Pediatric Urinary Lithiasis in Turkey

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Turkey is accepted as one of the endemic countries for stone disease. This was also noted by HB Eckstein who had done considerable research and clinical work in his pioneering years of pediatric urology in Turkey [8]. He is well known to all experienced pediatric surgeons and urologists in Turkey. His admirable work, particularly in the field of pediatric urolithiasis was the main reference for this study which aimes to give an update of the subject. (*)

In this study an evaluation of the present status of stone disease in children was made by reviewing the case material of the Department of Pediatric Surgery, Ege University Hospital. Moreover, to have an idea of the dissemination of the disease throughout the country, a questionnaire was sent to principal Pediatric Urology centers from different geographical regions of Turkey with a total catchment of almost two thousand new cases since 1980.

Clinical material

A retrospective study was carried out on 196 children with urolithiasis in the Department of Pediatric Surgery of Ege University Hospital between 1975-1993. Those patients formed the 0.8 % of all pediatric surgical admissions and 4 % of urologic cases. There were 145 boys (74 %) and 51 girls (26 %), with a male to female ratio of 3 to 1. The mean age was 6.8 with a range of 1 to 16 years. A cluster of patients (45.4 %) between 2 to 8 years of age was noted (Table 1).

The incidence of urolithiasis pointed to a steady decline in the recent years (Table 2). The majority of the patients were from Izmir (52 %) and the rest were from neighboring provinces. Izmir is located in the western part of the country with a relatively higher socio-economic level compared especially to Central, East, and Southeastern Turkey.

In only 5 (2.5 %) of the patients there was a family history.

The most common presenting symptoms were dysuria in 90 patients (45.9 %), hematuria in 83 (42.3 %), and flank pain in 70 (35.7 %). Nonspecific abdominal pain, fever, vomiting, nausea, urinary retention and incontinence, facial edema, and growth retardation were noted less frequently (Table 3). In 4 patients urinary stones were detected incidentally during radiological investigations for other diseases.

Following a routine KUB, work-up included ultrasound studies and/or intravenous urograms to display a possible dilatation or obstruction in the upper urinary tract (Table 4).

A total of 129 children (65.8 %) had calculi in the upper urinary tract at the time of presentation. Bladder and urethra stones were found in 25.5 %. There were also patients with multiple stones in different locations of the urinary tract (Table 5).

The predisposing factor was unknown in the majority of the cases. Congenital anomalies and metabolic causes were extremely rare (Table 6).

Although there were symptoms of urinary infection in 95 patients (48.5 %), only 59 of those (30.1 %) had positive urine cultures (colony forming units over 100,000/ml). Escherichia coli was the predominating microorganism (45.8 %), followed by Klebsiella pneumonia in 9 cases (15.3 %), Proteus in 8 (13.6 %) and Pseudomonas in 8 (13.6 %). Most of the patients with UTI were between the ages of 3 and 6.

All patients with kidney stones were treated surgically. Pyelolithotomy was performed in 69. In 16 cases ureterolithotomy was combined with a pyelolithotomy. Three patients with non-functioning kidneys and one with a hypoplastic kidneys underwent nephrectomies (2 %). In one child with ureteropelvic obstruction a simultaneous pyelolithotomy and pyeloplasty were carried out. There were

Table 1. Distribution of the cases according to sex and age (n=196)

