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CASE REPORT
ΕΝΔΙΑΦΕΡΟΥΣΑ ΠΕΡΙΠΤΩΣΗ

Lithium toxicity in a patient with Parkinson's disease and bipolar disorder

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ΑΡΧΕΙΑ ΕΛΛΗΝΙΚΗΣ ΙΑΤΡΙΚΗΣ 2026, 43( ):1 –3

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Τοξικότητα λιθίου σε ασθενή με νόσο του Parkinson και διπολική διαταραχή

Περίληψη στο τέλος του άρθρου

A 69-year-old female who developed lithium toxicity with both neurological and systemic manifestations. The toxicity followed the concurrent use of levodopa/benserazide and pramipexole along with chronic lithium therapy. The patient had a history of recent Parkinson's disease diagnosis and chronic bipolar disorder, and her complex pharmacological regimen posed significant diagnostic and therapeutic challenges. Elderly patients with neurodegenerative and psychiatric comorbidities are particularly vulnerable to adverse drug interactions due to polypharmacy and age-related renal decline. In this case, lithium toxicity progressed rapidly, leading to renal impairment, rhabdomyolysis, and ultimately death. This case highlights the importance of close clinical monitoring, early recognition of toxicity signs, and coordination among healthcare providers, when coadministering Parkinson's disease therapy with lithium in high-risk populations.

Key words

Bipolar disorder
Lithium toxicity
Parkinson's disease
Polypharmacy
Rhabdomyolysis

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Lithium is a first-line treatment for bipolar disorder due to its well-established efficacy in mood stabilization and the prevention of manic and depressive episodes.[1] However, its narrow therapeutic index makes it prone to toxicity, particularly in the elderly and in individuals with comorbidities or impaired renal function.[2–5] Drug-drug interactions –especially with agents affecting renal excretion, such as nonsteroidal anti-inflammatory drugs (NSAIDs), diuretics, and certain dopaminergic agents– can increase serum lithium levels, leading to neurotoxicity.[3,6] This case highlights how complex polypharmacy in a patient with coexisting Parkinson's disease and bipolar disorder resulted in acute lithium toxicity, underscoring the importance of close monitoring in vulnerable populations.

CASE PRESENTATION

A 69-year-old woman with chronic bipolar disorder (diagnosed several years ago) treated with lithium carbonate (300 mg twice daily), quetiapine, agomelatine and venlafaxine and had recently been diagnosed with Parkinson's disease. Olmesartan, nebivolol, atorvastatin, fenofibrate and pantoprazole were also part of her long-term treatment. Two weeks before admission, her neurologist added levodopa/benserazide (100/25 mg twice daily) and pramipexole (0.18 mg three times daily). Shortly after initiation of these agents, she became progressively bradykinetic and hypophonic, refusing food and fluids. She presented to the emergency department with lethargy and rigidity. Her Glasgow Coma Scale (GCS) score was 11 (E3 V3 M5) and she had choreoathetoid movements of the upper limbs. Vital signs were within normal limits, pupils were equal and reactive. Computed tomography (CT) of the brain revealed no acute abnormalities (fig. 1). Arterial blood gases demonstrated compensated metabolic acidosis: pH 7.38; pCO_2 29 mmHg; pO_2 76 mmHg; lactate 0.6 mmoL/L; HCO_3^- 17.2 mmoL/L; base excess -7.0 mmoL/L; SpO_2 95%. Initial laboratory results showed creatinine 1.93 mg/dL; blood urea nitrogen 157 mg/dL; potassium 5.6 mmoL/L; creatine phosphokinase (CPK) 1928 IU/L and C-reactive protein (CRP) 57.5 mg/L. Serum lithium concentration measured more than 12 hours after the last dose was 2.44 mmoL/L (therapeu-

