Short report

Progressive supranuclear palsy and In¹¹¹-DTPA cisternography

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SUMMARY Three cases of progressive supranuclear palsy are reported in which In¹¹¹-DTPA cisternography showed slow diffusion, ventricular reflux and failure of isotope clearance. The clinical diagnosis of progressive supranuclear palsy was confirmed histologically in two of these patients. The possible causes of the cisternographic changes and their relationship to the changes of CSF dynamics in progressive supranuclear palsy are discussed.

Since 1961 progressive supranuclear palsy¹ has been investigated largely by neuroradiological techniques,² though to our knowledge^{3–5} Indium¹¹¹-DTPA scintiscisternography (In¹¹¹-DTPA SC) has been reported in only three cases.⁶ In these patients slow diffusion, ventricular reflux and failure of isotope clearance were interpreted as evidence of normal pressure hydrocephalus. Ventriculoperitoneal shunting afforded only temporary improvement in gait, mental function and bladder control. The clinical diagnosis of progressive supranuclear palsy was not supported by pathological studies.

We report three further cases of progressive supranuclear palsy in which In¹¹¹-DTPA SC scans yielded the same results as in the patients described by Morariu,⁶ a point of interest because in our cases there could be no doubt about the diagnosis, supported by the necropsy evidence in two cases and by an absolutely typical course until death in the third.

Case reports

Case 1 A 62-year-old man had shown signs of mental deterioration, slow gait and masklike facies 3 years before admission and, more recently, he had had several falls. On admission his head was extended, the trunk was bent forward and he was unable to stand. His expression was masklike with staring gaze, knitted brows, eyelid retraction,

doll's head phenomenon in all directions and absence of upward and lateral gaze. Tendon reflexes were brisk and the palmo-mental reflex was present bilaterally. The patient had rigidity, bradykinesia and mental deterioration, this taking the form of poverty of judgment, slow responses and delay in obeying instructions. CT showed cerebral atrophy and ventricular dilatation (fig a). In¹¹¹-DTPA SC showed isotope in the ventricles after 3 h (fig b). Twenty one hours later activity was still detected in the lateral ventricles and had not reached the parasagittal area. (fig b) Ventricular reflux was present and isotope clearance was very slow. The patient died 15 days later. Gross examination revealed diffuse atrophy of the cortex and atrophy of the midbrain tegmentum. Histological examination of the brain disclosed a marked decrease of substantia nigra cells, neurofibrillary degeneration and gliosis of the periaqueductal grey. Neurofibrillary degeneration and gliosis were also present in the pallidum, dentate nucleus, subthalamic nucleus of Luys, pretectal and vestibular nuclei (fig c). There was moderate cortical atrophy but the structure of the cortex was still present. Definite demyelination of the hilus of the dentate nucleus was also observed.

Case 2 A 66-year-old man was admitted to hospital with a 2 year history of unsteady gait, progressive mental deterioration and incontinence of urine. The neurological findings were: spastic facies, no blink reflex, blepharospasm, absence of downward gaze, severe restriction of lateral eye movements, anisocoria (R > L) and doll's head phenomenon; plastic rigidity of all limbs, brisk reflexes and bilateral Babinski sign; palmo-mental reflex, brisk jaw reflex, snout reflex and grasp reflex were also present. The voice was hoarse and monotonous and mental deterioration was noticeable. Verbal responses were very slow with no interest in surroundings and no emotions. In¹¹¹-DTPA SC showed ventricular reflux and failure of isotope clear-

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Fig (case 1) (a) CT scan showing enlargement of the ventricles. (b) In^{111} -DTPA cisternography at 3 hours and at 21 hours showing the slow clearance of the tracer with ventricular visualisation. (c) Neurofibrillary degeneration in the cells of the locus coeruleus (Azan Mallory, $\times 180$).

ance after 44 h. The patient died 13 days later. Necropsy disclosed diffuse cerebral atrophy and marked atrophy of the brainstem tegmentum. Histological examination revealed diffuse fibrillary degeneration of the residual neurons, mainly in the locus coeruleus, in the periaqueductal grey and in the substantia nigra, which was depigmented bilaterally. There was also diffuse gliosis.

Case 3 A 67-year-old man had enjoyed good health for 60 years, after which he developed progressive mental deterioration, unsteady gait and frequent falls. Examination on admission showed a hoarse monotonous voice, dysarthria, dysphagia, incontinence of urine and, as in the other cases, mental deterioration with the characteristics of subcortical dementia. The neurological findings were: mild spasticity of the right limbs and a right Babinski sign, snout reflex and bilateral palmomental reflex, eyelid retraction, restriction of eye movements and absence of downward gaze, limb muscle atrophy and fasciculations. In In^{111} -DTPC SC showed ventricular reflux and failure of isotope clearance after 36 h. The patient deteriorated steadily until he died 3 months after the procedure. Permission for necropsy was refused.

Discussion

Since 1980 nine out of 38 patients who underwent In^{111} DTPA SC in our department and whose

neurosurgical workup had excluded the need for ventriculoperitoneal shunting presented all three signs of serious alteration of the CSF flow: delayed ascent of the tracer, reversal of flow with filling of the ventricles and delayed isotope clearance.⁷ Of these nine cases five are still living and the diagnosis is still *sub judice*. Of the four patients who died one had diffuse cerebral vascular atrophy. The other three were the cases reported above, which confirm the scintiscan findings of Morariu⁶ in progressive supranuclear palsy, by showing severe alteration of the CSF dynamics, at least in the more advanced stages. This may be due to the process of destruction of the parenchyma and consequent atrophy. Radioisotope studies of CSF flow in cortical atrophy⁸ and in degenerative processes of the posterior cranial fossa⁹ have shown identical changes. The pattern of change may depend on the process of cerebral or subtentorial atrophy with attendant anatomical changes such as dilatation of the cortical sulci, documented by CT in two of our cases and in those of Morariu.⁶

It may be of interest that of the other 29 patients studied, whose scans were negative or doubtful, nine had Parkinson's disease and six advanced dementia

syndromes. To understand the meaning of the scintiscan findings in progressive supranuclear palsy it would be useful to perform serial investigations in the same patient at different stages of the disease.

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