Plasma cortisol and growth hormone levels did not rise when hypoglycaemia was induced, but plasma cortisol rose after an intramuscular injection of 5U of vasopressin. Further, the plasma thyroid-stimulating hormone level measured by radioimmunoassay, responded to thyrotrophin-releasing hormone 200 µg given intravenously (see table). No evidence of tumour recurrence was found at operation, and replacement therapy with cortisone, testosterone, and thyroxine produced increased energy, hair growth, and decreased cold sensitivity.

Comment

Chronologically, the development of unequivocal pituitary failure was consistent with the usual latent period of several years preceding chronic radiation damage. The macroscopic appearances at necropsy in Case 1 and the radiological and operative findings in Case 2 made the involvement of the pituitary by tumour unlikely.

In case 2 evidence for a hypothalamic site of the lesion was provided by a thyroid-stimulating hormone response to thyrotrophin-releasing hormone which was normal but delayed, typical of the pattern seen in hypothalamic disease and in contrast to the lack of response in patients with local pituitary destruction (Hall *et al.*, 1972). Further, in contrast to hypoglycaemia, which elicits corticotrophin release via a hypothalamic effect mediated by corticotrophin-releasing hormone, vasopressin appears to act in part directly upon the pituitary (Gonzalez-Luque *et al.*, 1970). The plasma cortisol response to vasopressin but not to hypoglycaemia suggested that the pituitary was intact but that the hypothalamus was not. In the case of Tan and Kunaratnam (1966) pituitary dwarfism resulted from irradiation of a naso-

pharyngeal carcinoma in a 12-year-old girl who received a total dose of 9,000 r; panhypopituitarism was unequivocal, but the data did not discriminate between a hypothalamic and a pituitary origin. Arnold (1954) and Lawrence *et al.* (1971) have suggested that the therapeutic effect of irradiation for pituitary dysfunction may result from hypothalamic damage rather than an action on the pituitary itself.

Both the patients reported here received large but conventional doses of irradiation with apparent complete regression of their tumours, and the pituitary and ventral hypothalamus received most of the total tumour dose. The development of hypopituitarism after radiotherapy of the head and neck may be more common than has been suspected in the past, and with the greater sophistication of current tests of pituitary function evidence of this complication should be sought more diligently.

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References

- Arnold, A. (1954). *Journal of Clinical Endocrinology and Metabolism*, 13, 859.
 Arnold, A., Bailey, P., and Laughlin, J. S. (1954). *Neurology*, 4, 165.
 Bradley, J. M. (1965). *Journal of the College of Radiologists of Australasia*, 9, 36.
 Gonzalez-Luque, A. L'Age, M., Chariwal, A. P. S., and Yates, F. E. (1970). *Endocrinology*, 86, 1134.
 Hall, R., Ormston, B. J., Besser, G. M., Gryer, R. M., and McKendrick, M. (1972). *Lancet*, 1, 759.
 Kelly, K. H., *et al.* (1951). *Journal of the National Cancer Institute*, 11, 967.
 Lawrence, A. M., Pinsky, S. M., and Goldfine, I. D. (1971). *Archives of Internal Medicine*, 128, 369.
 Tan, B. C., and Kunaratnam, N. (1966). *Clinical Radiology*, 17, 302.

Primary Hypothyroidism Presenting as Pituitary Failure

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An 18-year-old male presented with dwarfism and failure to undergo puberty. Routine investigations showed evidence of pituitary failure but serum thyrotrophin levels were raised, indicating primary hypothyroidism. After treatment with thyroxine thyrotrophin was suppressed and other aspects of pituitary function were recovered.

Case History

An 18-year-old Indian male presented with shortness of stature and failure to undergo puberty. Development had been normal until the age of 10 when he was overtaken in height by his younger sister. His height had remained unchanged for the past two years.

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His parents and four siblings were all of normal build. His diet was the same as the rest of the family and he had not received any drugs. There was no past history of head injury or other illness.

At examination his height was 134 cm (<3rd percentile), weight 36 kg. He was mentally and physically slow, with dry thick skin and delayed relaxation of tendon reflexes. He was prepubertal and there was no gynaecomastia or galactorrhoea. There were no visual field or cranial nerve defects. Results of investigations are shown in the Table.

Results of Investigations in Case of Primary Hypothyroidism

	Before Treatment	3 Months After Treatment
Growth:		
Peak human growth hormone (µIU/ml) (W.H.O. 1st I.R.P.) after hypoglycaemia*	<1	32
Bone age (years) (Greulich and Pyle)	8	9
Alkaline phosphatase (K.A. units)	16	48
Gonads:		
Basal luteinizing hormone mU/ml (M.R.C. research standard A) (normal adult range 1.8-4.1)	1.0	1.1
Luteinizing hormone response to clomiphene	absent	absent
Luteinizing hormone peak after LH/FSH-RH (mU/ml)†	—	2.6
17 β-hydroxyandrogens (ng/ml)‡ (normal adult range 4.9-21.5)	1.0	0.6
Adrenal:		
Basal 9 a.m. cortisol (µg/100 ml)	9.0	8.0
Peak after hypoglycaemia	9.0	33.0
Thyroid		
Protein bound iodine (µg/100 ml)	0.8	—
Cholesterol (mg/100 ml)	450	179
Electrocardiogram	Flat T-waves	normal
Antibodies§	negative	—
Thyroid stimulating hormone (µU/ml) (M.R.C. research standard A) (normal range < 1.4-5)	620	2.0

Pituitary fossa tomography and air encephalogram: no enlargement of the fossa and no suprasellar extension.