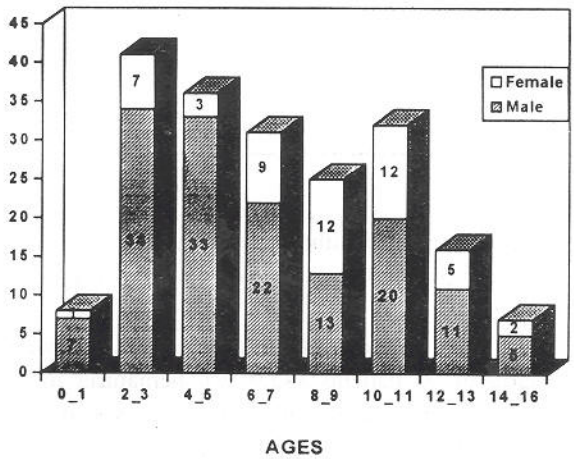

Table 2. Distribution of the cases through 1975-1993

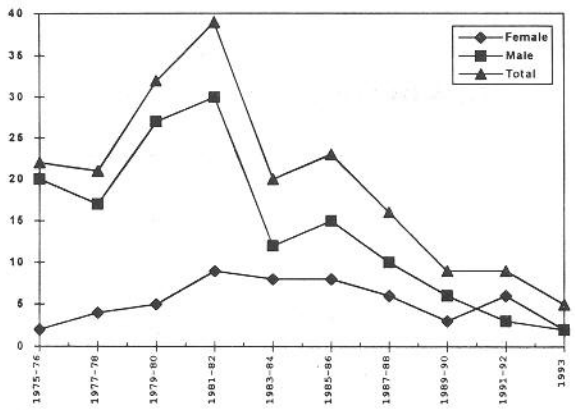

Table 3. Symptoms and findings

	N	%
Dysuria	90	45.9
Hematuria	83	42.3
Flank pain	70	35.7
UTI	59	30.1
Abdominal pain	25	12.7
Nausea/vomiting	18	9.2
Fever	16	8.1
Frequency	11	5.6
Palpable bladder	3	1.5
Edema	2	1
Incontinence	1	0.5
Growth retardation	1	0.5

Table 4. Urographic findings

	N
Hydronephrosis	22
Hydronephrosis and hydroureter	2
Ureteral dilatation	13
Non functioning kidney	3

36 ureterolithotomies and 41 cystolithotomies. Stones in the lower ureter were removed endoscopically in 3 patients. In 2 of the 9 patients with urethra stones urethrotomies were needed as well.

The most frequent postoperative complication was wound infection (3.8 %). In 3 patients there was prolonged urinary discharge at the same time which healed spontaneously. Residual stones were observed in 8 patients (4 %). There was no mortality.

Only 60 % of the patients could be followed up. In 11 of those (5.6 %) there were recurrent stones.

Stone analysis was available in 74 patients. Mixed calcium oxalate-phosphate and uric acid stones were the most common type. In only 9 patients there were pure calcium oxalate stones. No significant difference between the chemical compositions of the kidney and bladder stones was found (Table 7).

In the second part of our study, the results of the questionnaire sent to the major pediatric urology centers were evaluated: Most of departments from western Turkey noted a declining incidence of stone disease over the last decade. The incidence was also declining or stable for most of the centers from Istanbul, a metropolis over 10 million. The results from some of the departments located in Central and Eastern Turkey still reflect high numbers of pediatric urolithiasis cases. There were few centers which showed urolithiasis as the most frequent cause of admission within all their pediatric urological cases, while most other centers rank stone disease somewhere between third and sixth on their listings.

Although extracorporeal shock wave lithotripsy (ESWL) is gaining popularity in major cities, the percentage of children treated with ESWL is quite low, and in general, surgery continues to be the main modality of treatment for pediatric urolithiasis in Turkey. However, many of the centers surveyed have recently started, or plan to start both endoscopic removal of urinary stones and ESWL, as soon as they set up their equipment.

Discussion

The incidence of urolithiasis in children varies with geographic regions, and ranges from 1:1000 to 1:7000 [13]. Although reliable statistical data are

Table 5. Location of stones in urinary tract

	N:Right	Left	Bilateral	Total	%
Kidney	31	34	6	71	36.2
Ureter	15	18	4	37	18.9
Bladder				41	20.9
Urethra				9	4.6
Kidney+Ureter				21	10.7
Kidney+Bladder				6	3.1
Kidney+Urethra				2	1
Kidney+Ureter+Bladder				4	2
Kidney+Ureter+Urethra				1	0.5
Ureter+Bladder				2	1
Ureter+Urethra				2	1

Table 6. Actiology in stone formation

	N	%
1. Congenital anomalies		
Ureteropelvic obstruction	1	
Right renal hypoplasia	1	
Ureterocele	1	
Ureteropelvic duplication	1	3.06
Penoscrotal hypospadias	1	
Rectoperineal fistula	1	
2. Metabolic		
Cystinosis	1	1.02
Cystinuria	1	
3. Idiopathic	188	95.91

Table 7. Composition of stones

	N	%
Oxalate-Phosphate	24	32.4
Oxalate-Phosphate-Uric acid	13	17.6
Oxalate-Uric acid	8	10.8
Oxalate	13	17.6
Phosphate	6	8.1
Cystine	2	2.7
Uric acid	2	2.7
Other	6	8.1

unavailable, urinary tract stones can still be considered as endemic in Turkey. Remzi, et al reported a 0.8 % incidence in school age children [15].

