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Case Report

A Probable Paraneoplastic Cerebellar Degeneration during Neoadjuvant Chemotherapy in High-Grade Serous Ovarian Carcinoma: A CARE-Compliant Case Report

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Background: Paraneoplastic neurological syndromes (PNS) are rare immune-mediated disorders associated with malignancies, often preceding or complicating cancer diagnosis and treatment. Among them, paraneoplastic cerebellar degeneration (PCD) is a severe subtype.

Case Presentation: A 41-year-old woman with high-grade serous ovarian carcinoma developed progressive cerebellar symptoms including dizziness, diplopia, gait instability, and dysarthria approximately two months after initiation of neoadjuvant carboplatin/paclitaxel chemotherapy. Neurological examination revealed nystagmus, positive Romberg test, and ataxic gait. Brain and spinal MRI were unremarkable. Differential diagnoses including cerebellar stroke, multiple sclerosis relapse, chemotherapy-induced neurotoxicity, and metabolic encephalopathy were excluded. Although onconeural antibody testing (Anti-Hu, Anti-Yo, Anti-Ri, and Anti-Ma2) was not available, the clinical presentation supported a probable diagnosis of PNS. The patient received high-dose intravenous immunoglobulin (0.4 g/kg/day for 5 days), corticosteroids (methylprednisolone 1 g/day for 5 days), and plasmapheresis, resulting in partial neurological improvement.

Outcome: Following cytoreductive surgery and continuation of oncologic management, gradual improvement in neurological symptoms was observed over four months, although residual gait impairment persisted.

Conclusion: PNS should be considered in patients with ovarian cancer presenting with unexplained neurological symptoms despite normal imaging. Early recognition and immunotherapy may improve outcomes.

Keywords: Ovarian Carcinoma, Neoadjuvant, Paraneoplastic

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Introduction

Paraneoplastic neurological syndromes (PNS) are rare immune-mediated disorders associated with systemic malignancies and are not attributable to direct tumor invasion, metastasis, infection, metabolic disturbances, or treatment toxicity. They result from an autoimmune response directed against shared antigens expressed by tumor cells and neural tissue (1).

The overall incidence of PNS is estimated to be less than 1% of all cancer patients, although underdiagnosis is likely (1, 2). PNS most commonly occur in association with small-cell lung carcinoma, breast cancer, thymoma, and hematologic malignancies; however, gynecologic cancers-particularly ovarian carcinoma-have also been implicated (3).

Among neurological presentations, paraneoplastic cerebellar degeneration (PCD) is one of the most severe and well-characterized syndromes, accounting for approximately 20–30% of PNS cases (4). In women,

ovarian and breast carcinomas are frequently associated with anti-Yo-mediated cerebellar degeneration (5, 6). Clinically, PCD presents with rapidly progressive gait ataxia, dysarthria, diplopia, vertigo, and imbalance. Brain MRI may initially appear normal, with cerebellar atrophy developing later in the disease course (7).

According to the updated diagnostic criteria proposed in 2021, a classical neurological syndrome occurring in a patient with known malignancy, after exclusion of alternative causes, strongly supports the diagnosis of PNS even in the absence of detectable onconeural antibodies (8).

High-grade serous ovarian carcinoma (HGSOC) is characterized by marked genomic instability and immunogenic potential, which may trigger cross-reactive immune responses against neuronal antigens. Although PNS associated with ovarian carcinoma are uncommon, early recognition is essential because neurological deficits may become irreversible if treatment is delayed.

Here, we report a rare case of probable paraneoplastic cerebellar syndrome developing during neoadjuvant chemotherapy in a patient with high-grade papillary serous ovarian carcinoma.

Case Presentation

A 41-year-old G2P2L2 woman presented with a five-month history of progressive abdominal pain and distension. Histopathological evaluation confirmed high-grade serous ovarian carcinoma with pelvic involvement. Due to the extent of disease at presentation, neoadjuvant platinum-based chemotherapy was initiated (carboplatin and paclitaxel). Dates have been converted to a relative timeline in accordance with journal standards.