* Insulin tolerance test: glucose fell to <25 mg/100 ml.

† Measured 20 and 60 minutes after 100 µg intravenous gonadotrophin releasing hormone (LH/FSH-RH).

‡ Measured by Dr. D. C. Anderson.

§ Measured by Dr. W. J. Irvine.

Serum thyroid stimulating hormone, initially 620 μ U/ml, fell to 20 μ U/ml after one month on thyroxine 0.1 mg daily, and to 2 μ U/ml after a further month on thyroxine 0.2 mg daily. After three months' therapy his weight had fallen by 6 kg and his height had increased by 2.5 cm. He was euthyroid but there were no signs of further sexual development.

Repeat investigations (see Table) showed rapid advance in bone maturity and recovery of human growth hormone and cortisol responses to hypoglycaemic stress. Basal levels of luteinizing hormone remained low, but rose to within the normal adult range in response to luteinizing hormone-releasing hormone.

Comment

The patient presented with features of hypopituitarism but the raised levels of serum thyroid stimulating hormone indicated the true diagnosis of primary hypothyroidism. The aetiology of the hypothyroidism remains obscure, there being no evidence of a previous thyroiditis or of a lingual thyroid.

Varying degrees of partial pituitary failure secondary to primary hypothyroidism have been described. A blunted cortisol response to insulin-induced hypoglycaemia may occur (Lessof *et al.*, 1969), and similarly the growth hormone response may be absent (Najjer and Blizzard, 1966; Root *et al.*, 1967). After replacement therapy with thyroxine these hormone responses usually return to normal and treated cretins have a normal growth hormone response to hypoglycaemia (Harrison *et al.*, 1968). In the present patient normal human growth hormone and cortisol responses were seen after replacement therapy but luteinizing hormone levels remained low and unresponsive to clomiphene. This latter finding was not surprising in that the patients' physical development was that of an 8-year-old, and normal subjects remain unresponsive to clomiphene until stage III-IV of puberty (Anderson *et al.*, 1972).

The partial luteinizing hormone response to the gonadotrophin releasing hormone shows, however, that the pituitary is capable of secreting gonadotrophin and so puberty may develop spontaneously at a later date.

Enlargement of the pituitary fossa may occur in primary hypothyroidism and be persistent after treatment. It may then be difficult to exclude a coexistent chromophobe adenoma of the pituitary. In this patient despite the clinical and biochemical evidence of pituitary failure (thyrotrophin excepted) there was no radiological evidence of pituitary enlargement or an empty sella, and the reversibility of the pituitary disturbances indicates that they were secondary to the thyroid failure. The mechanism whereby the high level of thyroid stimulating hormone is maintained but other pituitary function is impaired remains obscure. Hypertrophy of the thyrotrophin secreting cells may interfere with the production of other pituitary hormones; or, alternatively, the failure of human growth hormone and adrenocorticotrophic hormone release may be due to a direct effect of lack of thyroxine at hypothalamic or pituitary level.

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References

- Anderson, D. C., Marshall, J. C., Young, J. L., and Fraser, T. R. (1972). *Clinical Endocrinology*, 1, 127.
- Greulich, W. W., and Pyle, S. I. (1950). In *Radiographic Atlas of Skeletal Development of the Hand and Wrist*. Stanford, University Press.
- Harrison, M. R., Fierro-Benitel, R., Ramirez, I., Refetoff, S., and Stanbury, J. S. (1968). *Lancet*, 1, 936.
- Lessof, M. M., Lyne, C., Maisey, M. N., and Sturge, R. A. (1969). *Lancet*, 1, 642.
- Najjer, S., and Blizzard, R. M. (1966). *Pediatric Clinics of North America*, 13, 437.
- Root, A. W., Rosenfield, R. L., Bongiovanni, A. M., and Eberlein, W. R. (1967). *Pediatrics*, 39, 844.

Toxocara Larval Papillitis

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Adult toxocara worms commonly infest the intestinal tracts of dogs, cats, kittens, and puppies, thus their eggs are frequently excreted. Children and occasionally adults are at risk from accidentally ingesting these eggs. In the human intestinal tract larvae escape from the eggs and pass through the wall of the intestine. Visceral infestation causes pica, cough and wheezing, fever, and sometimes convulsions. Enlarged liver and spleen, with leucocytosis and eosinophilia, are also commonly found. Ocular involvement sometimes occurs with uniocular

poor vision usually due to macular chorioretinal scarring, often with retinal detachment. A convergent squint often follows, and may be the presenting symptom. Involvement of the central nervous system results in acquired epilepsy (and also poliomyelitis), according to evidence presented by Woodruff *et al.* (1966).

The present case is the first to be recorded of an adult presenting with papillitis due to a larva of the nematode worm *Toxocara*. One similar case was recorded in a child (Bird *et al.*, 1970) in whom enucleation allowed histological proof of the presence of a *Toxocara canis* larva in the optic disc. Wilder (1950) identified in sections for the first time nematode larvae embedded in fibrous tissue in enucleated eyes which had been removed usually because of a suspected retinoblastoma. Brown (1970) reported a review of the literature which included accounts of 245 affected patients in the U.S.A., Europe, Australia, and elsewhere. Ashton (1960) and Duguid (1961a, 1961b) described cases in England, and in two of Duguid's cases (1961b) the temporal part of the disc was implicated.

Case Report

A 25-year-old woman had had poor vision in her left eye from childhood attributed to strabismic amblyopia (6/18 with correction for hypermetropia—namely +7.50/+0.50 at 100°. The right eye had good vision (6/6) when corrected for a similar degree of hypermetropia until February 1971, when she noticed a flickering

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