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Research Article

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An Unusual Case of Steroid-Induced Psychosis versus Post-operative Neuropsychiatric Complication Following Pituitary Macroadenoma Surgery

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ABSTRACT

Background: Steroid-induced psychosis is a recognised adverse effect of systemic glucocorticoid therapy but is rarely described after short-term peri-operative steroid replacement for pituitary surgery. Only a handful of such cases have been reported worldwide [1].

Case presentation: We describe a 49-year-old woman with hypertension and no past or family psychiatric history who underwent left pterional craniotomy and near-total excision of a pituitary macroadenoma. She received peri-operative hydrocortisone replacement. On post-operative day (POD) 2 she developed acute behavioural changes, persecutory ideas and vivid visual hallucinations. She was fully conscious and oriented, with preserved vital signs and no focal neurological deficits. Laboratory parameters, including serum electrolytes, were within normal limits, and neuroimaging did not show new structural lesions. A diagnosis of steroid-induced psychosis was considered in the differential alongside post-operative delirium and surgery-related complications. Steroids were rapidly tapered and atypical antipsychotic medication was initiated, leading to gradual resolution of symptoms over the next week.

Conclusion: This case illustrates the diagnostic challenge of distinguishing steroid-induced psychosis from post-operative neuropsychiatric complications after pituitary surgery. Clinicians should maintain a high index of suspicion for glucocorticoid-related psychiatric adverse effects even when using "replacement" doses, carefully monitor patients in the early post-operative period, and individualise peri-operative steroid protocols.

Keywords: Steroid-Induced Psychosis, Glucocorticoids, Pituitary Macroadenoma, Peri-Operative Steroids, Post-Operative Complications

Introduction

Glucocorticoids are widely used in neurosurgical practice for peri-operative stress-dose coverage and to prevent adrenal crisis, particularly in patients with pituitary tumours. However, systemic corticosteroids can precipitate a spectrum of psychiatric adverse effects including mood elevation, depression, agitation, delirium and frank psychosis [2].

Steroid-induced psychosis is more commonly reported with high-dose or prolonged glucocorticoid therapy, but cases have also been described following short-term "physiological" replacement.3In the specific context of pituitary surgery, only a few case reports describe psychosis emerging after peri-operative steroid replacement for pituitary adenoma [1].

Post-operative patients with pituitary disease are at baseline risk of neuropsychiatric complications such as delirium due to metabolic disturbances, hormone shifts, neurosurgical stress and pain medications [3]. Distinguishing steroid-induced psychosis from these entities is clinically important because management focuses on glucocorticoid dose adjustment in addition to symptomatic treatment.

We report a rare case of acute psychosis in the immediate post-operative period following pituitary macroadenoma surgery, likely triggered by peri-operative hydrocortisone replacement, and discuss the diagnostic challenges and management considerations.

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Case Presentation

A 49-year-old married woman, known hypertensive on regular treatment, with no history of psychiatric illness and no family history of mental disorders, presented with a several-month history of headache, giddiness and one episode of fall. Initial symptomatic treatment by a local practitioner produced no improvement. She subsequently developed blurring of vision, for which MRI brain was obtained. Imaging revealed a pituitary macroadenoma compressing the optic chiasm, and she was referred to a tertiary care centre and admitted under neurosurgery and neuropsychiatry care.

Pre-Operative Evaluation

On admission she was conscious, oriented and cooperative. There were no psychotic, mood or cognitive symptoms. Neurological examination showed no focal deficits except for mild visual field blurring subjectively. Routine laboratory investigations (complete blood counts, renal and liver function tests, serum electrolytes, fasting blood sugar) were within normal limits. Endocrine evaluation confirmed a non-functioning pituitary macroadenoma with evidence of secondary adrenal insufficiency for which peri-operative steroid coverage was planned.

Surgery and Peri-Operative Steroid Protocol

She underwent left pterional craniotomy with near-total excision of the pituitary macroadenoma under general anaesthesia. The open craniotomy approach was chosen due to associated left-sided CSF rhinorrhoea and extension. Intra-operative and immediate post-operative courses were uneventful.

Hydrocortisone was administered as stress-dose replacement (for example, 100 mg IV at induction followed by 50–100 mg IV every 6–8 hours in the first 24–48 h, then gradually tapered), in line with institutional protocol for pituitary surgery and adrenal insufficiency. (Exact dosing is omitted here as this is a retrospective description.)

Onset of Psychiatric Symptoms

On POD 2, nursing staff and family reported sudden onset of "abnormal behaviour". She became suspicious, repeatedly stating that staff were trying to harm her, and reported seeing "people and shapes on the wall" that others could not see. She was restless at times but remained cooperative with basic care. There was no disorientation, fluctuation of consciousness or prominent sleep-wake reversal.

She was referred to the psychiatry team and admitted under acute care.

Mental Status Examination

On examination she was:

- **Consciousness:** clear; alert
- **Orientation:** fully oriented to time, place and person
- **Appearance/behaviour:** adequate self-care; mildly restless; occasionally scanning the environment
- **Speech:** normal rate and volume
- **Mood/affect:** subjectively "fearful"; affect anxious and mildly constricted
- **Thought content:** ideas of persecution ("nurses are plotting against me") with partial conviction
- **Perception:** well-formed visual hallucinations of people and faces, occurring in clear consciousness
- **Cognition:** attention, immediate recall and remote memory grossly intact
- **Insight and judgement:** insight partial; acknowledged that "maybe medicines are doing this" when explained

There was no history of euphoria, pressured speech or other manic symptoms preceding the psychosis or similar illness in the past.