Approximately two months after starting chemotherapy, she developed progressive dizziness, diplopia, blurred vision, headache, and voice changes, followed by gait instability. Neurological examination revealed horizontal nystagmus, dysmetria on finger-to-nose testing, a positive Romberg sign, and a wide-based ataxic gait. Cranial nerve examination showed diplopia without facial weakness or dysphagia. Motor and sensory examinations were within normal limits.

Laboratory investigations, including metabolic panel and infectious workup, were unremarkable. However, serological testing for paraneoplastic antibodies (Anti-Hu, Anti-Yo, Anti-Ri, Anti-Ma2) was not performed due to limited availability.

To exclude metastatic disease and structural causes, brain MRI and lumbosacral MRI were performed and showed no abnormalities **(Figure 1).**

Treatment

The patient received combined immunomodulatory therapy as follows: Intravenous immunoglobulin (IVIG): 0.4 g/kg/day for 5 consecutive days Methylprednisolone: 1 g/day for 5 days followed by oral taper
Plasmapheresis: 5 sessions over 10 days .

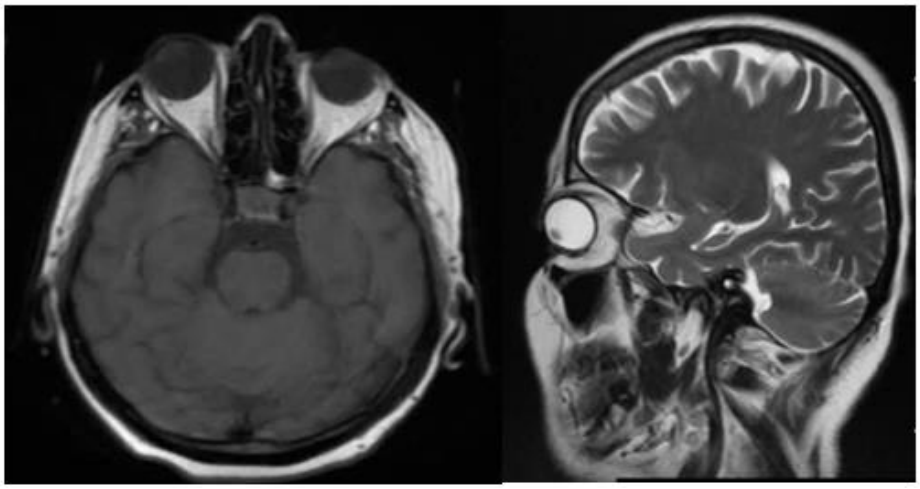

Fig 1: Brain MRI demonstrating no evidence of cerebellar metastasis or structural lesion at the time of neurological symptom onset.

Clinical response was evaluated based on improvement in gait stability, reduction in diplopia, and ability to ambulate independently

Timeline

A chronological summary of clinical events is presented in **(Table 1).**

Table 1. Timeline of clinical events and interventions

Timepoint	Clinical Event
Month 0	Diagnosis of ovarian carcinoma
Month 1	Initiation of neoadjuvant chemotherapy
Month 3	Onset of neurological symptoms
Month 3.5	Initiation of immunotherapy
Month 4	Partial improvement
Month 5	Cytoreductive surgery
Month 9	Gradual neurological recovery

Diagnostic Reasoning

Differential diagnoses were systematically considered and excluded:

Chemotherapy-induced neurotoxicity (carboplatin/ paclitaxel): unlikely due to predominant cerebellar signs rather than peripheral neuropathy

Cerebellar stroke: ruled out by normal MRI findings

Multiple sclerosis relapse: no prior history and no demyelinating lesions on imaging

Metabolic/toxic encephalopathy: laboratory findings were within normal limits

Despite the absence of antibody testing, the diagnosis of probable PNS was supported by the following:

Subacute cerebellar syndrome

Presence of a known malignancy (high-grade serous ovarian carcinoma)

Exclusion of alternative etiologies

Partial clinical response to immunotherapy

Follow-up

At 4-month follow-up, the patient regained partial ambulation with assistance. No recurrence of neurological symptoms was observed during subsequent oncologic follow-up. However, mild gait instability persisted, indicating incomplete neurological recovery.

