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Cranial Computed Tomography Study of Patients with Acute Confusional States

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ABSTRACT

Objectives. To study the neuro-imaging findings in patients with acute confusional (AC) states with a view of diagnosing the organic conditions that cause AC.

Setting. Radiology Department of a University Teaching Hospital.

Method. Retrospective analysis of brain computed tomography (CT) films, radiology and medical records of patients who underwent CT scans on account of AC. The study of brain CT scans were conducted over a three-year- period (from 1st March 2001 to 28th February 2003).

Result. Twenty five patients, (12 males and 13 females) who were referred to the CT scan unit of a University Teaching Hospital had their CT scan findings and presenting symptoms studied. The patients' age range was from 40 to 69 years, with the 65 to 69 years having the highest frequency of 7 (28%) and the mean age was 63 +/- 6 years. All the patients presented with acute confusional (AC) states. In addition to AC states, other symptoms or presenting history were hallucination observed in 9 patients (36%), stroke in evolution seen in 5 patients (20%), coexisting diabetes and hypertension 4 patients (16%), electrolyte imbalance in 3 patients (12%), drug ingestion/intoxication 2 (8%), vomiting and neck pain 1 (4%) while 1 (4%) patient presented with history of steroid therapy. In the CT scan findings, 22 patients (88%) had abnormal while 3 patients (12%) had normal findings. The commonest findings were multiple areas of acute cerebral infarction with focal areas of post infarction atrophy in 10 (40%) patients, acute intracerebral haemorrhage with areas of previous focal chronic infarction in 5 (20%), acute intracerebral haemorrhage in 3(12%), and subacute large thrombotic unihemispheric infarct in 2 (8%) patients. There were acute intraventricular haemorrhage in 1(4%) patient and generalised cerebral atrophy in 1 (4%) patient.

Conclusion. CT scan can help in early diagnosis of the organic and treatable conditions that cause AC states instead of grouping all the diagnoses together as chronic progressive dementias. From the result, 88% of the patients had organic intra-cerebral lesions causing AC and many of them are treatable and preventable. Where they are available and when the patients can afford them in developing countries, neuro-imaging studies are advised in elderly patients with AC states for early diagnosis of treatable conditions that cause AC states.

KEY WORDS: Acute, Confusion, Delirium, Computed Tomography, Head.

INTRODUCTION

Acute confusional (AC) states also referred to as acute delirium (AC/Delirium) is a complex organic mental disorder often associated with severe somatic diseases and seen mostly in the elderly[1]. Since most patients are elderly, it is often attributed to dementia and depression[1,2,3] which it is not. Several aetiological factors have been attributed to it including psychological, physiological, organic, environmental and psychiatric [4]. Several researchers using clinical examinations, laboratory tests and

radiological studies have identified several organic causes including acute hypoxia[5], stroke and paraneoplastic syndrome[6], non-convulsive status epilepticus[7], heart failure[6,8], dehydration and volume depletion[9], infectious diseases[10], migraine[11], electrolyte imbalance[7,] adenitis and pulmonary tuberculosis[12], acute myocardial infarction[13], basilar artery and cerebral artery thrombosis[14], acute urinary retention[15], barotrauma[16], pressure ulcer/ sores[5,17], pulmonary embolism[5], cancers[3] and hip fractures[17].

There have been numerous clinical, psychological and psychiatric assessment methods using different scales to diagnose acute confusional states based on psychological, psychiatric, neurological and socio-economic parameters to score the patients[3,6,8,14,17,18,19,20]. The findings of several researchers showed that clinical assessment by psychiatrists, nurses and other physicians with all of them reaching a consensus is superior to each individual assessment of acute confusional states because of the transient, ubiquitous and fluctuating course of the condition[18,19,20,21]. Radiological assessment including using neuro-imaging modalities like computed tomography (CT) scan, magnetic resonance imaging (MRI), and angiography to determine the structural causes of AC states have been poor[5,8,14,16].

