

of the Dubowitz system for gestational ages 29 to 37 weeks. Where there is evidence of intrauterine growth retardation the Dubowitz scoring system has to be used for gestational ages above 37 weeks, as it remains accurate up to 43 weeks.

Summary

Seventy-three low birthweight babies were independently assessed for gestational age using the scoring system of Dubowitz *et al.* (1970) and 5 neurological reflexes described by Robinson (1966). The results obtained by the 5 reflexes were compared with those obtained by the scoring system and were found to be accurate estimations of gestational age. The 5 reflexes may be used for babies of gestational ages 29 to 37 weeks, but above 37 weeks the scoring system must be used.

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Increased urinary catecholamines in an infant with the diencephalic syndrome

Since Russell (1951) defined the diencephalic syndrome, a number of reports have described the wide spectrum of symptoms. In this report we call attention to the possible role of catecholamines in producing some of the symptoms.

Case report

A 15-month-old female infant was admitted because of severe malnutrition. She was the product of an uneventful pregnancy and delivery, the first child of healthy parents. Birthweight was 4000 g. She had initially been given a milk formula with solids added later, and appeared to be taking a well-balanced diet. She allegedly had had diarrhoea since birth, despite which growth proceeded normally at first, weight reaching 6500 g at age 5 months, but then remaining stationary. Psychomotor development however was normal. At age 10½ months nystagmus appeared.

On admission at 15 months a severe degree of malnutrition was noted. Weight was 6500 g (3rd centile), height 75 cm (10th centile), and head circumference 45 cm (25th centile). Despite marasmus she was in excellent general condition, was hyperactive, and looked unexpectedly happy. Blood pressure measured by a cuff covering 2/3 of her arm ranged from 120/80 to 110/70 mmHg, on several occasions. She had bilateral nystagmus and both optic discs were pale. The following were normal: full blood count; blood glucose and urea; serum electrolytes, Ca, P, alkaline phosphatase, proteins, cholesterol, and total lipids. Urine normal. Blood and urine paper amino acid chromatography were normal. Xylose absorption test, normal. Sweat test, Na 25.5 mmol/l.

CNS studies showed the following: normal skull x-ray. CSF protein 1.08 g/l, sugar 40 mg/100 ml (2.22 mmol/l), no cells. EEG showed a disorganised basic rhythm with superimposed paroxysmal discharge waves bilaterally. Brain scanning with ^{99m}Tc (Fig. 1) showed an increased uptake of the isotopic substance in the vicinity of the sella turcica. Pneumoencephalogram showed an upward displacement of the 3rd ventricle and an increased distance between frontal and temporal horns (Fig. 2). Carotid artery angiography showed a vascular mass displacing the middle cerebral artery. Fasting growth hormone was 28 ng/ml plasma (increased). Blood thyroxine was 11.3 µg/100 ml (145 nmol/l). Urinary vanillylmandelic acid was normal (2.4 mg/24 h),

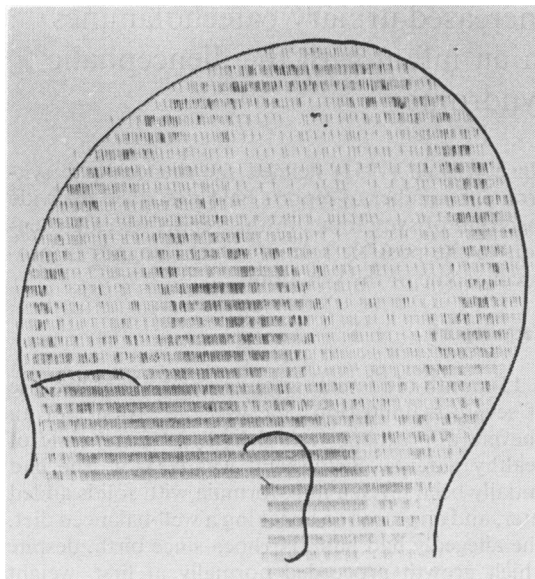


Fig. 1 *Brain scan. Note increased isotopic substance uptake in vicinity of sella turcica.*

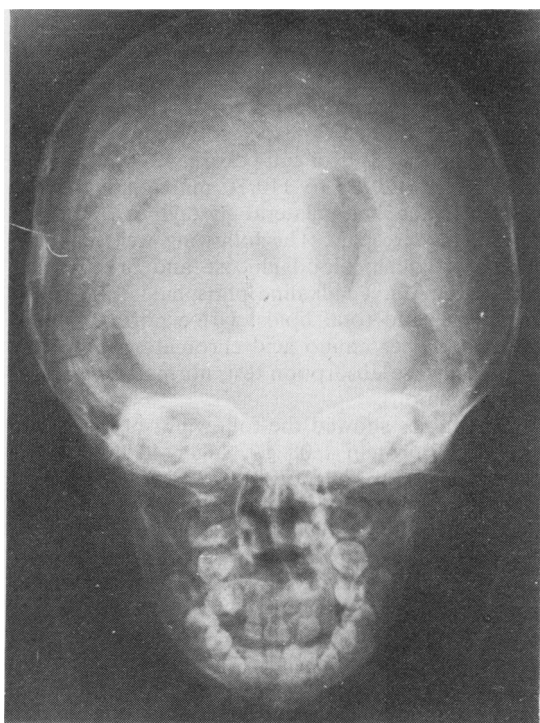


Fig. 2 *Pneumoencephalogram showing upward displacement of the 3rd ventricle and increased distance between its frontal and temporal horns.*

whereas catecholamines were abnormally increased i.e. norepinephrine (N) $30 \mu\text{g}/24 \text{ h}$ urine; epinephrine (E) $110 \mu\text{g}/24 \text{ h}$. Means values of (N) and (E) eliminated in 24-hour urine samples of healthy Greek children, aged from 3 to 12 years, are $14.5 \pm 6.3 \mu\text{g}$ and $4.9 \pm 2.3 \mu\text{g}$ respectively in our laboratory, by the fluorometric method of Crout (1961), on specimens purified by aluminium oxide column chromatography.

