Computed tomography in psychiatric patients

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Summary

In a retrospective study of 100 consecutive adult psychiatric patients referred for computed tomography (CT) for suspected intracranial lesions, abnormalities were found in 61%. Of these, 23% had focal lesions significantly associated with alcohol abuse, previous craniocerebral trauma and focal neurological signs. Detection of focal lesions influenced patient management in over half the cases. No single factor was able to predict all patients with focal lesions and the correlation between electroencephalogram and CT results was weak. If criteria for CT in psychiatric patients are too restrictive, some cases of occult brain disease may escape detection.

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Computed tomography (CT) of patients with psychiatric symptoms has shown that many have structural brain disease.[1-5] In the majority of these cases the abnormal findings consisted of diffuse cerebral atrophy, the significance of which remains largely uncertain.[6] However, certain patients with focal cerebral lesions present initially with psychiatric manifestations and demonstration of the lesions may profoundly alter their management and outcome. Because it is impractical to undertake routine CT to identify these patients, various selection criteria have been proposed.[2,3,7]

Certain of these criteria have been adopted, and the case notes of 100 such patients reviewed in an attempt to determine what clinical features could be useful in identifying those in whom intracranial lesions may coexist.

Patients and methods

The study group comprised 100 consecutive adults referred for CT from the psychiatric inpatient unit of Tygerberg Hospital between January 1983 and November 1984. CT was requested when it was believed that a distinct possibility of an intracranial lesion existed. The hospital notes, including psychiatric files, were scrutinized for clinical features known to be associated with structural brain disease. Hereafter these features will be referred to as 'risk factors'. If available, the report of an electro-encephalogram (EEG) was also annotated. According to the diagnosis at presentation, patients were allocated to one of three groups: organic brain syndrome, functional psychosis and neurotic disorder.

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CT was performed on a Siemens Somaton 2 whole-body scanner. The 100 CTs were reviewed and assessed by P.S.H.B. in the absence of clinical information and without reference to the original reports. Using visual inspection only, patients were allocated to one of three groups: normal appearance, evidence of focal lesion(s) and presence of diffuse abnormality, i.e. cortical atrophy or ventricular dilatation or both.

Statistical analyses were undertaken using the chi-square measure of association, Fisher's exact test and the McNemar test of symmetry. A standard significance level of 0,05 was used throughout.

Results

Eighty-two of the patients were coloured and 51 were men. Overall, their ages ranged from 18 to 72 years (mean 34,1 years). These 100 patients represented 5,7% of all adult admissions to the psychiatric unit during the 23-month period reviewed. Sixty-one patients had abnormal CT scans, 38 with diffuse abnormalities alone and 23 with focal lesions. Of the group with focal lesions (Table I), 11 showed diffuse abnormalities in addition. Among the patients with cerebral calcifications, 1 had bilateral symmetrical medial temporal lobe lesions associated with lipoid proteinosis (reported in detail elsewhere[8]) and 6 had numerous small scattered lesions typical of cerebral cysticercosis.

In Table II, patients are grouped according to their presenting diagnosis. Table III records the CT results of patients in whom 'risk factors' were present.

An EEG was performed in 54 of the 100 patients. Table IV compares the EEG results with those of CT. When focal and diffuse abnormalities of each of the investigations were grouped, the EEG was shown to be a poor predictor of CT abnormalities (McNemar test of symmetry (chi-square = 5,538; 1 df; $P = 0,0186$)).

Discussion

In this study, abnormal CT scans were found in 61% of 100 consecutive patients with psychiatric symptoms in whom the investigation was requested to rule out intracranial lesions. The outstanding feature when compared with other similar studies[1-5] is the high incidence (23%) of focal lesions detected. There are various possible explanations for this finding. For example, it could indicate a particularly selective approach in referring patients for CT. As this is a retrospective study, this possibility can neither be affirmed nor refuted. Additionally, these results could reflect a greater prevalence of cerebral disorders in the population involved. A very high rate of alcohol abuse has been reported among such individuals,[9] and alcohol abuse has been associated with strokes in young adults[10] and with trauma.[11] Furthermore, cerebrovascular accidents and trauma are listed among the commonest causes of death in the coloured community.[12]

In the majority of patients, the presence of focal lesions was associated with the presence of one or more 'risk factors', reaching levels of significance for the factors of alcohol abuse, craniocerebral trauma and — especially — focal neurological signs (Table III). However, in 5 such patients none of these factors was found to be present. Noting that in their study all 6 patients with focal lesions on CT had localizing signs on

neurological examination, Larson *et al.*[2] concluded that CT should be limited to this group only in order to save costs. The findings of the present study suggest that this approach may be too restrictive.

The discovery of focal lesions had a major impact on the management of more than half of these patients. By way of illustration, those with cerebrovascular lesions were further investigated for pathogenetic factors; the patients with the tuberculoma and subdural haematoma underwent surgery, and the patient with basal meningitis received a course of antimicrobial therapy. The findings in 6 patients of calcifications typical of cysticercosis could be coincidental, since the preval-