The effect of confusion and coma on prolonged hospital admission especially of patients with chronic debilitated illness with immobility has also been advocated as a cause of AC states. However the effects of chronic immobility like embolic events on the brain have received only little attention[2,6,9,14,17]. Patients with conditions such as AIDS, cardiac failure, carcinomas, hip fractures, hyperthyroidism and who develop AC states have been frequently assessed on the effects of these conditions on the patients' psychological state for development of AC states without corresponding neuro-imaging assessment of the acute effects of these conditions on the brain for development of AC states[3,6,8,14]. Some researchers have attributed the poor recognition of AC states to lack of standard methods of assessment by psychologists, psychiatrists and clinicians, who, most of the time are inadequately trained, unskilled and cannot apply the test scale accurately, lack high index of suspicion necessary before application of assessment scales[6,20,21,24]. These, partly contributed to the low request by clinicians for neuro-imaging assessment.

MATERIALS AND METHODS

The study consisted of retrospective analysis of the case notes, CT scan request cards and CT scan reports of twenty-five (25) patients who had CT scan done on them from 1st March 2001 to 28th February 2003 at a University Teaching Hospital presenting with symptoms of acute confusional states. The patients were referred by several physicians and were thought to have lesions that CT scan could diagnose. The CT scans were all cranial CT scans with axial 2 mm, 5 mm or 10 mm cuts or slices. A few patients also had coronal cuts for suspected orbito-ocular lesions. Both pre-contrast and post-contrast scans were done except in patients with acute haemorrhage in which case no contrast medium was given and therefore no post-contrast scan was done. The CT scan cuts or slices were done by 3 different imaging scientists under the supervision of 4 different senior registrars and three consultants.

The CT scan films were reported by 3 different consultants after reaching a consensus.
The case notes and CT scan request cards were studied to find out the age, sex, presenting complaint and other co-existing chronic conditions.

RESULT

The age range of the patients was 40 to 69 years with mean age of 63 +/- 6 years (table 1). The age range of 65 to 69 years had the highest frequency (n = 7). Twelve patients (48%) were males while thirteen patients (52%) were females with male to female ratio of 1:1. All the patients had acute confusional states diagnosed by consensus agreement of nurses, psychiatrists and physicians in the clinic using different appropriate clinical scales.

The symptoms that were associated with AC which necessitated the request for CT scan are summarized below (table 2). Nine patients (36%) presented with hallucination, 5 (20%) with stroke in evolution, 4 (16%) with

coexisting diabetes and hypertension, 3 (12%) with electrolyte imbalance, 2 (8%) with drug ingestion/intoxication, 1 with (4%) vomiting and neck pain while 1 patient (4%) presented with steroid therapy. Stroke was the diagnosis the referring physicians wanted to exclude in 81% of the patients with AC states referred for CT scan in this study.

In the findings on CT scan of the brain, 3 patients (12%) had normal and 22 patients (88%) had abnormal structural findings. Among those with abnormal structural findings, 10 patients (40%) had multiple areas of cerebral infarction with focal areas of post infarction atrophy. This appeared as focal hypodense areas with dilatation of ventricles and sulci. Among the ten patients with this, five of them (50%) had symptoms of stroke in evolution, 3 patients (30%) presented with hallucination while 2 patients (20%) were chronic hypertensive and diabetics with symptoms of AC states.

Also in the CT findings, 5 patients (20%) had acute intracerebral haemorrhage together with areas of previous focal chronic infarctions. Among these 5 patients, 3 patients presented with hallucination while 2 patients presented with symptoms of drug intoxication.
Acute intracerebral haemorrhage alone (Figure 1) was found in 3 patients (12%) of which 2 presented with hallucination and 1presented with vomiting and neck pain.

Three patients (12%) had normal CT scan and these were three patients with electrolyte imbalance. Two patients (8%) had subacute cerebral infarct (Figure 2) confined to one cerebral hemisphere and all the 2 patients presented with diabetes and hypertension associated with AC states. Only 1 patient (4%) had acute intra-ventricular haemorrhage (table 3); this patient had hallucinations associated with AC states. Generalized cerebral atrophy (Figure 3) was seen in only one patient (4%) aged 40 years who had been on continuous four years' high dose steroid therapy.