A diagnosis was made of a space-occupying lesion in the region of the floor of the 3rd ventricle. The infant received a total of 5500 rads cobalt radiotherapy. 4 months later her weight reached 8700 g, length 82 cm, head circumference 46 cm. One year after diagnosis weight is 15.5 kg, height 94 cm, head circumference 49 cm, blood pressure 95/55 mmHg. She walks, has good mental development, and normal optic fundi. (N) is $9 \mu\text{g}$ and (E) $2.1 \mu\text{g}/24 \text{ h}$ urine. Brain scan is normal.

Discussion

Our case presents the usual symptoms and laboratory findings of a diencephalic syndrome, associated with a space-occupying lesion, probably a tumour, situated in the anterior hypothalamus, which is pressing and distorting the 3rd ventricle. Interesting features are (a) moderately raised blood pressure compared with healthy children studied by Lieberman (1974), and (b) a huge increase of urinary (E) and (N). Since Russell (1951) defined this syndrome a wide spectrum of clinical manifestations (Burr *et al.*, 1976) and a variety of lesion sites in the diencephalon (Addy and Hudson, 1972) have been described.

This syndrome is one in which several apparently unrelated symptoms, i.e. marasmus, lipodystrophy, and nystagmus, together with various abnormalities of the autonomic nervous system, are attributed to a solitary lesion in the diencephalon. This lesion affects both thalamic nuclei and thalamo-hypothalamo-hypophyseal pathways (Bain *et al.*, 1966).

There have been few attempts to explain symptoms such as euphoria, diarrhoea, vomiting, sweating, and skin pallor in terms of autonomic nervous system dysfunction, as measured by urinary catecholamine levels, perhaps because increased blood pressure has rarely been reported in Russell's diencephalic syndrome. Mild increase of catecholamine secretion has been noticed in many intracranial tumours and attributed to pressure on the corresponding nervous pathways. Nevertheless, the observation of Evans *et al.* (1972) that urinary catecholamines were increased during episodes of hypertension in a case of proven astrocytoma, mimicking clinical features of pheochromocytoma, is indeed challenging. A

lesion in the diencephalon could also possibly stimulate the thalamo-hypothalamo-hypophyseal-adrenal axis. Catecholamine secretion should therefore be investigated in these infants.

Our findings of moderate increase of (N) in the urine and an over ten-fold increase of (E) may reflect overstimulation of the sympathetic nervous system, or actual secretion from the neoplastic tissue itself. (E) and (N) were not measured in the CSF; catecholamines are said not to cross the blood brain barrier (Axelrod and Weinshilbom, 1972). Our patient had most of the symptoms attributed to stimulation of the autonomic nervous system, such as euphoria, irritability, and skin pallor; she also had a mild but constant hypertension ($115/75 \pm 5/5$ mmHg).

In conclusion, we suggest that some of the symptoms in the diencephalic syndrome may be due to catecholamine oversecretion.

Summary

In an infant of 15 months with the diencephalic syndrome, urinary excretion of norepinephrine was moderately raised and epinephrine greatly so. It is suggested that catecholamine secretion may be due to sympathetic stimulation at the level of the diencephalon, by a space-occupying lesion pressing on the thalamohypothalamic pathway. Some of the symptoms of the diencephalic syndrome such as euphoria, irritability, skin pallor, and hypertension may be the result of catecholamine secretion.

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I-cell disease

I-cell disease is an inherited condition clinically resembling Hurler's disease but without excessive urinary mucopolysaccharide excretion. In contrast to Hurler's disease the clinical and radiological signs are already marked in early infancy with progressive mental retardation and death from respiratory infection in infancy or early childhood. Recent work (Strecker *et al.*, 1976) suggests that the basic defect is a deficit of neuraminidase. A further case is here reported, and the differential diagnosis and pathogenesis of the condition are discussed.

Case report

The second child of healthy unrelated parents was born at 38 weeks' gestation by breech delivery and weighed 3.1 kg. Fetal movements had been noticeably fewer than in the previous pregnancy. At birth he was noted to have an unusual facial appearance and a narrow chest. During the neonatal period he developed mild transient jaundice and was sleepy and slow with feeds. Over the next 4 months his development was slow and he suffered several respiratory tract infections.

At age 4 months he was admitted to hospital for investigation. He had an unusual appearance (Fig.) with a high prominent forehead, flattened supra-orbital ridges, a flat nasal bridge, and anteverted nostrils. Prominent epicanthic folds and a mongoloid slant gave him a sleepy appearance. The gums were swollen and the distance between mouth and nose increased. The chest was narrow and there was a dorsolumbar kyphoscoliosis. The liver was enlarged and palpable to 3 cm, the spleen was not palpable. The hands and feet were broad and his thumbs were held enclosed by his first and second fingers.

The skin showed varying degrees of thickening particularly over the shoulders and around the wrists. Passive movements about the limb girdles were restricted. He had generalised hypotonia with persistence of primitive grasp and walking reflexes. Head control was poor, and he was only just able to raise his head in the prone position. He could smile, follow with his eyes, and vocalise freely.