Medical and Neurological Work-Up

A repeat neurological examination revealed no new focal deficit. Post-operative CT scan showed expected post-surgical changes without haemorrhage, infarct or significant oedema.

Laboratory investigations, including serum electrolytes (with particular attention to sodium to exclude post-operative hyponatraemia), blood glucose and renal function, were within normal limits. There was no fever or evidence of infection. Analgesic and other peri-operative medications were reviewed; she was not receiving other centrally acting agents at doses typically associated with psychosis.

Diagnosis and Management

Given:

1. Temporal relationship between initiation of high-dose peri-operative hydrocortisone and onset of psychiatric symptoms within 48 hours;
2. Absence of preceding psychiatric history;
3. Clear sensorium without fluctuating consciousness, arguing against classic delirium; and
4. Lack of metabolic or structural explanation,

a working diagnosis of steroid-induced psychosis was made, with post-operative delirium and surgery-related neuropsychiatric complication kept as differentials.

In liaison with neurosurgery and endocrinology, hydrocortisone was rapidly tapered towards the lowest permissible replacement dose while monitoring for signs of adrenal insufficiency. An atypical antipsychotic (such as risperidone 1–2 mg/day) was started and gradually titrated. Supportive measures included reassurance, sleep hygiene and involvement of family in care.

Outcome

Over the next 5–7 days, the patient's persecutory ideas and visual hallucinations diminished and then resolved completely. She regained her premorbid level of functioning, remained oriented and did not show residual cognitive deficits. Antipsychotic medication was continued for a short period and then tapered off in follow-up. There was no recurrence of psychotic symptoms after steroid dose stabilisation, supporting the diagnosis of steroid-induced psychosis rather than a primary psychotic disorder.

Discussion

This case adds to the small but growing literature on psychosis precipitated by peri-operative steroid replacement in patients undergoing pituitary surgery. Mizutani et al. reported what was considered the first such case in a 35-year-old man who received hydrocortisone 200 mg pre-operatively followed by

tapering, developing elated mood, grandiose delusions and agitation on POD 4 [1]. More recently, Aranas et al. described another patient who developed psychosis after peri-operative steroid replacement for pituitary adenoma, highlighting prior psychiatric illness as a predisposing factor [2]. Similarly, a case of acute psychosis after hydrocortisone replacement in a woman with recurrent post-operative pituitary macroadenoma has been reported [4].

Pathophysiology and Risk Factors

The exact mechanisms of glucocorticoid-induced psychosis remain unclear, but proposed pathways involve dysregulation of hippocampal and limbic circuits, alterations in dopamine and serotonin transmission, and direct effects on glucocorticoid receptors in the brain [5]. Higher doses, rapid dose escalation and individual vulnerability are recognised risk factors, although cases can occur even with relatively modest or physiological doses3. Pre-existing psychiatric illness appears to increase risk, but psychosis has also been documented in patients without such history, as in our case [2].

Differentiating Steroid Psychosis from Post-Operative Delirium/Complications

Post-operative delirium is relatively common after transsphenoidal or craniotomy procedures for pituitary adenoma, with risk factors including older age, female sex, hyponatraemia, large tumour burden and peri-operative hormonal shifts [3]. Delirium classically presents with fluctuating consciousness, inattention, disorientation and mixed psychomotor changes.

In contrast, our patient had clear consciousness, intact orientation and stable attention, with well-systematised persecutory ideas and visual hallucinations. The isolated psychotic picture in the context of recent steroid exposure, normal metabolic parameters and unremarkable post-operative imaging favoured steroid-induced psychosis over delirium or structural complication. Nevertheless, overlap can occur, and careful assessment is crucial.

Management Implications

Management of steroid-induced psychosis involves:

1. **Reviewing steroid indication and dose:** Rapid tapering or discontinuation is recommended where feasible, while balancing the risk of adrenal crisis, especially in pituitary patients with hypoadrenalism [5].
2. **Symptomatic treatment:** Short-term use of antipsychotics (e.g., risperidone, olanzapine or haloperidol) is often effective in controlling acute symptoms [5].
3. **Monitoring and psychoeducation:** Patients and families should be informed about potential psychiatric side-effects of steroids, and early warning signs should be explained.

From a systems perspective, our case supports the argument that peri-operative steroid protocols for pituitary surgery should be individualised rather than universally high-dose, and that early psychiatric consultation should be sought for behavioural changes in the immediate post-operative period. Studies evaluating reduced-dose or selective hydrocortisone regimens have suggested that routine high-dose coverage may not be necessary in all patients [6].

Conclusion

This case underscores that:

- Acute psychosis can occur even with short-term peri-operative hydrocortisone replacement for pituitary macroadenoma surgery.
- Distinguishing steroid-induced psychosis from post-operative delirium and neurosurgical complications relies on careful mental-status examination, exclusion of metabolic/structural causes and close review of medication history.
- Early recognition, judicious tapering of steroids and short-term antipsychotic therapy can lead to full recovery.

Given the limited number of reported cases, further research and larger series are needed to clarify incidence, risk factors and optimal peri-operative steroid strategies in pituitary surgery.

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