PARATHYROID CARCINOMA WITH STEROID-SUPPRESSIBLE PLASMA IMMUNOREACTIVE PARATHYROID HORMONE AND HUMAN CHORIONIC GONADOTROPHIN

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ABSTRACT

A 31-year old male presented with bone pain, polyuria and a palpable nodule in the neck. Radiological examination showed generalised osteopenia, subperiosteal erosion and presence of bilateral renal stones. The essential chemical pathological changes were increased plasma calcium, mid-molecule immuno-reactive parathyroid hormone (iPTH), human chorionic gonadotrophin (hCG) levels. Surgical excision of the nodule revealed a parathyroid carcinoma. The uniqueness of this case is the steroid-suppressible plasma calcium, iPTH, and hCG levels. The diagnostic implications of the findings are discussed.

Keywords: Parathyroid carcinoma, steroid-suppressible calcium, iPTH, hCG, diagnostic implications.

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CASE REPORT

Steroid-suppression test was introduced in 1956 (1) to differentiate (non-suppressible) hypercalcaemia of primary and tertiary hyperparathyroidism from other causes of (suppressible) hypercalcaemia in sarcoidosis, vitamin D poisoning and cancer. One in twenty cases of hyperparathyroidism (especially in cases with sévere osteitis fibrosa) shows suppressible response (1). The basis of this and its relationship to plasma levels of immunoreactive parathormone (iPTH) and human chorionic gonadotrophin (hCG) is not clear (2). In this paper we are reporting an unusual case of parathyroid carcinoma showing steroid-suppressible serum calcium, iPTH and hCG levels.

A 31-year-old male presented with a history of generalised weakness, bone pain, difficulty in walking, dyspepsia, constipation and polyuria. One year earlier, he was investigated for chest pain which was diagnosed as "chondritis" and had experienced episodes of passing blood in the urine. Examination showed bilateral band keratopathy, and a palpable 1x1 cm nodule over the region of left lobe of the thyroid gland. Radiological examination showed the changes of generalised osteopenia, fracture of left femur, "Browns tumour" in both femurs, "pepper-pot" skull, sub-periosteal erosion,cortical tunnelling in both hands and bilateral renal calculi. Chemical pathological investigation (Table I) showed hypercalcaemia with elevated plasma mid-molecule iPTH and hCG levels (all specimens were collected between 0800 and 1000 hrs and assayed using 1) PTH-MM radioimmunoassay kit of Immuno Nuclear Corporation, Still water, Minnesota 55082 and 2) Amerlex-M B-hCG RIA kit, Amersham, U.K.), increased serum alkaline phosphatase activity, hyperchloraemic acidosis [chloride=108 mmol/l (reference range is 98-108) bicarbonate=16 mmol/l (reference range is 24-32)], normal plasma inorganic phosphate and creatinine level, normal serum protein electrophoretic pattern (using Gelman Sepratek system of Gelman Science, Ann Arbor, MI, USA). Oral prednisolone 30 mg given daily over 4 days suppressed serum calcium, iPTH and hCG levels (all blood specimen were collected between 0800-1000 hrs.). After discontinuation of the steroid, the plasma albumin was 32 g/ℓ and the calcium level returned to the pre-suppression range of 4 mmol/l whereas the plasma phosphate remained low at 0.7 mmol/l (analysis of iPTH and hCG was not carried out because of insufficient specimen). A diagnosis of hyperparathyroidism was made. His left femur fracture was treated with traction. A left inferior parathyroid tumour 2 x 3 cm was excised along with the left thyroid lobe. The parathyroid tumour was adherent to the wall of oesophagus. Histological examination revealed a parathyroid carcinoma. Post-operatively he developed hypocalcaemia which was treated with intrave-

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Table I
CHEMICAL PATHOLOGICAL CHANGES IN BLOOD PRE-, POST-STEROID SUPPRESSION AND POSTSURGERY

	PRE-STEROID SUPPRESSION		POST-STEROID SUPPRESSION	POST-SURGERY
DAYS	5	1	4	35
CALCIUM (2.1-2.8 mmol/l)	4.2	4.2	3.5	2.1
ALBUMIN (37-51 G/L)	33	29	35	40
iPTH (29-85 pmol/l)	793	960	67	60
HCG (< 8 IU/L)	134	94	20	< 8
CREATININE (60-130 umol/l)	115	120	99	155
ALKALINE PHOSPHATASE (34-135 iu/l)	759	655	671	1035

NOTE:- Reference ranges are given in parenthesis and all the chemical pathological tests (except iPTH and hCG) are carried out in the Abbott Spectrum Analyser (Abbott Laboratory, Illinois, USA)

nous calcium gluconate, and 1-alpha-hydroxy cholecalciferol. The plasma iPTH returned to normal level post-operatively (Table 1) with increase in alkaline phosphatase activity indicating increased osteoblastic activity. His post-operative plasma hCG level was less than the detection limit of the assay. He was followed up for further management of his renal calculi and fracture.

DISCUSSION

This was an unusual case of parathyroid carcinoma showing prednisolone suppressible plasma iPTH and hCG levels. Glucocorticoid has been shown in-vitro (3) and in-vivo (4) to stimulate rather than inhibit PTH secretion in rat and non-hyperparathyroid patient respectively. The paradoxical response observed could indicate inhibitory response (5) of neoplastic cells to the action of steroid. This was further supported by the concomitant post-steroid fall in plasma hCG levels. Elevation of serum hCG level has been described with pituitary, trophoblast, islet cell, breast, lung, gastrointestinal tract, liver, pancreas and parathyroid glands neoplasia. In the latter, the hCG level parallels that of iPTH and is most probably produced by the cancer cells (2). In the investigation of hyperparathyroidism, blood for iPTH assay should preferably not be collected immediately after steroid exposure which may mask an elevated iPTH level in responsive parathyroid carcinoma.

Further work is required to define the plasma iPTH and hCG response in primary hyperparathyroidism to steroid suppression and to explore the possibility of exploiting this altered response in the diagnosis of hyperparathyroidism.

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REFERENCES

1. Dent CE. Watson L: The hydrocortisone test in primary and tertiary hyperparathyroidism. Lancet 1968:ii:662-4.
2. Stock JL. Weinstraub BD. Rosen SW. Aurbach GD. Spiegel AM. Marx SJ: Human chorionic gonadotrophin subunit measurement in primary hyperparathyroidism. J Clin Endocrinol Metab 1982:54:57-63.
3. An WY: Cortisol stimulation of parathyroid hormone secretion by rat parathyroid glands in organ culture. Science 1976:193:1015-7.
4. Fucik RF. Kukreja SC. Hargis GK et al: Effect of glucocorticoids on function of the parathyroid glands in man. J Clin Endocrinol Metab 1975:40:152-5.
5. Clark JH. Schrader WT. Omally BW: Mechanism of steroid action. In: Wilson JD. Foster DW. eds. Williams Textbook of Endocrinology. W B Saunders Company : Philadelphia. 1985:33-75.