The incidence of primary hyperparathyroidism (PHPT) is about 21 cases per 100,000 person-years, and the disorder is usually caused by a solitary parathyroid adenoma.\textsuperscript{1,2} There are multiple neuropsychiatric symptoms associated with primary hyperparathyroidism.\textsuperscript{2,3} These disturbances can range from anxiety, depression, personality changes to psychotic symptoms and cognitive impairment. Although a direct mechanism between hypercalcaemia and psychosis has not yet been elucidated, calcium is thought to figure prominently in determining changes in monoamine metabolism in the CNS, thereby modifying neurotransmission and resulting in alterations in mood and cognition.\textsuperscript{2,3}

Generally, the psychopathology emerges after prolonged period of subclinical hypercalcaemia, but the correlation between symptom severity and degree of hypercalcaemia is poor. Here, the authors explore such a case of hypercalcaemia and primary hyperparathyroidism which required psychotropic medication and a plan for surgical treatment in the longer term.

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Generally, the psychopathology emerges after prolonged period of subclinical hypercalcaemia, but the correlation between symptom severity and degree of hypercalcaemia is poor.\textsuperscript{1,2,3} In case reports of severe hypercalcaemia and PHPT, parathyroidectomy appears to resolve the calcium disturbance and neuropsychiatric symptoms.\textsuperscript{1,3} Surgical option can be delayed due to various comorbid conditions and the treatment of neuropsychiatric symptoms will be needed to alleviate the distress caused. In addition to the escalation of risks, long hospital stays and delayed discharge can be a consequence. A literature review provided inconclusive results on the medical treatment of neuropsychiatric conditions associated with hyperparathyroidism. Early detection and treatment of such symptoms will help improve the quality of life and in turn have an impact on the physical and mental health management of the case.

This psychiatric case report highlights the complexities of the psychiatric and metabolic symptoms associated with hyperparathyroidism and the need for psychotropic medication even though there is limited evidence.

**Presentation**

An elderly Caucasian lady living on her own with no previous psychiatric history was admitted to the medical ward with an acute confusional state. Glasgow Coma Scale was 15 and Abbreviated Mental Test on admission was 7/10 (disorientated for date, address for recall and time). She was a Jehovah’s Witness, lived independently before admission, and her son who lives close to her visited few times in the week. Her past medical history included hypertension, hypothyroidism and chronic kidney disease, which had been treated by her GP. There was no history of a cognitive disorder. On admission, a CT scan of the patient’s brain did not show any acute abnormalities. Her baseline bloods were normal apart from a slightly raised inflammatory marker (C-Reactive Protein). Other blood tests incidentally found severe hypercalcaemia. This was investigated further and she was found to have high parathyroid hormone levels. A diagnosis of primary hyperparathyroidism due to parathyroid adenoma was made.

The patient’s hypercalcaemia was medically managed with intravenous fluids and bisphosphonates. A discharge from hospital was planned with a surgical resection of her parathyroid glands in a few months’ time.

During this time she developed acute psychotic symptoms on the ward, which led to non-concordance...
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with medication and made her medical management challenging. She presented with paranoid delusions, and was accusing staff of stealing her money, poisoning her food and having physical relationships with patients. She also experienced delusions of reference for, eg TV ‘talking about her relationship with her GP’. Some of her delusional content included themes around staff storing and transfusing blood and a belief that staff members were giving blood to patients without their knowledge. The patient had strongly believed that two men were opening a panel in the wall to store blood. She was deemed restless, sleepless and managing her on the ward was proving to be difficult. She was wandering on the ward and constantly demanding explanations. A referral was sent to the mental health liaison team in the hospital for assessment and management.

On the first assessment, the patient was initially reluctant to talk but then engaged reasonably well. She was guarded, restless and struggled to sit down and have a conversation due to the ongoing psychotic phenomenon. Her mood was unpredictable and labile during the conversation but her speech was normal in flow and coherent. There was evidence of misperception as often she would hear the nurses talking in the bay and became confused. She was responding to unseen stimuli and had expressed concerns about her safety on the ward. Her cognition was not formally tested due to her level of distress and the psychotic phenomenon; the scores could not be relied upon either. She lacked capacity to make decisions about treatment options and discharge planning.

The main risks noted were absconding, risk of deteriorating mental state, non-concordance with treatment and care and secondary self neglect. The risk of absconding was escalating, whereby she tried to leave the ward on a number of occasions and she was consequently nursed under DOLS (Deprivation of Liberty Safeguards).

Low dose risperidone 0.5mg once a day according to the locality delirium pathway was commenced and the dose was increased to 1.5mg once a day over a few weeks. The mental health liaison team formed a therapeutic alliance with this patient and medication concordance improved. With consistent antipsychotic use the patient showed significant improvement in her thought content, sleep and diet. Although her calcium levels were still high, her mental state stabilised. She regained insight and was able to recollect some of her delusional content. She also regained the capacity to make decisions about treatment and discharge plans. A discharge to home was planned with crisis team support whilst she waited the parathyroidectomy operation.

Discussion

We have described a case of an elderly patient with psychosis secondary to hypercalcaemia and primary hyperparathyroidism. Acute confusional state is a common cause of inpatient admission among the elderly. The initial assessment and treatment options are guided by the clinical presentation and investigations. Interestingly, some studies have reported neuropsychiatric disturbances in cases of mild hypercalcaemia due to otherwise asymptomatic PHPT. Neck ultrasound is usually the first-line imaging modality and can illustrate abnormal masses. PHPT is caused by adenomas in 85% of cases, hyperplasia in 15% and carcinoma in fewer than 1% of cases. Calcium is not routinely tested in patients without their knowledge. The patient had strongly believed that two men were opening a panel in the wall to store blood. She was deemed restless, sleepless and managing her on the ward was proving to be difficult. She was wandering on the ward and constantly demanding explanations. A referral was sent to the mental health liaison team in the hospital for assessment and management.

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led to the investigation of the cause and treatment. It is also worth noting that the onset of psychotic symptoms was linked to the increasing calcium levels, and the patient’s non-concordance with treatment made the situation more complex.

If hypercalcaemia is detected, levels of intact parathyroid hormone, ionized calcium, or total serum calcium corrected for albumin, and of 25-hydroxyvitamin D can be ordered to investigate the cause of the hypercalcaemia and diagnose hyperparathyroidism. The poor quality of life associated with the neuropsychiatric symptoms in PHPT, even with mild hypercalcaemia makes it imperative that treatment for PHPT be followed through.\(^2\) Evidence on the use of psychotropic medication in this condition is limited, but treatment may be required for symptom control and support until the normalisation of calcium levels. Psychiatrists will need to be aware of the neuropsychiatric symptoms associated with the condition and this case shows the need for more research in the area.

This highlights the potential benefit of screening for high serum calcium at presentation to aid a prompt diagnosis and to minimise further complications.

**Conclusion**

Hypercalcaemia and primary hyperparathyroidism should be considered in patients presenting with an acute confusional state. Hyperparathyroidism can be associated with neuropsychiatric symptoms and although the evidence is limited, this will need to be treated to improve the quality of life while a medical or surgical treatment is planned.

**Declaration of interests**

No conflicts of interest were declared.

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