TABLE I. DETAILS OF THE 23 PATIENTS WITH FOCAL CT ABNORMALITIES

Age (yrs)	Sex	CT	Presenting diagnosis	'Risk factors'	EEG
33	F	Calcification	Delirium	T	Normal
41	F	Calcification (in basal ganglia)	Delirium	A	Normal
47	M	Calcification + atrophy	Delirium	A	Not done
48	M	Calcification + atrophy	Dementia	N	Normal
18	F	Calcification	Organic personality syndrome	S	Abnormal (D)
42	M	Calcification + atrophy	Depression	Neg.	Normal
18	F	Calcification (bilateral medial temporal)	Atypical psychosis	Neg.	Normal
53	F	Calcification	Atypical psychosis	Neg.	Not done
30	F	Calcification (tuberculoma)	Atypical psychosis	NS	Abnormal (F)
34	M	Infarct + atrophy	Delirium	A	Not done
23	M	Infarct	Schizophrenia	AT	Abnormal (D)
20	M	Infarct + atrophy	Schizophrenia	Neg.	Not done
51	F	Infarct + atrophy	Depression	N	Not done
20	F	Infarct + atrophy	Conversion disorder	N	Normal
24	M	Infarct	Conversion disorder	S	Normal
40	M	ICH + atrophy	Delirium	AT	Abnormal (F)
47	M	ICH	Delirium	ATS	Not done
36	M	ICH + atrophy	Delirium	A	Not done
61	M	ICH + atrophy	Delirium	A	Not done
32	F	ICH	Conversion disorder	N	Abnormal (F)
34	F	Subdural haematoma	Delirium	ANT	Not done
27	F	Basal meningitis	Conversion disorder	N	Abnormal (D)
53	M	Porencephalic cyst + atrophy	Atypical psychosis	Neg.	Normal

ICH = intracerebral haemorrhage; S = seizures; T = trauma; D = diffuse; A = alcohol abuse; F = focal; N = neurological signs; Neg. = negative.

TABLE II. PRESENTING DIAGNOSIS AND CT RESULTS OF 100 PATIENTS

Diagnosis	Total	CT results (%) Normal	Focal	Diffuse
Organic				
Delirium	32	21,9	28,1	50,0
Dementia	6	16,7	16,7	66,7
Personality syndrome	3	33,3	33,3	33,3
Hallucinosis	2	50,0	—	50,0
Total	43	23,3	25,6	51,2
Functional				
Schizophrenia	9	55,6	22,2	22,2
Affective disorder	17	53,0	11,8	35,3
Other psychosis	15	33,3	26,7	40,0
Total	41	46,3	19,6	34,1
Neurosis				
Conversion disorder	14	64,3	28,6	7,1
Anxiety disorder	2	50,0	—	50,0
Total	16	62,5	25,5	12,5

TABLE III. ASSOCIATION BETWEEN 'RISK FACTORS' AND ABNORMAL CT RESULTS IN 46 PATIENTS

		CT results		
			Abnormal	
Risk factors	Total	Normal (%)	Diffuse (%)	Focal (%)
Alcohol abuse	**26**	**4 (15,4)**	**13 (50,0)***	**9 (34,6)***
Seizure	**12**	**5 (41,7)**	**3 (25,0)NS**	**4 (33,3)NS**
Craniocerebral trauma	**9**	**1 (11,1)**	**2 (22,2)[I]**	**6 (66,7)****
Neurological signs	**8**	**0**	**1 (12,5)[I]**	**7 (87,5)*****

*$P < 0{,}001$ ($\chi^2 = 14{,}07$, 2 df).
**$P < 0{,}001$ (Fisher's exact test).
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NS = not significant (Fisher's exact test).
[I] = Insufficient numbers for statistical analysis.

TABLE IV. COMPARISON OF EEG AND CT RESULTS IN THE 54 PATIENTS

		CT results		
			Abnormal	
EEG	Total	Normal (%)	Focal (%)	Diffuse (%)
Abnormal (F)	**6**	**1 (16,7)**	**3 (50,0)**	**2 (33,3)**
Abnormal (D)	**14**	**6 (42,9)**	**3 (21,4)**	**5 (35,7)**
Normal	**34**	**15 (44,1)**	**8 (23,5)**	**11 (32,4)**

F = focal; D = diffuse.

ence of asymptomatic cerebral cysticercosis in this population group has not been established. However, mental symptoms are very frequently encountered in this disorder,[13] and an association in our cases is indeed possible. This possibility notwithstanding, further investigation or possible treatment[14] of these patients was felt not to be warranted.

As might be expected, the greatest incidence of CT abnormalities was found in patients with an organic brain syndrome. This serves to emphasize the importance of the mental state examination in the assessment of patients presenting with psychiatric symptoms of this nature. The 4 patients initially diagnosed as hysterical conversion disorder constitute a further subgroup that merits comment. All were aged under 33 years, 3 were women and each was found to have a focal lesion, which in retrospect was judged to have been responsible for their symptoms. This underscores the need for exercising extreme caution in the diagnosis of hysteria and for avoiding biased judgements based on the patient's age and sex.

Cerebral atrophy was judged to be present in approximately half our patients. The mean age of these patients was 40,1 years, which although older than the mean 34,1 years of the study group as a whole is remarkably young. Only 5 of these patients had a clinical diagnosis of dementia[15] and it may be relevant that 13 of them had a history of alcohol abuse.[16] Other factors could well be involved, however, since cerebral atrophy is a nonspecific finding, and one that has been reported in a variety of psychiatric disorders.[17-20]

Our finding that the EEG is not a useful predictor of structural brain disease (as judged by CT) accords with that of Tsai and Tsuang.[3] An EEG recording is demanding of time, personnel and patient co-operation and we suggest that, when available, CT should be the investigation of choice for such evidence.

In conclusion, we have affirmed the findings of previous studies that a substantial number of patients presenting with psychiatric symptoms have underlying structural brain disease and that certain clinical features are helpful in predicting those harbouring focal intracranial lesions. This study has also indicated that detection of these lesions can have important implications for further patient management, but that some intracranial lesions may escape detection if criteria for CT of psychiatric patients are too restrictive.

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