against any tentorial herniation as a cause of the oculomotor palsy.

Wilson et al. recently described three patients with internal carotid occlusions who also had transient oculomotor palsies, generally recovering within hours. However, pupil dilatation and ptosis were observed for up to three weeks. The most likely mechanism for transient ptosis was transient impairment of the nutrient circulation of the oculomotor nerves. For example, the oculomotor nerve receives its blood supply from an anastomotic plexus of small arteries which in turn is supplied from branches of the internal carotid artery to the cavernous sinus, from multiple branches of the maxillary artery, as well as from the ophthalmic artery anteriorly, and from the posterior cerebral and basilar arteries posteriorly. This rich blood supply from multiple sources could explain why oculomotor palsy is so unusual, even transiently, after carotid occlusions or carotid ligations for the treatment of aneurysms, since occlusion of several components of the nerve's nutrient supply is probably required to produce significant ischemia. Thus the oculomotor palsy in diabetes mellitus is diffuse, with segmental abnormalities in the vasa nervorum. Similarly, flow was absent in the ophthalmic and internal carotid arteries in our case and in those of Wilson et al. Whether the resulting oculomotor palsy is transient or permanent may perhaps depend on the adequacy of the collateral blood supply from the posterior circulation, or on the extent of segmental occlusion of the plexus of small vessels along the nerves themselves.

Penicillamine treatment of Wilson's disease and optic neuropathy

We report a case of optic neuropathy associated with penicillamine treatment of Wilson's disease.

A twenty six year old woman presented with a one year history of progressive shaking of her hands and four months of shaking of her head. As a result she had had to give up her work. There was a history of neurological or liver disease. She had a history of tachycardia and had taken diospyramide 100 mg three times a day for three years. A mitral regurgitation murmur had been noted in the past.

On examination her pulse was 80/min and regular, and blood pressure was 115/60. There was a mid and late systolic murmur

lodest at the left sternal edge. Higher functions were intact, but her manner was disinhibited. Visual acuity was 6/9 on the right and 6/6 on the left with normal fields. Color vision at 6/6 on the right and 6/6 on the left using pseudoisochromatic discs. Slit lamp examination showed Kayser-Fleischer rings. The other cranial nerves were normal. She had titubation, tremor of the upper limbs, worse on the right and right sided hypophonia and cogwheel rigidity of both wrists. Reflexes, power and sensation were normal.

Serum copper was 7.0 micromol/l (Normal: 12-26 micromol/l, caeruloplasmin 70 mg/l (Normal: 190-450 mg/l) and 24 hour urinary copper was 5.1 micromol/24 hours (Normal <0.8 micromol/24 hours). Biochemical screen, plasma glucose, and chest and skull radiographs were all normal. Haemoglobin was 119 to 136 g/l, white blood count 2.2 to 3.9 x 10^9/l with polymorphs 1.0 to 2.3 x 10^9/l and platelets 85 to 116 x 10^9/l. The bone marrow was mildly hypoplastic, with reduced numbers of erythroid and myeloid cells and megakaryocytes. A CT brain scan showed low densities in the thalami and cerebral peduncles. Echocardiography showed mild mitral valve prolapse.

A diagnosis of Wilson's disease was made and D-penicillamine 50 mg three times a day was started.

Three weeks after starting penicillamine the patient complained of failing vision. One week after starting treatment she had developed a "red light" in the centre of both visual fields and then progressive blurring of vision. On examination both optic discs were pale and both pupils reacted sluggishly to light. Corrected visual acuity was 6/24 on the right and 6/18 on the left. Near vision was N18 bilaterally. Visual evoked potentials (VEP) showed latencies of 102 ms on the right and 112 ms on the left (Normal <115 ms). Brainstem auditory (BAEP) and somatosensory evoked potentials (SSEP) were bilaterally delayed. The wave form of the BAEPs was small. Electrotactogram and autoinmune profile were normal.

Penicillamine was stopped and pyridoxine 50 mg twice a day was started. Nine days later near vision was 6/18 bilaterally. Visual acuity was 6/12 on the right and 6/18 on the left. Near vision was N18 bilaterally. Visual evoked potentials (VEP) showed latencies of 102 ms on the right and 112 ms on the left (Normal <115 ms). Brainstem auditory (BAEP) and somatosensory evoked potentials (SSEP) were bilaterally delayed. The wave form of the BAEPs was small. Electrotactogram and autoinmune profile were normal.

As a result of untreated Wilson's disease the patient developed delayed neurological deterioration and her vision improved with pyridoxine. Against this theory is a third case, which developed while on prophylactic pyridoxine. In all cases there was no improvement of the Wilson's disease with penicillamine treatment, making the Wilson's disease itself unlikely to be the cause of the optic neuropathy.

Optic neuropathy has been described in association with D-penicillamine treatment of chronic active hepatitis for two months and rheumatoid arthritis for six months and for a year. The last was associated with development of antinuclear antibody (titre of 1/320) and improved with steroids.

This case differs from the others described as the duration of treatment before the development of optic neuropathy is much shorter. Pyridoxine deficiency is unlikely, because of the low dose and short duration of treatment. The short history and negative autoinmune profile make autoimmune disease unlikely. Neurological deterioration in the first month of penicillamine treatment of Wilson's disease has been recognised recently and the time course in this case would be consistent although optic neuropathy has not been described in this situation. Involving of extrapyramidal signs is often seen in this syndrome, but was absent in this case. The neurological deterioration may be due to redistribution of copper. Trientine therapy has not been associated with neurological deterioration. Neuro-ophthalamic complications of desferrioxamine, including one case with optic neuropathy, have been associated with raised cerebrospinal fluid copper levels and attributed to redistribution of copper. Another explanation of the optic neuropathy in this case consistent with the short history would be an idiosyncratic hypersensitivity reaction. Although no such complication, physicians should regularly assess the visual acuity of their patients on penicillamine, particularly when starting treatment or increasing the dose.

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5 Fall HS, Williams AC, Blake DR. Deterioration of Wilson's disease following the start of penicillamine therapy. Arch Neurol 1989;46:359-60.

Serum erythropoietin levels in von Hippel-Lindau syndrome

No serum marker exists in von Hippel-Lindau syndrome (HLS), an autosomal-dominant inherited cancer-prone disorder
Penicillamine treatment of Wilson's disease and optic neuropathy.

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