

# A Case Report of Acute Confusional State in Thyrotoxicosis

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## Abstract

*Confusion is a rare manifestation of thyrotoxicosis. The patient presented with an acute confusional state and had clinical and biochemical features of thyrotoxicosis. His illness was well controlled with antithyroid therapy. It is thus concluded that thyroid function should be evaluated in otherwise unexplained encephalopathy as response to treatment is dramatic and most rewarding.*

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*Key words: Confusion, Encephalopathy, Thyrotoxicosis*

## Introduction

A typical patient with thyrotoxicosis is a young lady who is extremely pleased with her moderate weight loss despite a good appetite, but has complaints of nervousness, anxiety palpitations, tremors and weakness. These features are however less common in the elderly, who may present with a poor appetite, weight loss, atrial fibrillation, heart failure and depression, the state referred to as the "apathetic thyrotoxic". As is well known, hyperthyroidism affects nearly every system of the body, but it is exceptional for patients to have all the clinical features. Atypical presentations of this disease often present a great challenge in diagnosis and treatment.

Apart from the well-described cardiovascular and gastrointestinal manifestations of thyrotoxicosis, one must not forget the neurological sequelae. Nervousness, difficulty in concentration, sleeplessness, tremors, and proximal weakness are features most of us are familiar with. But what is less commonly described are other neurological manifestations like encephalopathy, psychosis and seizures in predisposed individuals. We report one such patient who presented an initial diagnostic dilemma.

## Case Report

Mr WKC, a 29-year-old Chinese male was admitted after he was found at a bus stop, confused and dazed. He was holding his music notebook with no recollection as to what he was doing there. He had no significant past medical history, and was not on any medication. He also

did not have any history to suggest head injury, or substance abuse.

On examination, he was febrile with a temperature of 38.5°C. He had a tachycardia of 150 per minute and his blood pressure was 130/90 mmHg. He was confused and drowsy and noted to have choreiform movements of both upper and lower limbs. He had a decreased attention span and poor concentration. He was also disorientated in place, person and time. Both pupils were dilated 4 mm diameter, and reacted sluggishly to light. He did not have evidence of any ophthalmopathy. Fundoscopy was normal and his neck was supple. A small goitre was also noted. Thyroid bruit was absent. The rest of the clinical examination was unremarkable except for generalised hyperreflexia.

The initial diagnosis was that of a drug induced acute confusional state with a differential diagnosis of a sub-arachnoid bleed.

Investigations revealed a normal computed tomography of the brain with no haemorrhage or infarct. Serum urea level was 7.4 mmol/L, potassium 4.2 mmol/L, chloride ion 106 mmol/L, sodium 139 mmol/L, creatinine 79 µmol/L, calcium 2.32 mmol/L, phosphate ion 0.97 mmol/L, magnesium 0.77 mmol/L and random blood sugar 5.8 mmol/L. Arterial blood gas revealed pH 7.394, pCO<sub>2</sub> 28.5 mmHg and pO<sub>2</sub> 93.7 mmHg. Haemoglobin was 15.6 g/dl, and total white count was 11 000/mm<sup>3</sup>.

Liver function tests, as well as the coagulation profile were normal. Blood and urine for toxicology were negative for any drugs. Urine full examination and microscopy were normal. Urine and blood culture did not grow any

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organism. Lumbar puncture showed a pressure of 20 cm H<sub>2</sub>O, clear spinal fluid, cell count was 1/mm<sup>3</sup>, total protein 0.3 g/L and culture was negative for bacteria. Cerebrospinal fluid for neurotropic viruses was also negative. Electro-encephalography (done 7 days after admission) was within normal limits. Serum free thyroxine was raised at 41.2 pmol/L (normal range 10.3 to 31.0 pmol/L) and thyroid stimulating hormone (TSH) was undetectable. TSH receptor antibody was 13.2 U/L (normal range 1 to 3.4 U/L). Plasma ceruloplasmin was 0.41 OD (0.2 to 0.56 OD).