In the papers published before 1960s, the stones in the majority of the cases were located in bladder and mostly were seen in boys. Eckstein reported that the 90 % of the children with urinary calculi in Ankara were boys and in the 58 % of the cases the stones were found in the bladder [8]. A quarter of a century later the percentage of bladder stones in the same region was reported as 20 % [14]. It is generally accepted that, the geographic distribution of pediatric bladder stone disease changes over time and disappears in industrialized and affluent societies.

Urolithiasis cases constituted 0.8 % of all our pediatric surgical admissions in the study period. A significant decrease in urolithiasis admissions in the last two decades was noted compared to the earlier report of the same department [1]. The explanation for this obvious decrease may be the gradual increase in the quality of living standards in this part of the country [2,7,14,17]. On the contrary, stone disease is still endemic in the relatively underprivileged Eastern and Southeastern regions of Turkey [9,13].

Urolithiasis affects boys more frequently than girls. This finding shows conformity with almost all reported series. We found a male to female ratio of 3:1 for our series. The proportion of males is higher in the series from Eastern Turkey. This variation in the sex ratio is probably another reflection of the endemicity of stone disease. Endemic stones are generally seen in boys under 5 years of age, and mostly located in the bladder. The short and wide urethra in girls prevents stone formation in the bladder.

Family history is noted in only 2.6 % of our cases. In endemic areas family history is extremely high. The male preponderance, younger age at admission, the higher incidence of bladder stones, and the presence of familial disease are characteristic to endemic urolithiasis.

Pediatric stone disease have miscellaneous findings and symptoms that vary depending on the age of the patient, location and size of the stone, presence of infection, and the alterations in the urinary tract. Stone disease can be asymptomatic in pediatric age group. In 4 of our patients diagnosis was made incidentally during investigations for other diseases. Upper urinary tract stones may present with complications because of delay in diagnosis, and this is still an important health problem for this country [2,7,14].

The aetiology of the stone disease is unknown in most of the cases. It is speculated that stone formation in the children of developed countries is commonly due to the metabolic disorders and infection. However, in endemic regions, low protein diet is a major cause [10,12,16,18,19,20]. In his original study, Eckstein postulated that the incidence of the urinary stone disease is high, because protein consumption is inadequate in Turkey, and the frequency

of malnutrition is at least 41 % in the pediatric population [8]. However, the living standards have improved in the last decades, especially in the Western part of Turkey. The incidence of the disease has decreased, the location of the stone has changed from bladder to the upper urinary tract and the male/female ratio is lower. But these rates are still unchanged in the East and Southeastern parts of the country [9,13].

There are technical problems of retrieving stones endoscopically and percutaneously from small children. Besides there will always be a problem of residual and recurrent calculi. Our rates are close to the lower end of given ranges in the literature for these complications [2,3,4,5,7,14,17].

Although many responders to our questionnaire who have observed a decline in stone disease admissions underline the widespread use of EWSL in private practice as one reason, the small percentage of children within the reported series of urolithiasis patients treated with ESWL makes this unlikely to be a significant cause [6,11], yet a decline in frequency is certain.

Conclusion

As the living standards improve, the incidence of urinary stone disease have tended to decline in Turkey in the recent years. Today upper urinary tract stones are more common than bladder stones. However, the frequency of the disease is still high and endemic in the East and Southeastern parts of Turkey. Because of the delay in diagnosis, urinary stone disease continues to be one of the major urological problems of childhood in Turkey, and it causes significant morbidity including even end stage renal disease.

References

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(*) Editor's Note:

Herbert Eckstein's paper on urinary lithiasis in Turkish children (Archives of Diseases in Children, 1961; 36:137-143) remains a classical work that is still frequently referred today (v. Barratt, M.T. "Urolithiasis and Nephrocalcinosis", in M.A. Holliday, M.T. Barratt, E.D. Avner (eds), **Pediatric Nephrology**, 3rd ed., 1994, pp. 1070-1080).

