LOCALISATION OF PARATHYROID TISSUE BY ULTRASOUND AND COMPUTERISED TOMOGRAPHY SCANNING — A CASE REPORT

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SYNOPSIS

A 49 year old Chinese man presented with a history of renal stones, bone disease with pathological fractures, renal impairment and psychiatric disturbance. The diagnosis of primary hyperparathyroidism was confirmed by radiological and biochemical evidence. Localisation of the parathyroid tumour was achieved by computerised tomographic and ultrasonographic scanning. Surgery was successfully carried out with minor post-operative complications. The histology of the tumour proved to be that of a benign parathyroid adenoma.

INTRODUCTION

With the advent of multiphasic biochemical screening, the diagnosis of primary hypeparathyroidism is made with greater frequency as asymptomatic cases are uncovered (1). Symptomatic cases, however, remain few and far between, especially in a small country like Singapore.

We wish to report such a patient who had been symptomatic for the past ten-odd years but the diagnosis was only made after he had suffered multi-organ involvement, viz. bone, renal and psychiatric disorders.

CASE REPORT

C.T.H., a 49 year old Chinese man, was first seen at the Singapore General Hospital from 1971-1972 for the problem of renal stones. Surgery was offered but he refused and defaulted further follow-up.

From 1976 onwards, he began to complain of multiple bone and joint pain. He was noted to be "shrinking" in size, with progressive kyphosis and protrusion of his chest. He was seen by several general practitioners and was treated for osteo-arthritis. He also consulted Chinese physicians and acupuncturistss but was never compliant with any form of treatment.

For the past two years, he also developed some mental changes, viz. incoherence and garrulity. There was no history of recurrent renal stones or any abdominal pain.

In August 20, 1983 he was admitted to the Ortho-paedic Department of Tan Tock Seng Hospital after a fall. Subsequently he was transferred to the Medical Department.

Physical Examination

Examination revealed a man of short stature, with severe kyphosis and related increased antero-posterior diameter of the chest and a deep transverse crease across the abdomen. His vital signs were stable and no abnormality was detected in the heart, lungs or abdomen.

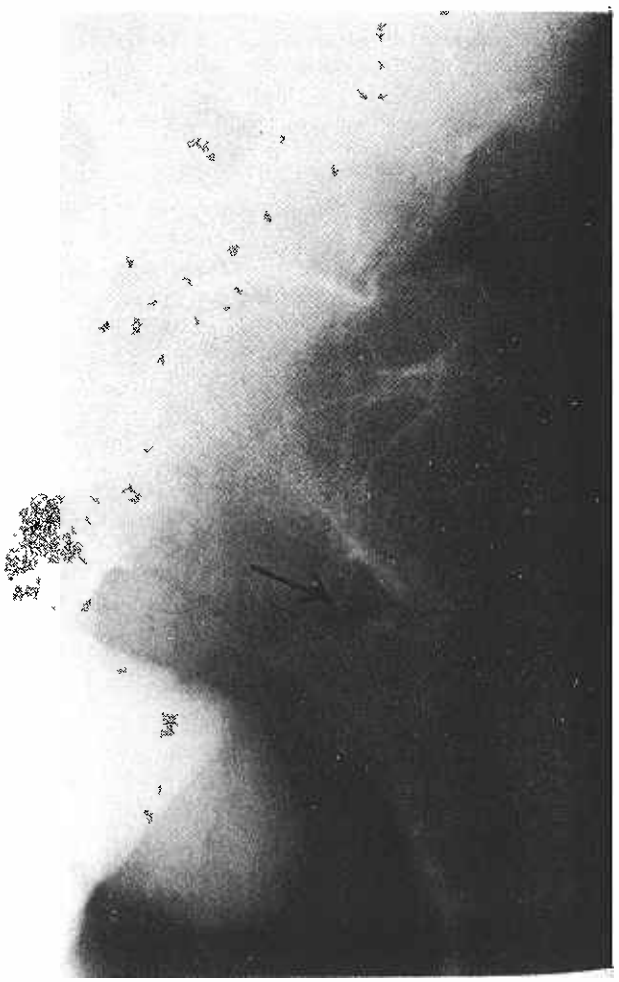
The left shoulder was swollen and tender. The left leg was shortened and externally rotated with a tender left hip. All the other joints were unaffected. No mass was felt in the neck.

