

# Unsuspected organic disease in chronic schizophrenia demonstrated by computed tomography

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**SUMMARY** Unsuspected intracranial pathology was demonstrated in 12 of 136 chronic schizophrenic patients examined by computed tomography (CT). Seven cases of cerebral infarction were found, and one each of porencephalic cyst, meningioma, cystic enlargement of the pineal body, and two of subdural haematoma. Attention is drawn to the value of CT in demonstrating organic disease in schizophrenia.

While the role of computed tomography (CT) in neurology and neurosurgery is established, the value of this technique in psychiatry is not yet clear. So far its main application in the investigation of major psychotic illness has been to detect structural change in the brain manifest as cerebral atrophy. Previous CT studies have shown a relationship between cognitive impairment and ventricular dilatation in selected chronic schizophrenic patients<sup>1,2</sup> and also that schizophrenic patients may exhibit a degree of ventricular dilatation.<sup>3</sup> We present details of clinically unsuspected intracranial disease demonstrated in a group of chronic schizophrenic patients scanned to assess the prevalence and degree of cerebral atrophy in relation to history, clinical findings and past treatment. The CT findings of a subgroup of 10 patients who had undergone leucotomy have been presented elsewhere.<sup>4</sup>

## Materials and methods

Five hundred and ten in-patients and 120 out-patients discharged from the same hospital over a five year period were selected on the basis of conformity to standardised criteria for schizophrenia.<sup>5</sup> In-patients scanned were randomly selected members of matched subgroups who agreed to the procedure. The subgroups were constructed on the basis of clinical state, exposure to past physical treatments (namely insulin coma, electroconvulsive therapy (ECT), neuroleptic drugs or none of these, leucotomy being considered separately), age and past academic record. Where

one patient refused, the next on the list was selected. In this way 118 in-patients were scanned. Eighteen out-patients were selected by matching for age, length of illnesses, and past treatment with the in-patients. All examinations were performed on an EMI CT5005 whole body scanner at 120 kVP using a 65 second scan time and the scans were examined on an EMI Mk II independent viewing console.

## Results

The abnormalities detected by CT are listed in table 1. Clinical findings, treatment details and the CT findings are summarised in table 2. Seven of the patients showed discreet focal low density areas compatible with cerebral infarction, three of which were multiple. One patient with a left fronto-parietal infarct (patient 7) also showed ventricular dilatation with evidence of progression over a four year period. Patient 8, despite no history of birth trauma or neonatal difficulties, gave a life-long history of spasticity on the left and showed signs of a mild left hemiparesis on examination. Her scan showed right-sided cerebral atrophy with minimal midline shift to that side and a 5×3 cm right porencephalic cyst.

A planned out-patient scan in patient 9 was pre-empted by her compulsory admission following deterioration in both her mental state and

Table 1 *CT diagnoses*

<i>Diagnosis</i>	<i>Number of cases</i>
Cerebral infarction	7
Porencephalic cyst	1
Meningioma	1
Subdural haematoma	2
Large pineal body	1

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Accepted 6 August 1980

Table 2 Clinical findings, treatment and CT findings

Patient no	Sex	Age at first admission (yr)	Duration of current admission (yr)	History of cerebral trauma	Previous treatment		Mental state	Neurological findings	CT findings		
					Number of insulin of ECTs	Number of phenothiazines comas					
1	F	66	26	40	Nil	0	0	No	Withdrawn. Emotionally flat stable course	Akinesia and rigidity	Bilateral parietal infarcts 2 × 2 cm on left and 2 × 1.5 cm on right. Bilateral triangular 3 × 2 cm occipital infarcts.
2	F	67	20	47	Unknown	0	44	Yes	Withdrawn. Stable course	Spontaneous movements of face and upper limbs. Akinesia and posturing of fingers	2 × 1.5 cm infarct in left parietal region. 1.5 × 1.5 cm infarct in right occipital lobe.
3	F	58	32	26	Nil	99	10	Yes	Occasional ill-sustained ideas of influence. Minimal emotional flattening. Stable course.	Mild spontaneous movements of lower limbs. Akinesia.	1.5 × 1.5 cm infarct in right posterior parietal region. 2 × 1.7 cm infarct in right temporal lobe.
4	F	76	39	37	Nil	0	0	Brief	Marked withdrawal. Emotional flattening and fluctuating course.	Rigidity.	2 × 2 cm right parietal infarct.
5	M	49	16	8	Minor head injury as child.	0	0	Yes	Constant hallucinations and delusional ideas. Stable course.	Nil	2 × 2 cm right frontal infarct.
6	M	49	21	28	Nil	0	0	Yes	Partial delusions. Stable course.	Nil	1 × 1 cm left frontal infarct lateral to the head of the caudate nucleus.
7	M	58	21	33	Nil	114	8	Yes	Gross affective flattening and withdrawal stable deteriorated condition.	Rigidity and flexed posture. Spontaneous movements of lips and stereotyped rocking.	Moderate ventricular dilation and cortical atrophy. Follow-up 4 years later showed increased cerebral atrophy and a 3 × 2 cm left fronto-parietal infarct.