Herbert Eckstein himself was interested in the progression of urinary stone disease among children in

Turkey, and enquired about the subject in a letter he addressed to Dr. Akgün Hiçsönmez, Head of the Department of Pediatric Surgery at Hacettepe Children's Hospital:

"I am writing to you with a request of some help, although it will probably involve you in no more than passing this letter on to one of your urological colleagues at Hacettepe, bu I am afraid I cannot remember the name of your paediatric urologist....

I can obviously produce the original stone material I collected in Turkey from 1958 to 1960, and present an analysis of the 120 or so patients I saw, but I really do feel that some more up-to-date information would be helpful. Since I am sure that your medical records system is by now computerised and highly efficient, I wonder whether somebody could possibly let me have some recent figures of bladder and kidney stones in children as seen at Hacettepe over the last 10 years or so, and obviously any figures or information given to me would be duely acknowledged during the paper and in any eventual publication. At a guess I would expect that stones in children have become a much less frequent problem in recent years but of course I have no hard evidence of this. So any information you or your colleagues could let me have would be gratefully appreciated"

(24th December, 1979).

With this review we pay tribute to all Mr. Eckstein's efforts and attempt at an actual reply to the question that occupied his mind on the Christmas of 1979.

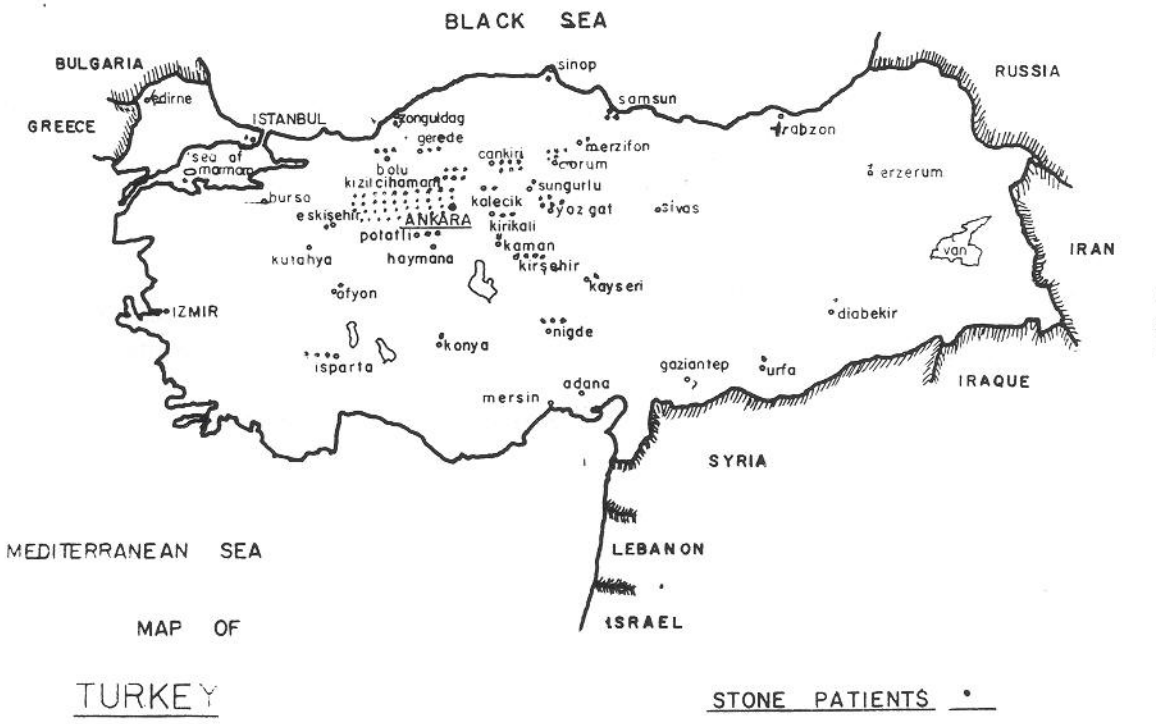

FIGURE 1.

Herbert Eckstein's urinary stone patients in Turkey

(**HB Eckstein: Urinary Lithiasis in Childhood: A Clinical Study**, Typescript, Ankara, 1960, p.12, Fig. 1).