Anuria Caused by Bilateral Non-opaque Renal Calculi

Herbert B. Eckstein, F.R.C.S., Sevinç Oral, M.D.*****
and
İhsan Doğramacı, M.D.****

Calculous anuria in childhood is a rare condition.[1] There are three possible ways in which anuria can be associated with stones:

1. "Reflex anuria", or obstruction of one ureter with suppression of the contralateral kidney.

2. Obstruction of a solitary or only functioning kidney; usually in this type of case the other kidney has either developed a hydronephrosis due to a "silent" calculus or has previously been removed for calculous disease.

3. Simultaneous obstruction of both ureters by stones.

Non-opaque urinary calculi are very uncommon in children although Campbell[2] puts the incidence at 10 %. However Myers,[3] reporting a series of 85 cases of urolithiasis in children from the Great Ormond Street Hospital over a period of 20 years, was unable to find a single non-opaque stone amongst them. We have not seen any other case of non-opaque stone in some 40 cases observed by us in the past year, and Ankara is an area where urinary stones are endemic.

A case of anuria resulting from the simultaneous obstruction of both pelvi-ureteric junctions by non-opaque calculi must be exceedingly rare and presented a considerable diagnostic problem. We therefore feel that the following case is worth recording.

Case Report

M. Ö. (58/14663), a one year old boy, was seen at the Hacettepe Children's Hospital on December 2nd, 1958 complaining of vomiting, diarrhoea and anuria. There had been diarrhoea and pyrexia for a week before this and he had vomited intermittently. The parents were quite certain that the child had passed no urine for the preceding six days. There had been no signs to suggest abdominal pain or colic and there was no history of ingesting nephrotoxic substances. The past history was non-contributory except that the child had been breast-fed for the whole of his life. All three siblings had died at the ages of two years, six months and one year respectively and the parents were peasants.

---

* From the Hacettepe Children's Hospital, Ankara.
** Consultant in Paediatric Surgery, Research Institute of Child Health.
*** Senior Resident in Paediatrics, Hacettepe Children's Hospital.
**** Director, Research Institute of Child Health and Professor of Paediatrics, Ankara University Faculty of Medicine.

On examination his general condition was excellent, weight 7.7 kg, blood pressure 130/80 mm Hg, temperature 37.7° C (rectal). There were scattered rales in both lungs; the liver was enlarged to 1 cm below the costal margin but the kidneys and spleen could not be felt and the bladder was not distended.

Laboratory investigations at this time showed haemoglobin 7.8 gm %, leucocytes 13,000 per cubic millimeter (differential count normal), serum proteins 6.3 gm % (albumin 4.4, globulin 1.9), N. P. N. 132 mgm %. A catheter was passed easily and 12 ml of urine were withdrawn. This contained 15 leucocytes and 10 erythrocytes per high power field but no casts were seen. There was no sugar, protein nor acetone in the urine and the culture was sterile.

A radiograph of the abdomen showed normal intestinal gas patterns but no radio-opaque calculi. The renal outlines appeared normal. Although a clinical diagnosis of anuria due to bilateral renal or ureteric calculi was suspected this was initially dismissed because of the negative radiological findings.

The child was admitted and treated with intravenous fluids, electrolytes, blood transfusions and antibiotics. His condition remained satisfactory and the diarrhoea decreased. He passed small amounts of urine (most of the time this was actually collected by an indwelling catheter) and the urine findings were similar to those on admission except that the urinary proteins ranged from "a trace" to "two plus." On December 6th both kidneys were palpable and the left one definitely enlarged. Since the child did continue to pass urine, even though in only small amounts, a conservative policy was maintained, but the child's condition deteriorated gradually. (See graph).