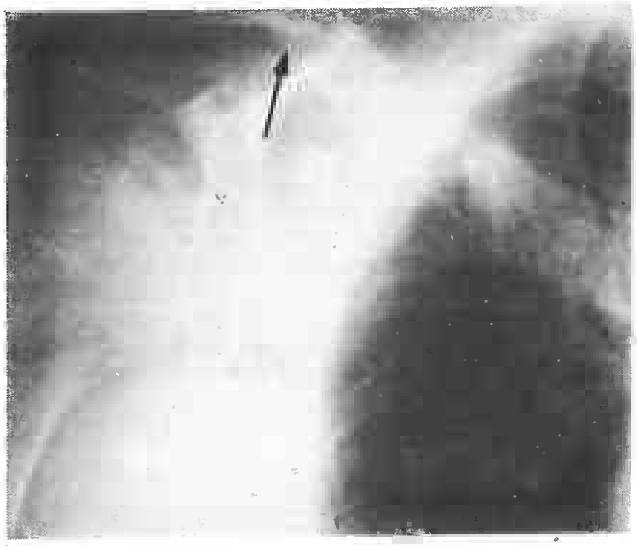
Mentally, he was garrulous, complaining about trivial things and yet refused any form of rectification. He was even at times incoherent.

Radiographic Examination

Initial radiographs showed pathological fractures of the neck of the left humerus and the greater trochanter of the left femur (Figs 1, 2).

Skeletal survey done revealed severe generalised osteoporosis: all the vertebral bodies were com-pressed to some degree; the skull had a 'pepper-pot' appearance; there was tufting of the terminal phal-anges of the hands; both clavicles showed pseudo-fractures; there was gross thinning of the cortices of the long bones with multiple cysts in the diaphyses (Fig 3-6). No radio-opaque renal stones were seen in the films of the abdomen.






MODILE

Laboratory Investigations

Haematologically, the patient was anaemic (haemoglobin was 10.6 g%; PCV was 34.8%). His erythrocytic sedimentation rate was 40 mm in the first hour.

Blood urea was 27 mg/dl and serum creatinine was 0.8 mg/dl. Creatinine clearance was impaired at 38.9 ml/min with a urine volume of 1,950 ml. Total protein was 6.7 g/dl and serum albumin was 4.5 g/dl. Serum sodium was 139 mmol/l; potassium was 3.4 mmol/l; chloride was 106 mmol/l. Uric acid level was 4.5 mg/dl.

Diagnostically, serum calcium level was 11.5 mg/dl initially but rose to 13.0 mg/dl a few days later (normal values: 8.4-10.4). Serum phosphate level was 1.5 mg/dl (2.4-4.3). Serum alkaline phosphatase level was 1235 I.U./l (32-105). The 24-hour urinary excretion of calcium was 583.2 mg in 3600 ml of urine (100-300 mg). Serum magnesium level was 1.8 mg/dl (2-3 mg).

Diagnosis

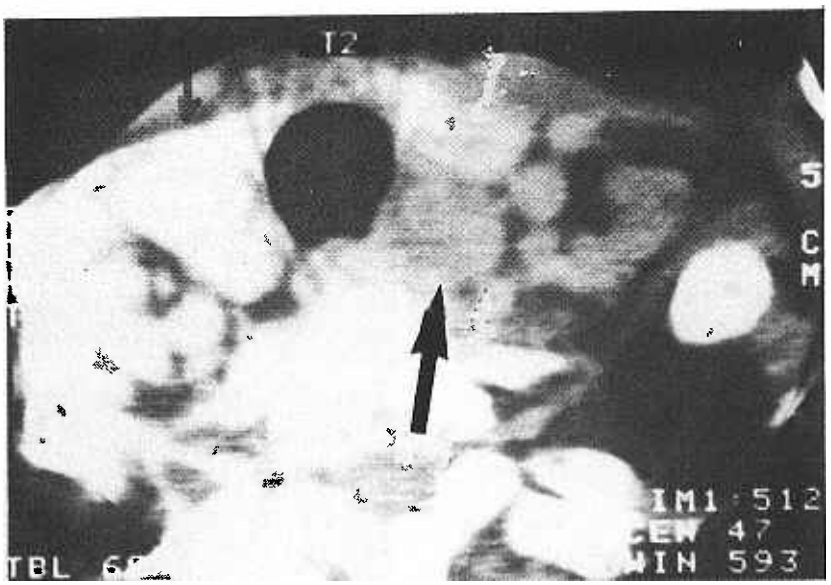
From the history of renal stones, bone disease and psychiatric disturbance, and the radiological and biochemical evidence of hypercalcaemia and hypercalciuria a diagnosis of primary hyperparathyroidism with extensive bone disease, renal impairment and hypercalcaemic psychosis was made.

