Failure to Thrive: The Diencephalic Syndrome of Infancy and Childhood

A Case Report*

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This case report presents an example of the enigmatic condition given the sundry names of diencephalic syndrome of infancy, inanition syndrome, athrepsia, failure to thrive, and others. It is almost invariably caused by an astrocytoma of the anterior hypothalamus and optic chiasm. Patients with this syndrome show few of the signs and symptoms usually attributed to brain tumors, optic nerve gliomas, or hypothalamic-pituitary lesions. Enough cases with similar signs and symptoms have been reported in the radiologic, pediatric, and neurologic literature in the past 7 years to form a fairly characteristic syndrome that must be considered in the differential diagnosis of emaciation in infants and children.

Case Report

History. D. C. is a white boy who was born in May, 1962. After a normal pregnancy and delivery, he did well for 9 weeks, gaining in weight from 5 lb. 14 oz. at birth to 13 lb. He then stopped gaining weight and would take only 10–16 oz. of milk and one jar of baby food a day. He was tried on many different formulas. Tests for cystic fibrosis, malabsorption syndrome, food allergy, and metabolic diseases were negative. In January, 1963, he was noted to have vertical and rotational nystagmus with no other neurologic abnormality. Skull films were normal as was lumbar puncture. A pneumoencephalogram was performed because the diencephalic syndrome was suspected, but it was interpreted as showing only mild cortical atrophy. He continued to be emaciated to a greater degree than could be explained by his caloric intake (Fig. 1) and was again hospitalized for complete metabolic and gastrointestinal studies in June and August, 1963 (aged 13–15 months).

Examination. Pituitary, thyroid, and adrenal functions were normal as shown by studies of heat and cold tolerance, serum protein bound iodine, serum electrolytes, and urinary steroids. SU-4855 studies were normal. No gastrointestinal or pancreatic dysfunction could be found. Carbohydrate and amino acid metabolism was normal as shown by glucose tolerance, insulin tolerance, adrenalin tolerance, serum glucose and galactose, and urinary amino acid studies.

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Neurologic and ophthalmologic examinations showed a bright, hyperkinetic youngster who smiled a great deal. He walked only with support and did not talk. His vision and visual fields were bilaterally normal. The optic discs and fundi were normal. He had no pupillary or extraocular muscle deficit. There was no conjugate gaze palsy. He had constant vertical nystagmus thought to be compatible with congenital nystagmus. There were no other cerebral, cerebellar, motor, sensory, or reflex abnormalities. Psychological testing demonstrated average intelligence. Skull films, electroencephalograph and spinal fluid examinations were again normal. The pneumoencephalogram performed at the age of 8 months was reviewed and thought to be compatible with an anterior third ventricular mass. Soft tissue films of the extremities showed complete absence of subcutaneous fat with relative preservation of muscle. Skeletal development was normal (Fig. 2). Films of the optic foramina revealed a markedly dilated right optic foramen. A ventriculogram demonstrated a large mass in the area of the optic chiasm and anterior...
third ventricle with no obstruction of the foramina of Monro.

Operation. A right frontal craniotomy in August, 1963, (at the age of 15 months) revealed a greatly enlarged right optic nerve extending through the dilated optic foramen and extending into a massively enlarged optic chiasm. The left optic nerve was relatively normal. A biopsy taken from the optic chiasm proved to be a benign fibrous astrocytoma (optic glioma). No further removal or exploration seemed advisable or possible. The full superior and posterior extent of the tumor was not seen.

Course. He was given 4000 r tumor dose irradiation by a cobalt-60 machine through multiple ports over a 6-week period. At present (May, 1964) he is able to walk and talk, and is alert and active (Fig. 3). His vision seems intact although the nystagmus is unchanged, his appetite is fair, but he remains severely emaciated and weighs only 15 pounds. The only consistent, marked abnormality of hormones or metabolism found by laboratory tests has been a greatly elevated level of growth hormone in the serum—approximately three times maximum normal values. Extensive metabolic studies are being done and will be reported later.

Discussion

Tumors in the hypothalamic area are usually thought to cause obesity, precocious puberty, somnolence, and diabetes insipidus. Cases of emaciation and cachexia have been associated with hypothalamic tumors. Rarely, cranio-pharyngiomas cause progeria and dwarfism in children. But none of these patients demonstrated the syndrome of initial acceleration of growth followed by profound emaciation paradoxically associated with vigorous hyperactivity, eager over-alertness, and euphoria first reported by Russell in 1951 and 1957. Twenty cases with strikingly similar histories, physical findings, and pathological lesions have been reported since Russell's ten cases.

These patients are first brought to the pediatrician from the age of 3 months to 4 years with a history of failure to gain weight for several months. They may have had some vomiting and diarrhea but this is not severe enough to explain their severe emaciation. Their appetites vary from anorectic to ravenous. Examination reveals extreme cachexia with loose pale skin, but fairly good preservation of musculature. The patients usually are bright and alert with good strength and often are smiling, euphoric, and hyperactive.