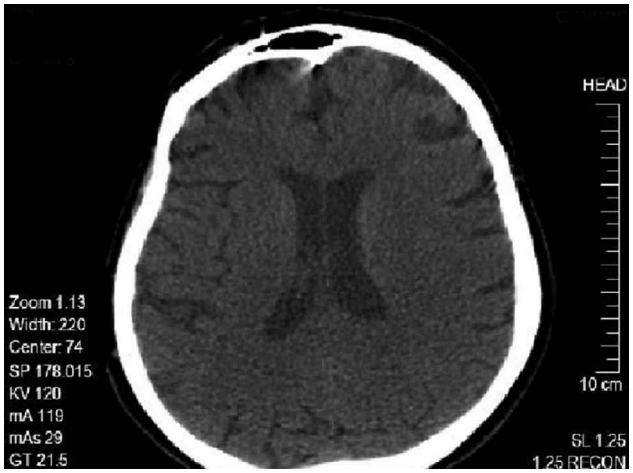

Figure 1. Axial computed tomography (CT) of the brain shows no acute abnormalities.

tic range: 0.5–1.2 mmoL/L). These findings confirmed lithium toxicity complicated by rhabdomyolysis, renal impairment and neurological complications.

Lithium, along with the recently initiated dopaminergic agents, was discontinued immediately upon admission. Supplemental oxygen was administered at 3 L/min via a nasal cannula, and the patient received intravenous hydration with initially normal saline and subsequently with half-normal saline (0.45% NaCl) at a rate of 1,000 mL every eight hours (total 3,000 mL per 24 hours). Despite these supportive measures, CPK levels remained persistently elevated, and renal function showed no improvement.

Although hemodialysis was considered, it was not initiated because the patient was transferred to a higher-level facility for further management. At the referral hospital's neurology department, despite hemodialysis and supportive treatment, the patient's condition did not improve clinically. Ultimately, she succumbed to complications of lithium toxicity.

DISCUSSION

This case highlights the heightened risk of lithium toxicity in elderly patients receiving multiple medications, particularly those with neurodegenerative and psychiatric comorbidities. Lithium is primarily excreted by the kidneys, and any factor impairing renal clearance –such as dehydration, drug interactions, or age-related glomerular filtration rate (GFR) decline– can precipitate toxicity.[4] This patient was on a recently initiated regimen of levodopa and pramipexole, two dopaminergic agents whose administration can cause neurotoxic effects in combination with lithium. Also, reduced oral intake, polypharmacy, and underlying renal vulnerability likely contributed to lithium accumulation and systemic toxicity.

This case is consistent with prior literature identifying polypharmacy, impaired renal function, and advanced age as major risk factors for lithium toxicity.[2,3,6] Gitlin emphasizes that the elderly are especially prone to lithium side effects due to a combination of pharmacokinetic changes and comorbidities.[2] Finley also describes a wide range of drug interactions that can elevate lithium levels, including angiotensin receptor blockers and antipsychotics, both of which were present in our patient's regimen.[6]

Also extends current literature by illustrating how the combination of dopaminergic agents and lithium can complicate clinical assessment. The patient's presentation –rigidity, altered consciousness, elevated CPK– overlapped with features of serotonin syndrome and neuroleptic malignant-like syndromes. The co-administration of quetiapine, pramipexole, and levodopa/benserazide further amplified the neurotoxic profile. Notably, while prior case reports describe rhabdomyolysis as a complication of levodopa-induced dyskinesia in Parkinson's disease our patient had no such dyskinesia, suggesting that lithium toxicity alone may be sufficient to provoke rhabdomyolysis in vulnerable individuals.[7,8] This observation expands upon current understanding of the pathophysiological mechanisms behind lithium-induced muscle injury.

Regarding therapeutic intervention, hemodialysis is a key consideration in severe lithium toxicity. According to the Extracorporeal Treatment for Lithium Poisoning: Systematic review and recommendations from the EXTRIP workgroup, in chronic lithium users, extracorporeal removal is recommended when serum levels exceed 2.5 mmoL/L, in combination with neurological deterioration or impaired renal function. In acute ingestion, levels above 4.0 mmoL/L constitute an absolute indication for dialysis.[9] In our case, the patient had a serum lithium concentration of 2.44 mmoL/L, marginally below the chronic threshold. However, the presence of severe neurological symptoms, persistent oliguria, and elevated creatinine fulfilled EXTRIP's clinical criteria for dialysis initiation. Unfortunately, hemodialysis could not be performed prior to transfer, underscoring the importance of timely recognition and intervention.