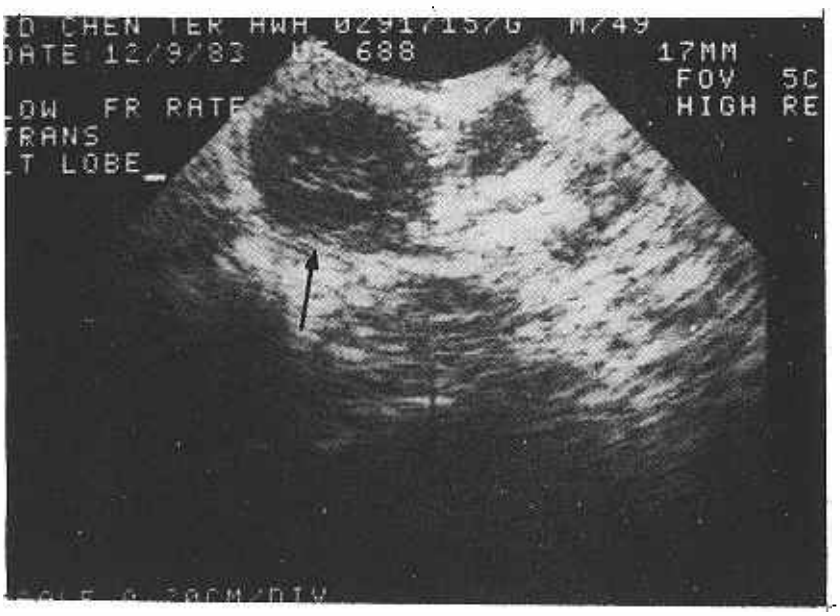
Pre-Operative Localisation of Parathyroid Tumour

A computerised tomographic scan of the neck was done and this showed a solitary round mass lesion behind the left lobe of the thyroid (Fig 7).

An ultrasonographic scan of the thyroid also revealed a round, well-defined mass lesion of poor echogenicity at the lower pole of the left thyroid (Fig 8).

Venous sampling for parathyroid hormone from either side of the venous drainage of the parathyroid glands was made. The plasma parathyroid hormone level was found to be elevated to 949 pg/ml (normal range 150-450 pg/ml).





MANAGEMENT

The patient was put on Russel's Traction for his left femoral fracture and a collar cuff for the fracture of the left humeral neck. Forced diuresis with intravenous saline (3 to 3.5 litres/day) with frusemide was started. The serum calcium level was brought down to less than 11 mg/dl and the serum phosphate level rose to within normal limits.

After the parathyroid tumour was localised to the left inferior gland, the patient was referred to the Singapore General Hospital for surgical management. The patient subsequently underwent a cervical exploration on September 29th 1983. At operation a left parathyroid tumour measuring 3 by 2 cm was found. The other parathyroid glands were identified and found to be normal. Histological findings were compatible with a benign parathyroid adenoma.

A significant fall in calcium level was noted almost immediately after the operation (from 11.1 before operation to 10.3 mgm/dl). Post-operative asymptomatic hypocalcaemia was corrected with oral calcium supplements (calcium lactate) and Rocaltrol 0.5 to 0.25 µg daily.

DISCUSSION

The signs and symptoms of primary hyperparathyroidism are basically those of hypercalcaemia. The commonest modes of presentation in symptomatic cases are those of renal stones and bone disease. Psychiatric symptoms have also been described (2). In recent years great progress have been made in the diagnosis of hyperparathyroidism. With the introduction of routine screening of serum calcium and other blood parameters, primary hyperparathyroidism has been detected much earlier in the asymptomatic phase. As a consequence of these developments, increasing numbers of patients are being referred for neck exploration. Unfortunately parathyroid surgery remains difficult even in the best of hands because even abnormal parathyroid glands are usually small in size, variable in location and non-uniform in appearance. A number of techniques have therefore been developed in an attempt to localise the parathyroid glands pre-operatively. These include selenomethionine radio-scanning (3, 4), intra-operative vital staining with toluidine blue (5, 6), thermography (7), neck massage (8), eosophageal cineradiography (9) and selective arteriography and venous catheterisation with blood sampling for parathormone levels (10, 11). In 1975 Arima et al (12) demonstrated that it was possible to visualize parathyroid tissue by echography with a diagnostic accuracy of 70%. In a study of 165 consecutive patients with suspected primary hyperparathyroidism who were scanned pre-operatively using high-resolution real time sonography, Reading et al obtained a sensitivity of 69% and a specificity of 94% with the procedure in the localisation of individually enlarged parathyroid glands (13). There was a close but not linear correlation between sonographic diagnostic accuracy and the size of the tumour which in turn was directly related to the serum calcium and immunoreactive parathyroid hormone levels.

The use of CT scanning in pre-operative localisation has currently been limited to those patients with negative ultrasound scans where a high index of suspicion still exists for the presence of a lesion. It has also been utilized in the assessment of post-operative patients presenting with recurrence or in patients for localising mediastinal glands (14). The cost of CT scans would preclude its use as a routine screening procedure, but the use of ultrasonography has considerable utility and we would commend it as a diagnostic modality of choice in all patients with hypercalcaemia.

ACKNOWLEDGEMENT

We wish to thank Prof Abu Rauff, University Department of Surgery, Singapore General Hospital for the surgical management and Dr R P S Edmondson, Department of Renal Medicine, Singapore General Hospital for estimating the parathormone level.

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