Discussion

Paraneoplastic neurological syndromes (PNS) are a group of immune-mediated disorders that occur in association with systemic malignancies but are not attributable to direct tumor invasion, metastatic spread, metabolic derangements, or treatment toxicities. These syndromes are believed to result from an autoimmune response driven by shared antigens between the tumor and components of the nervous system, particularly Purkinje cells in cases of cerebellar degeneration (9, 10).

Although PNS can affect any part of the nervous system, paraneoplastic cerebellar degeneration (PCD) remains one of the most frequently described neurological manifestations in patients with gynecologic malignancies, including ovarian carcinoma (10, 11). PCD accounts for a significant proportion of PNS cases and presents with subacute onset of cerebellar symptoms such as ataxia, dysarthria, diplopia, and gait instability. These symptoms may develop before, during, or after cancer diagnosis and treatment (10, 11). The prevalence of PNS in ovarian cancer is estimated to be less than 1%, although underdiagnosis is likely, and increased clinical awareness may reveal higher rates. This underscores the importance of considering PNS in patients with unexplained neurological symptoms, even in the absence of radiological abnormalities.

Importantly, PNS can occur without detectable metastatic disease on neuroimaging, as illustrated in this case where both brain and spinal MRI were normal despite significant cerebellar symptoms.

The pathogenesis of PCD involves immune-mediated damage to cerebellar Purkinje cells triggered by onconeural antibodies such as anti-Yo, anti-Hu, anti-Ri, and less commonly anti-CV2/CRMP5. Among these, anti-Yo antibodies are most frequently associated with ovarian cancer-related PCD, particularly in high-grade serous carcinoma. Although antibody testing was not performed in this case, similar antibody-negative presentations have been reported, and diagnosis may rely on clinical criteria and exclusion of alternative etiologies. Previous reports have described similar cases where neurological symptoms developed in the context of ovarian carcinoma without evidence of metastatic spread on imaging, reinforcing the concept that PNS is primarily an autoimmune phenomenon rather than direct tumor invasion (3, 11). A careful differential diagnosis is essential in such cases. Conditions including chemotherapy- induced neurotoxicity (particularly from carboplatin and paclitaxel), cerebellar stroke, multiple sclerosis relapse, and metabolic or toxic encephalopathy

should be considered and excluded. In the present case, normal neuroimaging findings, absence of metabolic abnormalities, and the pattern of neurological involvement made these diagnoses unlikely, thereby supporting a probable diagnosis of PNS.

Compared to previously reported cases, this case is notable for the development of neurological symptoms during neoadjuvant chemotherapy, absence of radiological abnormalities, and partial reversibility following immunotherapy. These features distinguish it from many classical presentations reported in the literature.

High-grade serous ovarian carcinoma is known for its immunogenicity, which may predispose to autoimmune cross-reactivity against neuronal tissue. This may explain the occurrence of PNS in this patient and supports a potential biological link between tumor subtype and neurological manifestations.

Management of PNS involves both oncologic and immunomodulatory approaches. Early tumour resection and effective oncologic therapy may reduce the antigenic stimulus driving the immune response, potentially ameliorating neurological symptoms. Immunotherapies such as high-dose corticosteroids, intravenous immunoglobulin (IVIG), and plasma exchange are commonly used, although their efficacy varies and depends on the timeliness of initiation. Some patients experience partial neurological improvement following immunotherapy, as observed in the present case (12, 13).

Despite advances in cancer therapy and immunomodulation, the overall prognosis of PNS remains guarded, with many patients experiencing persistent neurological dysfunction even after treatment of the underlying malignancy (3, 11). Long-term follow-up and multidisciplinary management, including physical therapy and supportive care, are essential for optimizing functional outcomes.

In this case, early initiation of immunotherapy resulted in partial neurological recovery, although residual deficits persisted. This is consistent with previous studies indicating that early treatment may improve outcomes but does not always lead to complete recovery.

