Calculus disease of the urinary tract at a district hospital

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Summary

At a District General Hospital the organization of a clinic for the investigation and treatment of patients with calculus disease of the urinary tract is described. The way in which such a clinic may be organized is discussed and the results presented. In patients with idiopathic hypercalciuria, sodium cellulose phosphate causes a significant reduction in urinary calcium levels when used in such a clinic.

Introduction

Calculus disease of the urinary tract is an ever present medical problem. Nordin (1973) states that any District General Hospital can expect to admit three to six patients per 10,000 of the population per annum, although this figure will vary from locality to locality.

In those patients who have an infected urine or a significant degree of urinary stasis, a few investigations will disclose underlying pathology. If the abnormality found is that of hypercalcaemia or hypercalciuria a detailed and meticulous follow-up of investigation is required.

In practice it is found to be extremely difficult to arrange for all the specimens to be taken, collected, the results returned and correctly filed. Consequently it is only from specialized units that significant information is obtained.

The organization of a clinic to deal with calculus disease at a District General Hospital is now described and the results obtained in such a clinic are reported. These results cannot be accused of having any epidemiological bias, as can those from a specialist unit owing to the very nature of such a unit. The results reported here include all patients with calculus disease referred to the stone clinic between August 1972 and September 1974, from the Bath clinical area. It will be shown, using sodium cellulose phosphate, that a significant improvement in the urinary calcium levels can be obtained in patients with idiopathic hypercalciuria.

Patients and methods

At a routine urological out-patients, a stone clinic

was organized to which 200 patients with calculus disease were referred between August 1972 and September 1974. All patients have a full urological examination, following which the clinic secretary organizes all further investigations which include mid-stream urine specimen (MSU), serum urea and electrolytes, serum uric acid, serum calcium and inorganic phosphate, three 24-hr urine collections for calcium and phosphate and a creatinine clearance. No advice regarding treatment is given until all the base-line investigations have been collected. When the patient returns to out-patients, if he is found to be hypercalciuric (defined as 24-hr urinary calcium above 300 mg in men and 250 mg in women) a renal tubular acidosis screen is arranged. The patient is given 0.1 g/kg body-weight of ammonium chloride and the urine collected until the pH has fallen to 5.2; at this figure and below the patient is considered to be normal. Those patients who are found to be hypercalciuric in the range 300-360 mg in men and 250-320 mg in women are treated with diet and fluid intake only. Those in a greater range are treated according to the following outline. At the return visit to out-patients following the renal tubular acidosis screen the patients are instructed to take sodium cellulose phosphate at the rate of one 5-g sachet three times a day and to return to the clinic 6 months later when two 24-hr collections of urine are obtained for calcium estimation. If the results are satisfactory, the patient is told to reduce the dose to one sachet daily, on which they are maintained indefinitely. Those patients whose urinary calciums are not satisfactory are given, in addition, a thiazide diuretic, bendroflumethiazide 2.5 mg daily.

Results

Two hundred patients have been seen at this clinic in 25 months and only five have refused to be fully investigated, although in all cases at least one 24-hr urine collection was obtained. The mean age of the male patients was 45.5 and the female 38.4, with the male to female ratio, 3 : 1. The youngest patient was 6 years old and the oldest 74. The peak age incidence is between 35 and 55.

Seventy-two patients have had their stones analysed. No cystine or xanthine stones were found but the number of stones analysed is incomplete (Table

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1). In the patients with magnesium ammonium phosphate stones, only four had infected urine at the time of investigation at the stone clinic; 50% of patients in this group had a significant hypercalciuria.

TABLE 1. Stone analysis

Calcium phosphate and/or oxalate	50 = 69%
Magnesium ammonium phosphate	13 = 18%
Uric acid	3 = 4%
Too small for analysis	6 = 8%
Total	72

Thirty-six of fifty patients (72%) who formed calcium stones were found to be hypercalciuric. The male to female ratio in all groups remained at 3 : 1.