8	F 46 20	9	No specific mention of birth difficulty but mild left hemiparesis from birth	89	3	Yes	Constant hallucinatory experiences.	L hemiparesis	5 × 3 cm right parieto-temporal porencephalic cyst. Mild right cerebral atrophy.
9	F 71 60	Out-patient	Nil	0	0	Yes	Constant preoccupation with auditory hallucination and pronounced delusions. Severe exacerbation on stopping neuroleptics.	Nil	Dense homogeneous 2 × 1.8 cm space occupying lesion attached to dura over left frontal bone.
10	M 62 25	37	Road traffic accidents 6 weeks prior to CT scan.	0	16	Yes	Regular intense hallucinatory experiences. Fluctuating course.	Spontaneous "frowning" movements of face. High myopia.	0.8-1 cm low density between skull and fronto-parietal surface of the left hemisphere with slight displacement of the midline to the right and flattening of the cerebral sulci on the left. Follow-up 4 weeks later show decrease in thickness to 0.3-0.5 cm.
11	M 65 26	39	Nil	0	0	No	Emotional flattening retardation social and withdrawal. Stable course.	Rigidity. Mild pescausus.	0.7-1 cm thick low density lesion over left fronto-parietal cortex with slight displacement of the midline to the right.
12	M 41 11	10	Nil	0	0	Yes	Partial delusions and intermittent hallucinations.	Nil	1.5 cm cystic pineal body with calcification in the wall.

behaviour. A routine admission skull X-ray showed parasagittal calcification and the CT scan showed an area of contrast enhancement in the right frontal region compatible with a meningioma.

Two patients with unsuspected subdural haematoma were found. In patient 10, there was a 0.8–1 cm region of low density between skull and fronto-parietal surface of the left hemisphere with associated flattening of the cerebral sulci and displacement of the midline to the right, while patient 11 showed a 0.7–1 cm diameter low density lesion over the left fronto-parietal cortex with slight displacement of the midline to the right. Despite a recent accident in the former patient, these scans were performed as a routine part of the research project, the subdural haematoma being unsuspected in each case. The scan of patient 12 showed cystic enlargement of the pineal body.

### Discussion

The abnormalities reported here were unsuspected prior to the CT scans, apart from patient 8 (congenital spasticity) where some intracranial pathology was anticipated on a clinical basis. However, in two cases retrospective examination of the case notes identified episodes compatible with the cause. Patient 10 had a road traffic accident six weeks previously which was the cause of the subdural haematoma. In patient 1 (multiple infarction) an acute episode was recorded three years previously. Prior to this she was independent; however, after losing her way home on one occasion she was observed to be much more disorganised in her behaviour and marked visual impairment also was noted. She burned her forehead and hair trying to light a cigarette. This was attributed to bilateral cataracts for which she underwent operation two years prior to her CT scan with some improvement, though her vision still remains poor. Ophthalmological examination revealed no evidence of a visual field defect.

Cystic enlargement of the pineal body is an unusual abnormality. Such lesions usually only become symptomatic by blocking the aqueduct from compression superiorly. The functional status of this enlarged pineal is not yet known. Physically, the patient appears to be a normal adult male. However, it is of some interest that his somewhat atypical and distinctly cyclical psychosis developed first at a very young age, around early puberty.

Cerebral neoplasm on the other hand is not

infrequently found in psychiatric populations, though whether or not they present an increased prevalence compared to non-psychiatric groups is unclear.<sup>6</sup> Among 1200 chronic schizophrenic patients subjected to a routine skull X-ray, Kraft *et al*<sup>7</sup> found evidence of cerebral tumour in three. There is general agreement<sup>8,9</sup> that meningiomas contribute twice as many intracerebral neoplasms in psychiatric patients as they do in non-psychiatric patients. Meningioma can present with psychiatric symptomatology, which may resemble that of schizophrenia if the tumour is in certain frontal sites.<sup>10</sup> This raises the question as to whether patient 9 was primarily schizophrenic. It is impossible to be certain on this point but her positive family history of paranoid psychosis, and the general practitioner's history of two decades of suspicious "paranoid" behaviour suggest that the tumour may be coincidental. However, a slow-growing lesion can produce its clinical effects over many years (up to 43 years in one of Hunter's cases<sup>10</sup>). As the patient refused operative intervention, the point is unlikely to be clearly established.

None of the patients with CT changes suggestive of infarction had obvious localising neurological signs. While the prevalence of clinically manifest stroke appears to have declined in recent years,<sup>11</sup> the frequency of undetected cerebral infarction remains unknown.

The only other CT study to provide similar information is that of Jacob *et al*<sup>12-14</sup> They reported incidental findings in a group of 41 clinical demented, 40 affectively ill patients and 40 normal controls (all over 60 years of age), being scanned for signs of cerebral atrophy. In this study one neoplasm (a corpus callosum glioma) and one chronic subdural haematoma were found, both in demented patients. They also found CT changes suggestive of infarction in 10 patients with dementia, three with affective disorder and one normal subject. Only one of these abnormalities was suspected because of a history of a post-operative stroke. The total prevalence of probable unsuspected infarction in all their patients was 10.7% compared to 5.1% in our much younger sample.

Thus we found a considerable degree of unexpected pathology in this sample of 136 chronic schizophrenic patients. CT is a safe procedure, but of equal merit in a frequently disturbed population is the ease with which it can be performed, especially where the clinical state gives rise to any suspicion of sudden change. Such change is not always due to psychological factors and this is particularly important in

patients who by the nature of their illness possess an impaired capacity to present symptoms.

We are grateful to Mr MD Saunders for examining patient 1 and to Dr J Ambrose for his opinion on the CT scan of patient 12.

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