Adrenoleukodystrophy (ALD) is a sex-linked recessive, peroxisomal disorder that causes diffuse demyelination of the central nervous system. ALD presenting as spinocerebellar degeneration (SCD), a variant form of ALD, has been recognized. The brain computed tomography (CT) finding most commonly seen in this form of ALD is atrophy of the brain stem and the cerebellum. However, MRI has not previously been reported. A 29-year-old man was admitted to our hospital because of gait disturbance. His parents were not consanguineous. His mother was asymptomatic though neurological examination revealed mild spasticity of both legs. At age 26, the patient complained of dysarthria and gait disturbance, and these symptoms were slowly progressive. Impotency, incontinence, and weight loss developed.

He was euphoric and mildly pigmented. Neurological examination revealed slow slurred speech, considerably increased deep tendon reflexes, extensor plantar responses and, ataxia of all limbs. His gait was markedly spastic and ataxic and he could not walk without support. His total IQ on Wechsler adult intelligence scale was 76.

The following laboratory data were normal or negative: full blood picture, electrolytes, liver function, kidney function, plasma glucose, creatine kinase, serological tests for syphilis, tests for SLE, anti-HIV antibody, anti-HTLV-I antibody, lymphocytes lysozomal enzyme activities including beta-galactosidase, beta-hexosaminidase and sphingomyelinase A. Fasting plasma ACTH was 81 pg/ml (normal less than 65 pg/ml) while cortisol was normal. Serum cortisol response to ACTH (rapid ACTH test) showed a low response pattern. Cerebrospinal fluid was normal except for a raised protein (61 mg/dl). Very long-chain fatty acids in plasma sphingomyelin fraction were considerably increased, that is C24:0/C22:0 was 2.171 (normal (SD), 0.735 ± 0.131), C25:0/C22:0, 0.0380 [0.0143 ± 0.0039], C26:0/C22:0, 0.0199 [0.0057 ± 0.0017]. Brain CT showed atrophy of the cerebellum and the brain stem. MRI revealed abnormal intensity areas in both corona radiata, internal capsules, cerebral peduncles and white matter around the dentate nuclei of the cerebellum (fig 1) in addition to atrophy of the cerebellum and the brain stem (fig 2).

Pathological findings for ALD presenting as SCD include diffuse demyelination of the cerebellar white matter and the brain stem involving the internal capsule, corpus callosum and optic nerves. Marked loss of Purkinje cells and neurons of the dentate nuclei, and lesions in superior cerebellar peduncles have also been reported. In this patient, MRI clearly showed lesions in the pyramidal tracts and cerebellar white matter adjacent to the dentate nuclei, consistent with the clinical findings. The cerebellar lesions seen in this patient also shows one of the common pathological findings in the classic type of ALD, because a discrete lesion involving the cerebellar white matter adjacent to the dentate nucleus was reported in five of 17 necropsy cases. MRI in the classic type

Myasthenia gravis and thymoma in multiple endocrine neoplasia (MEN-1) syndrome

Multiple endocrine neoplasia (MEN-type 1) or Werner's syndrome is characterised by the
presence of neoplasms or hyperplasia involving endocrine glands. The organs most often affected are the parathyroids, pancreatic islets and pituitary gland. Occasionally neoplasms of the thymus gland have been reported in this syndrome.2' Myasthenia gravis is frequently associated with thymic hyperplasia and approximately 10-15% of the patients have a thymic tumour. Our patient presented with both thymus and myasthenia gravis. Physical examination showed a slightly overweight man (height 1.72 m, weight 85 kg) with little facial hair. Internal inspection showed no clinical abnormalities. Neurological investigation revealed slight dysarthria, bilateral ptosis, facial weakness and paresis of abduction and elevation of both eyes. These symptoms fluctuated, depending on the level of exertion. Lea raising was possible for 45 seconds, no other limb muscle weakness was present. Deep tendon reflexes were normal. The functional capacity of the lungs by spirometry was within normal limits.

Laboratory investigations demonstrated serum calcium level of 3-19 mmol/l; phosphate 0.84 mmol/l; chloride 101.4 mmol/l; magnesium 0.9 mmol/l; sodium 142 mmol/l. The serum creatinine was normal (0.06 mmol/l). Serum parathyroid hormone level was 11.7 pmol/l (N: less than 5 pmol/l). Proctolin 468 U/l (N: less than 0.3 U/l) and glucose 44 mmol/l; creatinine 281 U/l (N: 5-291 U/l); insulin 0.9 U/l (N: less than 10 U/l); serum gastrin and glucagon were normal, as 5HIAA in daily urinary excretion. Circulating antibodies to acetylcholine receptors were elevated 97 nM (N: less than 2 nM). Antibodies to acetylcholine receptor antibodies were positive. There was a normal EMG pattern of the abductor digiti quinti muscle after repetitive (3 Hz) and tetanic (20 Hz) stimulation. Edrophonium chloride (Tensilon) 10 mg given intravenously resulted in a marked temporary improvement of signs and symptoms. Computerised tomography (CT) of the thorax revealed a large dense, partly cystic, anterior mediastinal mass. CT of the sella turcica showed a pituitary tumour. On echocardiography and CT of the abdomen no tumour of the pancreatic islets was seen.

The patient had a median sternotomy. A mediastinal tumour (12.5 × 8 × 3 cm) was completely excised. Microscopically the classic histological features of a benign thymoma were present with both epithelial and lymphoid cells without argyrophilia or mitoses. The tumour cells positive for cytokeratin and antibodies to insulin, no other endocrinological activity could be demonstrated. Furthermore, a parathyroid adenoma was removed (1.5 × 0.5 × 0.3 cm) in the same session, the other parathyroid glands were normal. The patient made a slow recovery from thymectomy; some days he required intubation and mechanical ventilation because of respiratory insufficiency. On repeated postoperative examination his calcium, phosphate, insulin level and insulin/glucose ratio had normal values, the antibodies to acetylcholine receptors were reduced to 24 nM; anti-striated muscle antibodies were still positive. Nine months later he was considerably improved taking pyridostigmine 60 mg four times daily, and bromocriptine 2.5 mg twice daily. This case represents a combination of myasthenia gravis, a benign thymoma, hyperparathyroidism and a pituitary tumour, probably a prolactinoma. The coexistence of hyperparathyroidism and a pituitary tumour is characteristic of MEN-1 syndrome. The evolution of this syndrome may take years and it is inherited as an autosomal dominant trait with a very high degree of penetrance.4 The mother of our patient also had hyperparathyroidism. Less common findings reported in patients with MEN-1 syndrome included lipoma, carcinoid tumours, thymic tumours and pinealoma. The neoplasms of thymic origin mainly comprised carcinoid tumours and tumours with a relatively poor prognosis.4 None of these cases had myasthenia gravis. Only one other patient has been described with the combination of myasthenia gravis, thymomas and hyperparathyroidism; sporadic forme fruste of the MEN-1 syndrome was suggested by the author.4 Moreover, our patient had a pituitary tumour which underlines the diagnosis of MEN-1 syndrome. The insulin level and insulin/glucose ratio were slightly elevated, these values, however, did not prove to be a pancreatic islet tumour. Perhaps the thymoma was responsible for this disturbance as the tumour cells reacted positively with antibodies to insulin and the value returned to normal postoperatively.

The importance of this remarkable finding is not clear, but cell surface receptors for some poly peptide hormones have been mentioned in thymoma cells.7 This reaction was negative in five other thymomas that we have investigated in recent years. The association of tumours of the thymic and anterior mediastinal regions is not surprising as these structures have a common embryonic origin from the third pharyngeal pouch.

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