There appears to be no proved advantage in exceeding a dose of 30 mg. of prednisolone daily except for a "loading dose" in the emergencies of hypercalcaemia and cerebral and pulmonary metastases. A previous history of sex hormone insensitivity does not significantly influence response to corticoids, nor, in this series, does the age-group. Evidence is presented suggesting that the benefits of corticoid therapy may have a different mechanism from those due to sex-hormone control in breast carcinoma.

Objective response to corticoids is, in general, not as prolonged nor as complete as that following adrenalectomy, but subjective benefit is noted in a considerable proportion of cases. Combination with an alkylating agent gives remarkable, although short-lived, palliation of intrathoracic metastases.

Figs. 1 and 2 are reproduced from *Acta ; Unio internationalis contra cancerum*, vol. 16, p. 919, by permission of the principal editor, Professor J. H. Maisin.

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DIAGNOSIS OF HYPERPARATHYROIDISM IN PATIENTS PRESENTING WITH URINARY CALCULI

BY

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Surgeons who treat patients for urinary calculi commonly regard the report of a normal serum calcium (Wooton and King, 1953) as sufficient evidence to exclude the diagnosis of hyperparathyroidism in the first instance. There are other biochemical tests (Howard *et al.*, 1953; Shaaf and Kyle, 1954; Nordin and Fraser, 1956; McIntosh *et al.*, 1958; Lloyd and Rose, 1958; Hyde *et al.*, 1960), but they are time-consuming or require specialized techniques, and may involve a stay in hospital for the patient: for these reasons they are frequently omitted.

In the urological unit of the Queen Elizabeth Hospital, Birmingham, the incidence of hyperparathyroidism in patients with urinary calculi during the five-year period 1955-9 has been 2.2%, and is lower than that reported from other centres (Albright and Reifstein, 1948; McIntosh *et al.*, 1958; McGeown, 1960). It is noteworthy, however, that no evidence of hyperparathyroidism has subsequently come to light in our patients after the initial treatment. In this unit, 11 mg./100 ml. has been taken as the upper limit of normal for the serum calcium concentration (Dent, 1956), and, moreover, we have felt that values between 11 and 12 mg./100 ml. are significant only when there are characteristic radiographic changes in the bones or there has been recurrent stone formation. To affirm this opinion it was decided: (1) to determine the frequency distribution of serum calcium and phosphorus values in the type of patient attending our clinics; (2) to review the frequency distribution of pre-operative serum calcium values in patients with renal stones and proved hyperparathyroidism who had been treated in the period 1955-9; and (3) to review a group of patients with urinary calculus disease seen during 1955-9 with serum calcium values greater than

the accepted normal but in whom subsequent investigations showed no evidence of hyperparathyroidism.

1. Frequency Distribution of Serum Calcium, Phosphorus, and Total Proteins

Peripheral venous blood samples were collected from 112 patients who were either attending the urological clinic and were mainly follow-up patients attending for cystoscopy, or were new patients attending for conditions other than urinary calculus; a few members of the medical, nursing, and secretarial staff were also included. A thin rubber-band tourniquet was kept in place for a maximum time of two minutes while the blood samples were obtained (Philpot, 1958). Serum calcium, phosphorus, and total protein concentrations were estimated. The serum calcium was estimated by the E.D.T.A./murexide technique using the E.E.L. titrator, serum phosphorus by the autoanalyser, and the total serum proteins by the method of Wolfson *et al.* (1948). The serum calcium values in this group of patients were found to range between 8.5 and 10.8 mg./100 ml., the serum phosphorus between 1.6 and 4.4 mg./100 ml., and the total proteins between 6.4 and 9.1 g./100 ml. (Fig. 1).

2. Pre-operative Serum Calcium Values in Cases of Renal Stone and Hyperparathyroidism

Eight patients with urinary calculus and hyperparathyroidism, proved by operation, were treated during 1955-9, and all eight were found to have pre-operative serum calcium values greater than 12 mg./100 ml. (Fig. 2).

