CASE REPORTS

Idiopathic hypoparathyroidism manifesting after lactation

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THE GENERALLY accepted criteria for the diagnosis of idiopathic hypoparathyroidism (IdH) are those of Drake *et al.* (1939): (1) low serum calcium; (2) high serum inorganic phosphorus; (3) absence of renal insufficiency, steatorrhoea and alkalosis; (4) no X-ray evidence of rickets or osteomalacia; and (5) chronic tetany. One further criterion (Albright *et al.*, 1942; Strom & Winberg, 1954) is a significant phosphate diuresis following the injection of parathyroid hormone (Ellsworth Howard test).

Since the first recorded case of IdH by Liu (1928) there have been approximately 100 examples of this condition in the literature fulfilling the above criteria. Perhaps the most comprehensive review is by Bronsky *et al.* (1958) who present one case each of IdH and pseudohypoparathyroidism (PsH), and comment on fifty cases of IdH and forty cases of PsH previously reported.

A 17-year-old girl with IdH is reported in whom all six criteria are fulfilled. The time of onset is especially interesting in that symptoms first occurred in late pregnancy and tetany followed lactation.

Biochemical methods

The serum and urinary calcium estimations were performed by the method of Clark & Collip (1925). All blood samples, except the initial one, were taken without compression of the arm. The serum and urinary phosphorus estimations were performed by the method of Fiske & Subbarow (1925).

Case report

A 17-year-old girl was brought to the Casualty Department of Hope Hospital on 3 March 1966 with severe generalized tetany. There was marked carpo-pedal spasm and speech was impossible because of violent twitchings of the facial muscles. In addition there was hyperventilation. The tetany

was thought to be that of respiratory alkalosis, but no relief followed a period of rebreathing and in fact this manoeuvre only produced increased agitation. There was no response to 20 ml of 10% calcium gluconate given intravenously over a period of 10 min, and a further 20 ml given over the following hour was required to abort the attack. Even then the Chvostek and Trousseau signs were strongly positive, carpal spasm occurring on just gripping the upper arm tightly. The patient was admitted for observation because of the large amount of calcium given.

History. On 4 February 1966 she delivered a full-term normal baby. She had antenatal care at this hospital. Between the 7th and 8th months of her pregnancy she had five 'blackouts', each lasting about 5 min and preceded by tinnitus and blurring of vision. She passed urine on three of these occasions. No similar attacks had occurred prior to her pregnancy. Labour was uneventful, delivering a male infant weighing 6 lb 3 oz. Lactation was suppressed by stilboestrol after 9 days' breast feeding.

On 25 February the patient began to notice tingling, 'pins and needles' and cramp in her hands, her calf muscles became painful and 'tight' and her hands and feet assumed positions which she demonstrated as classical carpo-pedal spasm. These attacks occurred every few hours and on 1 March her facial muscles started to twitch and she felt as if she was continuously 'fighting for her breath'.

There had been no serious illnesses in the past. Her mother was in good health, having had five normal pregnancies.

An interesting dietary factor was that for as long as the patient could remember she had been drinking 2-3 pints of milk daily.

Examination. An attractive girl of average intelligence and normal body habitus. Her face was oval, vision apparently normal and there were no obvious ectodermal abnormalities. Apart from the positive Chvostek and Trousseau signs, further examination was normal.

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Investigations. Serum calcium, 6.8 mg/100 ml on 4 March, 6.2 mg/100 ml on 5 March; serum phosphorus, 6.5 mg/100 ml; serum alkaline phosphatase, 11.2 K.A. units; haemoglobin, 81% (11.7 g/100 ml); WBC, 8600/mm³; ESR, 37 mm/hr (Westergren); Urinalysis: specific gravity, 1020; acid in reaction, protein and sugar negative, no abnormal cells, blood urea, 18 mg/100 ml; serum sodium, 145 mEq/l; potassium, 3.8 mEq/l; chlorides, 100 mEq/l; standard urea clearance, 76% of normal. Total faecal fat content estimated on two occasions on normal ward diet was: 18.4%, 19.0% by weight of dried faeces. Total serum protein 6.9 g/100 ml (albumin 4.6 g, globulin 2.3 g). Further examination of the urine was negative for phenylpyruvic acid and excessive cystine. Chromatography showed a normal pattern for amino acids. A 24-hr urinary phosphorus excretion (volume 2800 ml) was 0.350 g (normal 1.5 g/24 hr), 24-hr urinary calcium excretion (volume 1800 ml) 154.8 mg (normal 300 mg/24 hr). Radiological examination showed normal bone structure with no evidence of soft tissue calcification. In particular, there was no brachydactyly and no calcification in the area of the basal ganglia. The electrocardiogram showed a QTc of 0.47 sec. Ophthalmological and dental examination revealed no abnormality. An electroencephalogram gave a normal tracing.