On December 13th a nephrostomy was carried out on the left side but owing to the child's poor condition it was (in retrospect unfortunately) felt that a complete exploration with the necessary mobilisation of that kidney or a bilateral nephrostomy would be unwise. Considerable amounts of urine were passed through the nephrostomy tube during the next few days and the blood N. P. N. began to fall. There was no urine in the bladder now but a postoperative pneumonia delayed further surgery. On December 18th a pyelogram was carried out through the nephrostomy tube which showed a moderate hydronephrosis and a translucent filling defect within the renal pelvis. There was no filling of the ureter with the dye and the diagnosis of anuria due to radiotranslucent calculi was now made with some confidence.

On December 20th the right kidney was explored and found to be moderately hydronephrotic. There was a calculus about 1 cm in diameter blocking the pelvi-ureteric junction and the urine was obviously infected. The stone was removed and a nephrostomy tube was left in situ. Only 20 ml of urine drained from the right kidney after operation and the child unfortunately developed a paralytic ileus. The following day the left nephrostomy tube accidentally pulled out (no suitable self-retaining type of catheter had been available) and the child's condition deteriorated rapidly. The left kidney was therefore explored on December 23rd and a stone was found obstructing the pelvi-ureteric junction just as on the right side. The baby's condition however continued to deteriorate; no urine came from the left nephrostomy, and he died the following day.

Analysis of stones: Right: uric acid 90%, calcium 10%. Left: uric acid 98%, calcium 2%.

No phosphate or carbonate in either stone.

Discussion

In retrospect this case should have been diagnosed and operated upon much earlier but the unusal combination of bilateral pelvi-ureteric obstruction and the non-radioopacity of the stones misled us. The differential diagnoses that were considered included :