3. Follow-up of Urinary Calculus Patients with Minimal Hypercalcaemia—11–12 mg./100 ml. (see Table)

Twenty-one patients with urinary calculi and serum calcium values greater than 11 mg./100 ml. were admitted to this unit during 1955–9: they had all been investigated for hyperparathyroidism by skeletal radiography, phosphorus clearance, and calcium balance studies, but this diagnosis had been refuted. These patients were reviewed in October, 1959; repeated serum calcium determinations were carried out at approximately three-month intervals,

FIG. 1.—Distribution of serum calcium, serum phosphorus, and total serum protein values in a group of normal patients.

FIG. 2.—Pre- and post-operative serum calcium values in eight proved cases of hyperparathyroidism (1955–9 inclusive). ● = Pre-operative serum calcium levels. ○ = Post-operative calcium levels.

radiographs of the urinary tract were taken annually, and 24-hour urinary calcium outputs on ordinary diet were estimated every six months during the subsequent two years.

Results of Follow-up Examination of 21 Patients Presenting with Urinary Calculi, Minimal Elevation of Serum Calcium, but No Other Evidence of Hyperparathyroidism

Case No.	Sex	Occasional High Serum Calcium Levels before 2 Yr. Follow-up	Occasional High Serum Calcium Levels during 1959–61 Follow-up	Average Urinary Calcium Output (mg./24 Hr.) on Normal Diet	Average Urinary Calcium Output (mg./24 hr.) on 100 mg. Calcium Diet	X-ray Evidence of New Stone Formation to Date	X-ray Evidence of Increase in Size of Existing Renal Calculi to Date
1	F	+	+	276	71	—	—
2	M	+	+	309	170	—	—
3	F	—	—	131	178	—	—
4	F	+	+	283	178	—	—
5	M	+	+	451	155	—	—
6	M	+	+	445	160	—	—
7	M	—	—	260	218	—	—
8	M	+	+	322	186	—	—
9	M	+	+	377	164	—	—
10	M	+	+	286	128	—	—
11	M	+	+	227	98	—	—
12	F	+	+	230	108	—	—
13	M	—	—	166	115	—	—
14	F	+	+	359	—	—	—
15	M	+	+	573	144	—	—
16	F	+	—	170	151	—	—
17	M	+	+	188	156	+	—
18	M	+	+	414	—	—	—
19	M	+	+	196	79	—	—
20	F	+	+	103	102	—	—
21	F	+	+	270	107	—	—

Before the follow-up period beginning in 1959, 16 of the 21 patients (Cases 1, 2, 4–6, 8, 10, 11, 14–21) were found on occasion to have serum calcium values of 11 mg./100 ml. or more after the initial high reading. During the two-year follow-up period 13 of the 21 patients (Cases 1, 4, 6, 8–14, 18, 20, 21) continued to have occasional high serum calcium levels.

The average 24-hour urinary calcium output on a normal diet exceeded 300 mg. in 8 of the 21 patients (Cases 2, 5, 6, 8, 9, 14, 15, 18) and the 24-hour urinary calcium output on 100 mg. calcium diet exceeded 150 mg. in 9 of the 21 patients (Cases 2, 4–9, 16, 17). Five of the 21 patients (Cases 2, 5, 6, 8, 9) had a raised 24-hour urinary calcium output on both a normal and a 100 mg. calcium diet.

In only one patient (Case 17) in the group was there radiological evidence of new stone formation, and in this patient the serum calcium values were within the normal range—that is, 9–11 mg./100 ml.—throughout the follow-up period and the urinary calcium output on a normal and a 100 mg. calcium diet was also normal (Hodgkinson and Pyrah, 1958; Harrison, 1959) (see Table).

Discussion

The main object of this review has been to re-appraise the significance of minimal degrees of hypercalcaemia in the diagnosis of hyperparathyroidism in patients with urinary calculi, since for practical purposes the stimulus for further investigation in suspected cases of hyperparathyroidism remains the finding of an elevated serum calcium. When the serum calcium values in 112 control patients were studied it was realized that a more realistic upper limit of normal should be 10.5 mg./100 ml., and we have now accepted this. The investigation also showed that the frequency distribution of serum phosphorus values was wider than we had previously accepted, and we now have doubts about the significance of serum phosphorus values in the diagnosis of hyperparathyroidism in patients with urinary calculi.