DISCUSSION

Acute confusional states is prevalent in both hospitalised, institutionalised patients and the general public[2,3,5]. However, it is frequently under-diagnosed because many doctors lack adequate training, skill and high index of suspicious for its diagnosis[6,20,21,24]. Thurston[21], advocated that the same energy devoted to the diagnosis of such lesions as acute severe asthma, acute coma, epilepsy and haematemesis should be applied to diagnosis of AC states, because several causes are life threatening, needing urgent attention both in nursing, intensive care and monitoring of patients.

The age of the patients seen in this study (table 1), is less than that seen in most European studies[1,6,8,9,10,17]. This may be related to the high cost of CT scan in our centre which is about 5 times the minimum wage of workers in Nigeria. It is also known that in Africa, many patients above 70 years are thought as old and should be allowed to pass on so that useful scarce resources should not be spent on such expensive investigation as CT scan. Therefore, Africans tend to spend less in the health of the old people and sometimes the patients themselves advise against expensive medical investigations on them. The increased mortality of Nigerians with organic brain syndrome may also be responsible for the reduced age in this study.

The disturbance of hallucination (36%) or the fear of the outcome of such diagnosis as stroke in evolution (20%), on the relations of patient may have encouraged them to seek medical attention and willing to pay for the CT scan in 14 of the patients (56%) studied (table 2). Patients with symptoms of diabetics and hypertension, electrolyte imbalance, drug intoxication[1,6,8,9,22], presented disturbing symptoms to the clinicians that necessitated the request for CT scan (table 2). Stroke was the diagnosis the clinicians wanted to exclude in 81% of the requests for CT scan.

From the result of the CT findings (table 3), it can be seen that 10 patients (40%) had multiple areas of cerebral infarction with focal areas of post infarction atrophy. Also 5 patients (20%) had acute intracerebral haemorrhage together with areas of previous focal chronic infarctions. These two groups make up 15 of the 25 patients (60%) in the study. The common features in these two groups are recurrence of infarct or

haemorrhage in the presence of previous lesions. Accurate neuro-imaging diagnosis can prevent these recurrences. The effective treatment and prevention of recurrence of these lesions can restore several patients to useful life with independent existence[5,6,7,11,13,14,15,16,22]. Many patients with AC states have been diagnosed as progressive dementia and such diagnosis puts the patients with curable causes at risk[6,16,22,23,24]. It can be seen that anticipatory treatment like embolization of bleeding artery, thrombolectomy of vessels using interventional techniques which patients without AC states have benefited can be useful to these patients if accurate diagnosis is made and pro-active treatment aimed at prevention of the development of structural intracranial lesions instituted[6,13]. Also, patients with electrolyte imbalance have good prognoses if the water and electrolytes are quickly corrected[6,9,21]. Treatment for steroid therapy could be stopped or dose reduced.

The CT findings clearly show that 88% of the patients in this study had structurally identifiable causes while normal findings were seen in only 3 patients (12%).

These findings indicate that significant structural brain abnormalities occur in elderly patients with AC state resulting in the psychological and psychiatric observed symptoms[3,5,16,17,22]. Where there is lack of adequate imaging of these patients with neuro-imaging radiological modalities will leave most of the structural brain lesions unidentified and therefore leading to inappropriate treatment of the patients[3,5,13,14,16,22].

In conclusion, 22 patients (88 %) with AC states who had cranial CT scan in this study demonstrated structural abnormalities of the brain while 3 patients (12%) had no detected lesion. Many of these lesions are preventable, treatable surgically or using radiological interventional techniques and recurrence can be preventable. Where the patient can afford it and if available, CT scan and other neuro-imaging modalities like MRI and angiography should also be used to diagnose treatable intracranial conditions that cause acute confusional states.

Table 1: Age Range and Sex Distribution of Patients

Age Range	*M*	*F*	*Total*	*Percentage*
40 – 44	2	1	3	12
45 – 49	1	3	4	16
50 – 54	0	3	3	12
55 – 59	2	0	2	8
60 – 64	3	3	6	24
65 – 69	4	3	7	28
Total	12	13	25	100

Table 2: Symptoms for Referral for CT Scan.