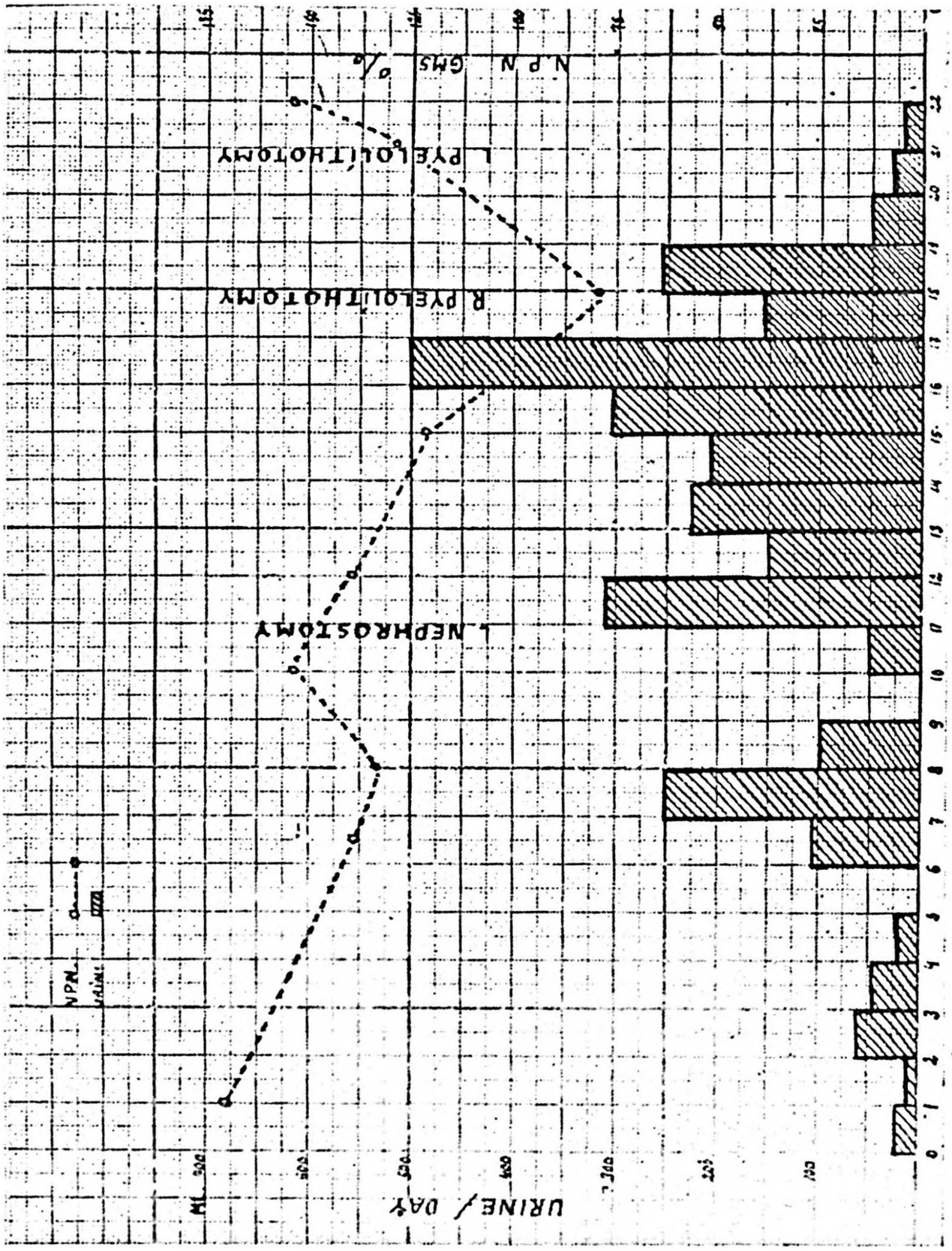
a) Acute glomerular nephritis. In spite of the fact that the condition is uncommon at this age, this diagnosis was considered in our patient because of oliguria (to the point of anuria), hypertension and azotemia. Red cells but no casts were present in the centrifuged urine. The urinary sediment can be of great help in such cases in ruling out glomerular nephritis if the following points are considered: 1. In a concentrated urine casts should be present; none were seen in our case. 2. In acute glomerular nephritis in infancy haematuria may be only microscopic but even then the morphology of the blood cells will be of help in revealing their pathological origin. Erythrocytes may appear in the urine from any part of the urinary tract, but those which come from the glomerular capillaries have travelled farthest and undergo certain changes because of the effects of their abnormal environment. Thus, as they pass into the proximal tubule, water is rapidly removed from the glomerular filtrate as well as most of the sodium chloride and all the glucose. Because of the reduced sodium chloride concentration the red cell takes up water and loses much of its haemoglobin. For these reasons the red cells in the urine of glomerular nephritis are atypical, sometimes resembling the ghosts of erythrocytes in the form of empty irregular circles, or are small and crenated or abnormally swollen. On the other hand red cells from the lower urinary tract are more typical of the normal erythrocyte. Considerations of this nature also helped us to rule out glomerulonephritis in this case.

b) Renal dysfunction due to lower nephron nephrosis; there was no history of ingestion of mercurials or other nephrotoxic substances and no other signs of poisoning.

c) Anuria due to extreme anhydraemia; this can occur in severe diarrhoea but the child's condition was too good initially and the diarrhoea not severe enough to produce a renal "shut-down".

d) Renal vein thrombosis; the relatively long history and the preponderance of leucocytes over erythrocytes in this case made this diagnosis unlikely.

e) Bilateral ureteric obstruction due to periureteric fibrosis or stricture could have presented as this case did but the fact that there was no obvious clinical hydronephrosis rather contradicted this diagnosis.



Early cystoscopy and retrograde pyelography would have helped greatly in this case but unfortunately no small enough catheterising cystoscope was available at the time.

Summary

A case of anuria due to bilateral pelvi-ureteric obstruction caused by radio-translucent calculi is presented and the diagnostic problems are discussed.

We would like to thank our anaesthetists, Dr. Emel Berker and Dr. Gürhan Ünlütürk for their help with the management of this case.

REFERENCES

1. Williams, D. I.: Handbuch der Urologie, 171. Springer, Berlin, 1938.
2. Campbell, M.: Clinical Pediatric Urology, 667. W. B. Saunders, Philadelphia, 1951.
3. Myers, N. A. A.: Urolithiasis in Childhood, Archives of Diseases of Children, 32: 48, 1957.