Reviewing our proved cases of urinary calculi and hyperparathyroidism, we found that the pre-operative serum calcium levels were all recorded to be persistently greater than 12 mg./100 ml., although Pyrah (1956) and Black (1953) have reported cases with pre-operative serum calcium values less than 12 mg./100 ml. In 21 patients with urinary calculi seen in the period 1955-9, and in whom the serum calcium values continued to range from 11 to 12 mg./100 ml., a follow-up period of two to seven years has shown no conclusive evidence of hyperparathyroidism; some of these patients have shown excess excretion of urinary calcium, and in one there was radiological evidence of new stone formation, but none of these abnormal features have occurred consistently or together in the same patient. It seems unlikely, therefore, that any cases of hyperparathyroidism have been overlooked in the patients attending this unit with urinary calculi.

At the present time it is felt that patients with serial calcium values consistently greater than 10.5 mg./100 ml. and urinary calcium outputs on an ordinary diet consistently in excess of 350 mg./24 hours should be admitted to hospital for more elaborate investigations of calcium metabolism, although in our experience it is unlikely that a diagnosis of hyperparathyroidism will be established unless the serum calcium concentration is persistently above 12 mg./100 ml.

It is intended to continue to follow up the group of patients who have had minimal hypercalcaemia (11-12 mg./100 ml.), though it seems unlikely that after an interval of two to seven years without recurrent stone formation a diagnosis of hyperparathyroidism will be made in any of them.

Summary

Because of the low incidence of hyperparathyroidism in patients with urinary calculus disease attending the urological unit of the Queen Elizabeth Hospital during 1955-9 the methods of diagnosing this condition have been reviewed. The frequency distribution of the normal serum calcium and phosphorus in 112 patients attending the unit has been redetermined, as a result of which the upper limit of normal serum calcium is now taken as 10.5 mg./100 ml., and the range of serum phosphorus was found to be greater than previously accepted and therefore its determination in the diagnosis of hyperparathyroidism is considered to be of less value.

A group of 21 patients with urinary calculus disease and serum calcium levels in the range of 11-12 mg./100 ml. has been followed up over a period of two to seven years and the diagnosis of hyperparathyroidism has not been established in any of them.

A review of the eight patients in whom a diagnosis of hyperparathyroidism was confirmed shows that in all cases the serum calcium level was persistently above 12 mg./100 ml. prior to operation.

As a result of this review it is felt that, for practical purposes, patients with urinary calculus disease should be admitted to hospital for more elaborate investigations of their calcium metabolism only if their serum calcium concentration is persistently greater than 10.5 mg./100 ml. and the urinary calcium output on an ordinary diet is consistently in excess of 350 mg./24 hours.

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LATE RESULTS OF HAEMORRHOIDECTOMY BY LIGATURE AND EXCISION

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Since Anderson (1909) reported his observations on "The After-Results of the Operative Treatment of Haemorrhoids" few studies on this subject have been published despite the passage of more than fifty years. His remarks were based on the results of 300 haemorrhoidectomies performed at St. Mark's Hospital, London; 150 were treated by the ligature-and-excision operation described by Salmon, and the remainder by either Whitehead's operation or the clamp-and-cautery technique.

Miles (1919) and Milligan, Morgan, *et al.* (1937) have since described modifications of the ligature-and-excision operation. These were designed to secure a low tie of the haemorrhoid pedicle, thus avoiding large raw areas within the anal canal and reducing the risk of later stricture formation. The techniques of haemorrhoidectomy described by these authors have been extensively practised for many years, but the only detailed follow-up studies of the results which we have been able to discover are those

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†Since this paper was submitted for publication another communication on the results of haemorrhoidectomy by the Milligan-Morgan method has emanated from Söderlund, *Acta chir. scand.*, 1962, **124**, 444.