No uric acid stone formers were hypercalciuric or were treated with low-calcium diet.

Using the clinic pathway outlined above, the following pathology is revealed: parathyroid adenoma, 7; hypercalcaemia, 1; idiopathic hypercalciuria, 78; normal, 114. There has been no case of renal tubular acidosis (Table 2).

TABLE 2. Pathology analysis in 200 patients

Parathyroid adenoma	7	
Hypercalcaemic	1	(under investigation)
Hypercalciuric	78	
Normal	114	
Renal tubular acidosis	None	

Thirty-one patients were treated with sodium cellulose phosphate, i.e. all those who had significant hypercalciuria, >360 mg in men and 320 mg in women. The data were analysed using a regression model. This showed that the difference between the pre- and post-treatment means was significant at the 0.1% level (pre-treatment mean 430.34 and post-treatment mean 313.04; standard deviation 89.05, $P < 0.001$).

Discussion

The follow-up of patients with calculus disease of the urinary tract has always been thought of as a difficult undertaking and one which, if it is to be significant, requires a meticulous technique. So far, the results have been reported only from special centres where such clinics have been organized. The present author has shown that such a clinic can be run in a District General Hospital. The details of organization described in this paper can only work satisfactorily if one person has absolute control of the documents and these never leave his/her possession.

Treatment is initially based on a low calcium diet and a high fluid intake, the latter being influenced by

the work of Frank and De Vries (1966). All patients are asked to maintain a fluid intake of at least 3 litres per day, and only those who have a degree of significant hypercalciuria, as previously defined, are treated with sodium cellulose phosphate. If an adequate response to this treatment is not shown in the follow-up 24-hr urinary calcium results, a thiazide diuretic, bendroflumethiazide 2.5 mg daily is added as suggested by Yendt, Guay and Garcia (1970).

Albright *et al.* (1953) first used the phrase idiopathic hypercalciuria when they described a syndrome which occurred mainly in men and which was characterized by the formation of renal calculi, increased urinary excretion of calcium in the presence of a normal serum calcium and a low serum phosphorus. Hodgkinson and Pyrah (1958) defined the normal level of urinary calcium as 300 mg/24 hr in men and 250 mg/24 hr in women, this being the amount that 90% of the population will excrete in a normal day. Unfortunately the literature is confusing on this subject as the levels that different authors consider to be normal vary. Rose and Harrison (1974) consider that 350 mg/24 hr for men and 300 mg/24 hr for women is the upper limit of normal, while Pak, Delea and Bartter (1974) take 200 mg/24 hr as the upper limit. The definition of Hodgkinson and Pyrah (1958) has been used in the present study.

Sodium cellulose phosphate is an ion exchange resin which inhibits the absorption of calcium from the gastrointestinal tract by exchanging sodium for calcium which is subsequently excreted in the faeces. It is unnecessary to treat all hypercalciuric patients with this drug as a number will become normocalciuric on diet together with a high fluid intake. This will render more vigorous therapy unnecessary. The author does not know the level at which treatment should become more aggressive but has arbitrarily chosen 360 mg/24 hr in men and 320 mg/24 hr in women as the levels at which treatment with sodium cellulose phosphate should start. The mean pre-treatment level was 430.34 and the post-treatment mean was 313.04. This is a significant difference. It is suggested that the reason that the post-treatment mean is still in the hypercalciuric range is because the timing of drug therapy in relation to meals may not have been as exact as had been hoped. Blacklock and Macleod (1974) have emphasized how important this may be. While taking sodium cellulose phosphate, two patients reported minor gastrointestinal disturbances, one was nausea which ceased on stopping the drug and the other slight frequency of bowel action which settled when the drug was discontinued. A clinic for the meticulous treatment and follow-up of patients with calculus disease of the urinary tract is easily organized. The results reported here should encourage clinicians to try to establish such clinics

as it is now known that the spectrum of calculus disease seen at a District General Hospital is identical to that seen at specialized units.

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