of all surgical procedures performed on children. Most frequent symptoms were impaired micturition (97%) and acute urinary retention (32%). Body mass index was low, at < 18.5 in 92% of all cases, indicating serious associated malnutrition. Parental interviews disclosed a history of recent episodes of diarrhea (>3 episodes in the previous year), recurrent urinary tract infection, and familial urolithiasis, in 60, 32, and 27% of patients, respectively. All children had been or were being breastfed, but 72% of the mothers introduced white rice into their children' diet as early as the first week of life, while 85% of them used to vary the food regimen (introducing meat, fish, fruit and vegetables) only after 1 year of age. This preliminary study suggests that the morbidity and social cost of childhood bladder stones may be high. A larger scale prospective and comparative study assessing their incidence and associated nutritional factors is warranted and feasible, and may lead to preventive measures.

## INTRODUCTION

Child bladder stones (CBS) have been a very frequent disease worldwide, including Europe, until the early 20th century. Its etiology and mechanism are presumed to be multifactorial but remain unclear. Improvement of social and nutritional conditions probably accounts for its near disappearance from affluent countries. However, it continues to be a serious public health problem in resource-poor settings, notably in the Middle East, Africa, and Southeast Asia (the so called "Afro-Asian stone belt") (Koko *et al*, 1996; Rabasse, 1998; Ece *et al*, 2000).

In northeastern Thailand, for instance, CBS accounted for one quarter of all child hospitalizations in the cities. In many settings (Thailand, India, Pakistan), an association between CBS and famine, drought, and vegetarian diet has been documented, a link supported by a dramatic decline in prevalence with improvement in child nutritional status. In Lao PDR, in 2003, the precise prevalence of this disease was unknown, but clinicians repeatedly reported that it was still highly prevalent, especially in southern Lao PDR.

Although accurate diagnosis is easily achieved by simple x-rays or ultrasound procedures, the disease,

which often runs a long asymptomatic course, may be diagnosed at a late stage of harmful complications such as recurrent infection or chronic kidney failure.

We undertook a preliminary study to describe the clinical presentation, and to assess the potential role of malnutrition or inadequate dietary habits, dehydration, infection, familial predisposition, and drug intake.

## MATERIALS AND METHODS

The hospital charts of all children who underwent open bladder surgery for stone removal within a 13-month-period (January 1<sup>st</sup> 2002 to February 28<sup>th</sup> 2003) in Saravan Provincial Hospital, southern Lao PDR were reviewed.

Subsequently, from one month to one year after their hospital discharge, the patients were visited at home. A rapid clinical assessment (urinary symptoms and signs, weight, and height), dip-stick urine evaluation (protein, nitrite, blood, leukocytes, pH), and a direct interview with patients and/or parents, were performed. A standard questionnaire was used and information was gathered on demographic and social data, as well as medical history of both the patients and their families, and their dietary and drug habits.

## RESULTS

Charts reviewed for the study period yielded a total of 205 cases of urolithiasis. Of these, 130 were upper

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Correspondence: Somphou Sayasone, Institut de la Francophonie pour la Médecine Tropicale, Vientiane, Lao PDR.  
E-mail: meditrop@laopdr.com

urinary tract stones, mostly in adults (125 of 130, 96%), and 75 were lower urinary tract stones, mostly in children (57 of 75, 76%) (Table 1). Of the 57 children with CBS, the mean age was 4.7 years (range 1-14 years), and 43 (77%) were male (M/F sex ratio 3:1).

CBS accounted for 55% of all surgical procedures conducted on children in this hospital. Of the 57 children's charts, only 40 yielded useful data, leading to 40 filled questionnaires. Around 2/3 of the children (62.5%) came from the local district (Saravane), the remaining came from nearby districts of the same province, which consisted of approximately 77,000 inhabitants. Clinical and urine dip stick data are summarized in Tables 2 and 3.