On admission, with all the urgent investigations done, WKC was managed symptomatically with fluid replacement and sedation with diazepam when he became restless. He became more alert and rational the following morning but still complained of feeling dizzy. He was noted to be anxious, restless and had mild proximal weakness, but the choreiform movements in the limbs had disappeared. His thyroid function tests results were available on the fourth day of his admission and with this a diagnosis of thyrotoxicosis with encephalopathy was made. He was started on carbimazole 20 mg twice daily for 2 months, and L-thyroxine was added 2 months later, as part of the "block and replace regime". He responded well to treatment and this regime was continued for one and a half years. He was followed up for a further 9 months and he had no relapses and remained free of any symptoms. He has since been discharged from follow-up.

### Discussion

Hyperthyroidism is a common endocrine disease with a local prevalence of 1.28%.<sup>1</sup> The florid cases often have an unmistakable presentation, but it is the atypical patient who often poses a diagnostic dilemma to many an astute physician. One such presentation is the occurrence of encephalopathy presenting with seizures and/or an acute confusional as in the patient described above.

Seizures, both focal and generalised are rarely seen in thyrotoxicosis. In a series by Jabbari and co-workers,<sup>2</sup> 9% of the patients with hyperthyroidism had seizures complicating their disease. Coma, and mental state changes have also been reported.<sup>3</sup> There too have been reports of cases presenting with pyramidal signs of weakness, spasticity, hyperreflexia and Babinski signs, all reversing with the correction of thyrotoxicosis.<sup>4-6</sup> We report one such patient who presented with an acute confusional state.

There are 2 issues which need to be addressed in the above patient's presentation. Firstly, we need to consider if there was any other cause of his confusional state and whether the thyrotoxicosis was merely incidental. From extensive investigations, no other possible aetiology for his sudden change of behaviour

was evident. This patient had clinical features of thyrotoxicosis. He was noted to be anxious and restless, and had mild proximal weakness. He also had choreiform movements of both upper and lower limbs, a feature which has rarely been described as one of the movement disorders associated with thyrotoxicosis.<sup>7</sup> The laboratory confirmation of thyrotoxicosis and the absence of recurrence of confusion or any such similar episodes lend further support to the diagnosis of thyroid encephalopathy as the cause of his confusion.

The second issue which needs to be discussed is the fact that if thyrotoxicosis was the cause of his confusion, how did the confusion resolve even before antithyroid treatment was introduced? This patient became more alert and rational the morning after he was treated with sedation with diazepam and also intravenous fluid rehydration. Although his confusion resolved, the other features of thyrotoxicosis persisted, and only resolved with antithyroid drugs. Benzodiazepines are known to potentiate presynaptic inhibition by gamma amino butyric acid (GABA) action, and also to decrease postsynaptic membrane sensitivity to excitatory neurotransmitters like catecholamines. As there is an upregulation of catecholamine receptors in thyrotoxicosis,<sup>8</sup> it is not surprising that benzodiazepine therapy is beneficial in control of neurological complications, as noted in our patient.

Confusion, like seizures, is a manifestation of a heightened irritability and restlessness, associated with a relatively rapid and progressive form of thyrotoxic process. Whether cerebral cellular dysfunction is a direct effect of thyroxine on cerebral metabolism,<sup>9</sup> or is a result of changes in the intracellular electrolytes and enzymes<sup>10</sup> is still unclear. It has however been shown that cerebral metabolic functions in thyrotoxics, are comparable to normal controls with regards to oxygen consumption.<sup>11</sup> The reversibility of the confusion further suggests that the neuronal changes are functional rather than organic in nature.

### Conclusion

We described a patient with thyrotoxicosis presenting with an acute confusional state and responding to antithyroid therapy with no further recurrence of his disorder. Neurological manifestations of thyrotoxicosis also include irritability, emotional lability, hyperalertness, exhilaration and euphoria. In susceptible patients, psychotic behaviour can also be unmasked. It is however unlikely that hyperthyroidism gives rise to *de novo* psychosis. This case serves to remind us that thyrotoxicosis is an important, treatable cause of an acute confusional state. Once diagnosed, appropriate treatment can yield a most satisfying outcome.

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