In summary, this case supports and expands the existing literature on lithium toxicity, particularly in the context of Parkinson's disease and complex pharmacotherapy. It emphasizes the need for early monitoring, cautious initiation of lithium in elderly patients, and close interdisciplinary coordination to avoid preventable complications.

ΠΕΡΙΛΗΨΗ

Τοξικότητα λιθίου σε ασθενή με νόσο του Parkinson και διπολική διαταραχή

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Περιγράφεται περίπτωση 69χρονης γυναίκας που ανέπτυξε τοξικότητα λιθίου με νευρολογικές και συστηματικές εκδηλώσεις. Η τοξικότητα εκδηλώθηκε μετά τη συγχορήγηση λεβοντόπα/βενσεραζίδης και πραμιπεξόλης σε συνδυασμό με χρόνια θεραπεία με λίθιο. Η ασθενής είχε πρόσφατη διάγνωση νόσου του Parkinson και χρόνια διπολική διαταραχή. Η πολυπλοκότητα του θεραπευτικού της σχήματος προκάλεσε σημαντικές δυσκολίες τόσο στη διαγνωστική αξιολόγηση όσο και στη θεραπευτική αντιμετώπιση. Οι ηλικιωμένοι με νευροεκφυλιστικές και ψυχιατρικές συννοσηρότητες είναι ιδιαίτερα ευάλωτοι σε ανεπιθύμητες αλληλεπιδράσεις φαρμάκων λόγω πολυφαρμακίας και μειωμένης νεφρικής λειτουργίας. Στη συγκεκριμένη περίπτωση, η τοξικότητα του λιθίου εξελίχθηκε ταχέως, οδηγώντας σε νεφρική ανεπάρκεια, ραβδομυόλυση και, τελικά, σε θάνατο.

Λέξεις ευρετηρίου: Διπολική διαταραχή, Νόσος Parkinson, Πολυφαρμακία, Ραβδομυόλυση, Τοξικότητα λιθίου

References

1. HIRSCHFELD RMA, BOWDEN CL, GITLIN MJ, KECK PE, PERLIS RH, SUPPES T ET AL. Practice guideline for the treatment of patients with bipolar disorder (revision). *Focus* 2003, 1:64–110
2. GITLIN M. Lithium side effects and toxicity: prevalence and management strategies. *Int J Bipolar Disord* 2016, 4:27
3. PAUDEL U, BHAM G, BHATT PR, GHIMIRE P, PARAJULI A, UPRETI D. Lithium toxicity: A case report. *Journal of Patan Academy of Health Sciences (JPAHS)* 2023, 10:68–71
4. HEDYA SA, AVULA A, SWOBODA HD. Lithium toxicity. StatPearls Publishing, Treasure Island, (FL), 2025. Available at: https://www.ncbi.nlm.nih.gov/books/NBK499992
5. PANDEY A, KHANAL K, JHA A, BASNET P, BHATTARAI D. Chronic lithium toxicity in old age patients taking angiotensin receptor blocker: A case report. *JNMA J Nepal Med Assoc* 2023, 61:901–903
6. FINLEY PR. Drug interactions with lithium: An update. *Clin Pharmacokinet* 2016, 55:925–941
7. LYOO CH, LEE MS. Rhabdomyolysis induced by severe levodopa-induced dyskinesia in a patient with Parkinson's disease. *J Neurol* 2011, 258:1893–1894
8. BEKTAŞ H, DENIZ O, TEMEL S, KEKLIKOĞLU HD, AKYOL S. Rhabdomyolysis related to dyskinesia in Parkinson's disease. *J Mov Disord* 2014, 7:25–27
9. DECKER BS, GOLDFARB DS, DARGAN PI, FRIESEN M, GOSSELIN S, HOFFMAN RS ET AL. Extracorporeal treatment for lithium poisoning: Systematic review and recommendations from the EXTRIP workgroup. *Clin J Am Soc Nephrol* 2015, 10:875–887

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