### Nutritional data

Thirty-seven out of 40 (92%) of the CBS patients were malnourished, as defined by a Body Mass Index <18.5. According to the questionnaire, all children had been, or were currently being, breastfed for a median duration of 17.3 months. In accordance with traditional practice, around 90% of mothers used to give their baby white rice in addition to breast milk, before the age of one month, and some 72% within the first week of life. Furthermore, 85% introduced other kinds of food (meat, eggs, fish, fruit, vegetables) very late, *ie* after one year of age (Table 4).

### Drug intake

No consistent or prolonged drug intake was reported by the interviewed mothers; 5 children had repeatedly used traditional herbal remedies for undocumented reasons and periods of time.

### Medical history

Relatives of 14 children had a history of documented urolithiasis (35%).

### Infection

Sixty percent and 32% of the children had suffered recurrent episodes of diarrhea (at least 3), or urinary tract infection, respectively, within the previous year.

## DISCUSSION

Late diagnosis is likely to occur in CBS because the condition becomes symptomatic only when the stone volume causes overt obstruction, leading to mechanical complication and infection. Earlier diagnosis could be possible if more attention were paid to clinical signs and symptoms in malnourished children, thus prompting access to x-rays or sonography - although the latter may not be easily available in provincial or district settings. Hence, only complicated cases may come to attention, resulting in

Table 1  
Distribution of urinary lithiasis by age in Saravane Provincial Hospital (n=205).

Age group (year)	Vesical stone		Kidney stone	
	No.	%	No.	%
1- 5	42	98	1	2
6-15	15	79	4	21
16-30	6	17	29	83
31-50	8	11	66	89
51-98	4	12	30	88
Total	75	37	130	63

Table 2  
Clinical signs of CBS patients at Saravane Provincial Hospital (n=40).

	Fever (%)	Acute bladder retention (%)	Cloudy urines (%)	Hematuria (%)	Dysuria (%)
Present	15	15	13	32.5	97.5

Table 3  
Urine dip-stick test in child bladder stone (CBS)  
patients (n=34).

	Positive (%)	Urine pH	%
Albumin	47	< 6.25	9
Leukocyte	44	6.25-6.50	79
Nitrites	44	>7.5	12

Table 4  
Rice introduction and other food (other than milk) in  
children with vesical stone (n=40).

Rice/other food introduction	No.	%
<b>Rice introduction</b>		
Before 1 week of life	33	72.5
Rice before 1 month	5	15.5
Rice from 1-4 months	1	2.5
Rice after 4 months	1	2.5
<b>Other foods (other than milk and rice)</b>		
Before one year	6	15.0
After one year	34	85.0

a gross underestimated prevalence of CBS. The fact that, in our small study, 47% of children had late post-surgical persistence of proteinuria and leukocyturia, may suggest that late complication, such as infection, silent kidney impairment, and finally chronic renal failure, may also be underestimated.

A poorly-balanced diet, with excessively high cereal / protein ratio, deficit in proteins, vitamins, and phosphates is known to favor child lithogenesis (Koko *et al*, 1996; Robertson, 2003). In our study, such an imbalance (very early rice and very late meat/fish introduction), as well as obvious malnutrition (Body Mass Index < 18.5), was well illustrated. Moreover, our limited results for urine pH suggest excessive

alkaline urine which also favors infection and lithiasis. In this respect, fruits such as mangos, limes, and oranges, which are easily available in Lao PDR may be advocated to acidify urine and prevent or reduce stone formation.

Dehydration may finally be an additional factor, linked to the huge burden of diarrheal diseases in developing countries.

### Conclusion

Childhood bladder stones have nearly disappeared from affluent countries. However, they are still a public health concern for some developing countries, where they are clearly associated with malnutrition. The sanitary and economic costs may be high if one takes into account the number of hospitalized children, those who need a surgical procedure, and those who develop overt or silent complications, such as chronic renal failure, the prevalence of which is largely unknown. As shown in this preliminary study, CBS is frequent in rural southern Lao PDR, where malnutrition is highly prevalent, and where it represents the leading indication for childhood surgery. A large-scale prospective study appears feasible to properly assess the burden and the predisposing factors of this neglected disease, in an aim to propose preventive measures.

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