Progress. Following admission there was no spontaneous tetany. The Chvostek sign remained markedly positive and Trousseau's sign could be elicited after only 30 sec ischaemia. On 9 March the serum calcium was 6.0 mg/100 ml and the serum phosphorus 8.5 mg/100 ml.

On 16 March an Ellsworth Howard test was performed (see Fig. 1). Parathyroid, 200 USP units, was injected intravenously and the urinary phosphorus estimated at hourly intervals for 3 hr prior to (29, 23 and 17 mg/100 ml) and for 4 hr following (107, 255, 207 and 215 mg/100 ml) the injection. There was a satisfactory phosphate diuresis in a normal control. Four hours after the injection the serum calcium had risen by 1.2 mg/100 and the serum phosphorus had fallen by 1.7 mg/100 ml.

Treatment was commenced with calciferol 100,000 units daily and calcium lactate 12 g daily by mouth. The diet was unaltered apart from drastically reducing her milk intake. A Sulkowitch test was performed daily on a fresh specimen of urine. By 19 March the Chvostek and Trousseau signs had become negative. She was discharged on 23 March. On 28 March the serum calcium was 8.8 mg/100 ml and serum phosphorus 5.2 mg/100 ml. The Sulkowitch test was positive for the first time. The calciferol was reduced to 50,000 units daily and the calcium lactate discontinued.

FIG. 1. Ellsworth Howard test. O, Urinary phosphorus; ●, serum P; ×, serum Ca; 200 units parathyroid hormone i.v. (arrow).

The patient was seen again on 12 April. She was complaining of 'cramp' in her hands and twitching of her facial muscles with recurrent brief attacks of carpo-pedal spasm. The Chvostek and Trousseau signs were positive. Serum calcium 7.5 mg/100 ml, serum phosphorus 6.3 mg/100 ml. She was re-admitted and treatment was altered to dihydrotachysterol (A.T.10) 3 ml daily, calcium lactate syrup 24 g daily and ammonium chloride 1 g three times daily. A special low phosphorus diet was obtained containing 0.65 g phosphorus daily. On this regime the signs of latent tetany became negative within 3 days. She was discharged on 26 April on A.T. 10, 1 ml daily only, continuing her low phosphorus diet. At this stage the serum calcium was 8.3 mg/100 ml and serum phosphorus 5.9 mg/100 ml.

Discussion

The diagnosis of IdH in this patient was unusually straightforward considering the average duration of symptoms prior to the establishment of the diagnosis is 9–12 years (Bronsky *et al.*, 1958). The absence of such features as soft tissue calcification, cataract formation, dental hypoplasia and other ectodermal changes, suggests a relatively early diagnosis. However, the interesting feature of this case is the fact that the onset of tetany followed lactation.

The discussion of cause and effect can be divided into three relevant considerations: (1) the actions of parathyroid hormone, (2) the effect of lactation

on calcium balance, and (3) the effect of calcium deprivation on the parathyroid gland.

(1) The actions of parathyroid hormone are well summarized by Harrison (1964). The serum calcium is raised by resorption from bone, by increased reabsorption of filtered calcium by the renal tubules and by increased intestinal absorption. Serum phosphorus is lowered by inhibiting renal tubular reabsorption of inorganic phosphorus. The hormone also influences magnesium transport.

(2) During lactation the calcium requirement is over 3 g daily, compared to the normal essential intake of 1.5 g day. This is related to the fact that the lactating mother loses ten times as much calcium daily in the milk as she lost to the foetus in the last stages of pregnancy (Wright, 1965). Negative calcium balance in lactation has been demonstrated by Donelson *et al.* (1931) and Hummel *et al.* (1936). An interesting finding which may have some bearing in this particular case was made by Toverud (1963) who demonstrated increased secretion of calcium in the breast milk in rats after parathyroidectomy.

(3) The effect of calcium deprivation on the parathyroid gland has been well demonstrated by the work of Smith, Davies & Fourman (1960). They produced calcium deprivation in patients by giving sodium phytate and a diet low in calcium. In those with normal parathyroid function the serum calcium remained normal, whilst in those with known hypoparathyroidism (post-thyroidectomy) the serum calcium fell sharply, tetany occurring in some cases. More significantly, in some apparently normal post-thyroidectomy patients, they found that calcium deprivation led to an abnormal fall in the serum calcium. Two main conclusions were: (a) the ability to maintain a normal serum calcium in the face of deprivation of calcium depends on adequate parathyroid hormone, and (b) a state of partial parathyroid insufficiency may exist where the serum calcium can be maintained under normal circumstances, but not under those of calcium deprivation.

Thus, in the case presented above, hypoparathyroidism remained latent until there was a special demand on parathyroid function, i.e. the 'calcium deprivation' of lactation. The unusually high, prolonged milk intake (1.08–1.62 g phosphorus in 2–3 pints of milk) may have been a secondary factor in straining inadequate parathyroid reserves.

Summary

A case of idiopathic hypoparathyroidism is described. Tetany appears to have been precipitated by the combined effects of pregnancy and lactation and the reasons for this are discussed.

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