Symptoms associated with AC	*Number*	*Percentage*
Hallucination	9	36
Stroke in involution	5	20
Diabetic with hypertension	4	16
Electrolyte imbalance	3	12
Drug intoxication	2	8
Vomiting and neck pain	1	4
Prolong steroid therapy	1	4
Total	**25**	**100**

Figure 1. Brain CT scan image showing acute intracerebral haemorrhage causing acute confusional states.

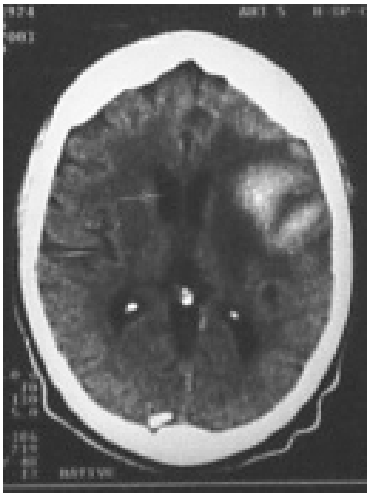


Table 3. CT scan Findings in AC states.

Brain CT scan findings	*Number*	*Percentage*
Normal	3	12
Multiple acute cerebral infarcts with previous post infarction atrophy	10	40
Acute intra-cerebral haemorrhage with previous chronic infarcts	5	20
Acute intra-cerebral haemorrhage	3	12
Sub-acute large thrombotic unihemispheric infarct	2	8
Intra-ventricular haemorrhage	1	4
Generalized cerebral atrophy	1	4
Total	**25**	**100**

Figure 2. Brain CT scan image showing cerebral infarct in the right temporal region causing acute confusional states.

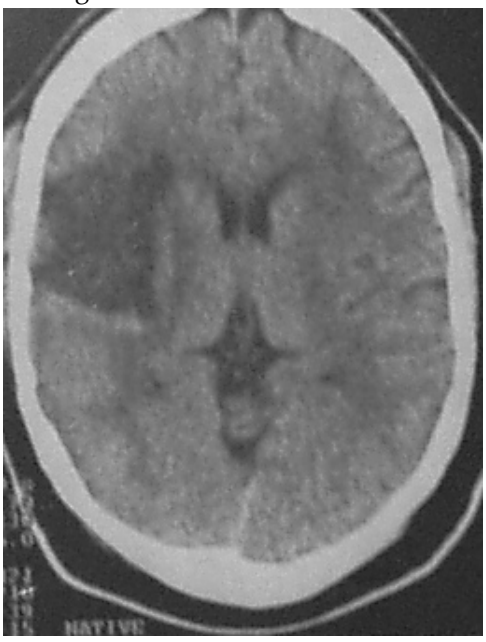
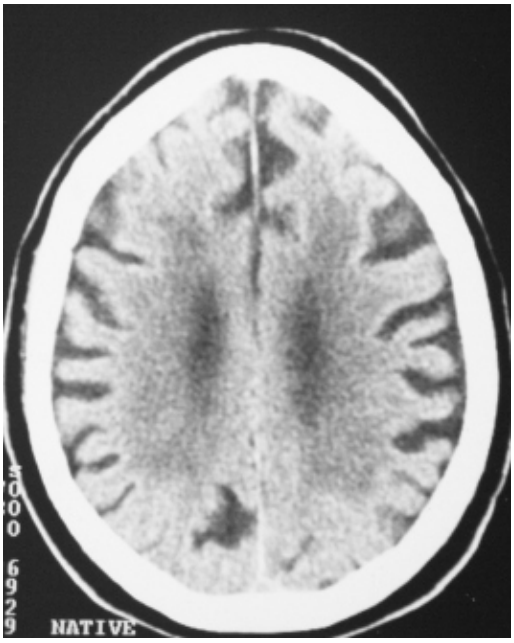


Figure 3. Brain CT scan image showing dilated sulci due to cerebral atrophy causing acute confusional states.



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