This case has several limitations, including the absence of paraneoplastic antibody testing and lack of cerebrospinal fluid analysis, which may have strengthened diagnostic certainty.

Conclusion

Paraneoplastic cerebellar degeneration should be considered in patients with ovarian cancer who develop subacute neurological symptoms in the absence of radiological abnormalities. This case highlights the diagnostic challenges of antibody-negative PNS and emphasizes the importance of early recognition, prompt immunotherapy, and multidisciplinary management. Increased awareness may facilitate earlier diagnosis and improve neurological outcomes.

Declarations

Availability of data and materials

The datasets used and analyzed during the current study are available from the corresponding author on reasonable request.

Competing interests

The authors declare no competing interests.

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Authors' contribution

All authors were participated in the concept and design, analysis and interpretation, data collection, writing the article, critical revision, final approval, statistical analysis, overall responsibility.

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Ethics approval and consent to participate

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References

1. Graus F. Paraneoplastic neurological syndromes. Autoimmune Disease Diagnosis: Systemic and Organ-specific Diseases: Springer; 2025; 571-6.

2. Graus F, Vogrig A, Muñiz-Castrillo S, et al. Updated Diagnostic Criteria for Paraneoplastic Neurologic Syndromes. Neurology(R) neuroimmunology & neuroinflammation. 2021; 8 (4).

3. Ray M, Kapoor R. Paraneoplastic syndromes in ovarian carcinoma: A study on clinical spectrum, treatment and survival perspectives. European Journal of Obstetrics & Gynecology and Reproductive Biology. 2025; 312: 114114.

4. Loehrer PA, Zieger L, Simon OJ. Update on Paraneoplastic Cerebellar Degeneration. Brain sciences. 2021; 11(11).
5. Kissinger CR, Gupta A, Aiad M, et al. Paraneoplastic cerebellar degeneration from an isolated nodal clear cell carcinoma of suspected gynecologic origin: case report and literature review. Journal of Cancer Research and Clinical Oncology. 2026; 152(2): 45.
6. Yang C-H, Xu Y, Fan S-Y. Case report: anti-Yo antibody mediated paraneoplastic cerebellar degeneration in a patient with squamous cell lung carcinoma. Frontiers in Immunology. 2025; 16: 1558867.
7. Behr E, Honaker JA. A Rare Presentation of Dizziness: Vestibular Testing in Paraneoplastic Cerebellar Degeneration. Journal of the American Academy of Audiology. 2025.
8. Zhao-Fleming H, Rezk M, Shah S, et al. Comprehensive analysis of paraneoplastic neurologic syndrome and PNS-CARE diagnostic criteria in clinical practice. Neurology: Neuroimmunology & Neuroinflammation. 2024; 11(6): e200316.
9. Marsili L, Marcucci S, LaPorta J, et al. Paraneoplastic neurological syndromes of the central nervous system: pathophysiology, diagnosis, and treatment. Biomedicines. 2023; 11(5): 1406.
10. Ray M, Halder S, Kapoor R. Paraneoplastic syndromes in ovarian cancer: Clinical manifestations, mechanisms and management challenges. Journal of Cancer Research and Therapeutics. 2025; 21(7): 1306-17.
11. Juárez-Vignon Whaley JJ, Carrera-Muiños A, Hernandez-Gutierrez KG, Rodriguez-Cid JR, Otero-Cerdeira ME, Garcia-Montes V. Paraneoplastic cerebellar degeneration with anti-CV2/CRMP5 antibodies in ovarian cancer: case report and review of the literature. Case Reports in Oncology. 2022: 805-1799:(3)14.
12. Honnorat J. Early-onset immunotherapy by intravenous immunoglobulin and corticosteroids in well characterized onconeural-antibody-positive paraneoplastic neurological syndrome. Clinical and experimental immunology. 2014; 178 Suppl 1(Suppl 1): 127-9.
13. Schneider BJ, Naidoo J, Santomasso BD, et al. Management of immune-related adverse events in patients treated with immune checkpoint inhibitor therapy: ASCO guideline update. Journal of clinical oncology. 126-4073: (36)39: 2021.