




# Psychiatric Manifestations in a Child with Periventricular Leukomalacia: A Case Report and Literature Review

Dr. Parinda Parikh <sup>\*1</sup>, Ananya Reddy Dadem <sup>2</sup>, Dilinuer Wubuli <sup>3</sup>, Eric Wang <sup>4</sup>, Shaurya Kumar Singh <sup>5</sup>, Himani J Suthar <sup>6</sup>, Kanuja Sood <sup>7</sup>, Arushi Chandra-Kaushik <sup>8</sup>, Rithika Narravula <sup>9</sup>, Sahia Manepalli <sup>10</sup>, Henny Witriol <sup>11</sup>, Dr. Mina Oza <sup>12</sup>

<sup>1</sup>Department of Psychiatry, Weill Cornell Medical School, White Plains, USA.

<sup>2</sup>SVIMS- Sri Padmavathi Medical College for Women, Andhra Pradesh, India.

<sup>3</sup>Department of Neurology, Toronto Western Hospital, Ontario, Canada.

<sup>4</sup>Edgemont Jr. Sr. High School, Westchester, New York, United States.

<sup>5</sup>Pravara Institute of Medical Sciences, Loni, Maharashtra, India.

<sup>6</sup>GMERS Medical College and Civil Hospital, Gandhinagar, India.

<sup>7</sup>Lincoln Medical Center, New York, USA.

<sup>8</sup>NYU Steinhardt School of Culture, Education, and Human Development, New York, USA.

<sup>9</sup>University of Pittsburgh, Pennsylvania, USA.

<sup>10</sup>University of South Florida, USA.

<sup>11</sup>Mt. Saint Vincent University, New York, USA.

<sup>12</sup>2nd ARC Associates, White Plains, USA.

\*Corresponding author: Dr. Parinda Parikh; [drparikh@2ndarc.com](mailto:drparikh@2ndarc.com)

Received: 07 June 2025;

Accepted: 20 July 2025;

Published: 01 August 2025

## Abstract

**Background and Objectives:** Periventricular Leukomalacia (PVL) is a type of brain injury that involves damage to the white matter around the brain's fluid-filled ventricles. PVL is more commonly reported in premature infants, and existing studies have associated it with neurodevelopmental sequelae, but its role in behavioral disorders and mood dysregulation in children has not yet been elucidated. This research article aims to evaluate the psychiatric effects of PVL using both pre-existing literature and a clinical case study. **Methods:** A qualitative investigation of English-language literature published after the year 2000 was performed in PubMed and Google Scholar using the following keywords: periventricular leukomalacia, behavioral disorder, attention deficit and hyperactivity disorder (ADHD), anxiety disorders, and disruptive mood dysregulation disorder. No preference was given. All available literature, including case reports, extensive cohort studies, and mechanistic papers providing insight into PVL pathophysiology, were reviewed, analyzed, and collected. **Case Presentation:** We report a rarely documented case of a 10-year-old female with PVL presenting with frequent outbursts of aggressive behavior, persistent irritability, refusal to sleep, enduring anxiety, depressed mood, and suicidal ideation. Collateral history reveals that symptoms have been prevalent for a significant period and have progressively worsened. **Results and Conclusion:** This case illuminates the possibilities of pediatric patients with PVL developing mood and behavioral disorders, emphasizing the need for a multidisciplinary assessment and long-term psychiatric monitoring.

**Keywords:** Periventricular leukomalacia, disruptive mood dysregulation disorder, anxiety disorders, attention deficit hyperactivity disorder.

## Introduction

Periventricular Leukomalacia (PVL) is a major neuropathological brain injury that is characterized by softening and necrosis of the white matter surrounding the lateral ventricle of the brain <sup>[1,2]</sup>. PVL is primarily caused by ischemic or inflammatory damage to the brain

tissue and is more commonly seen in premature or very low birthweight infants. Prior research indicates that infants with PVL have an increased risk of developing conditions like cerebral palsy in addition to other cognitive impairments <sup>[3,4]</sup>.

As per the American Psychological Association Dictionary of Psychology 2018, behavior disorders refer to a "persistent and

repetitive pattern of behavior that violates societal norms or rules, seriously impairs a person's functioning, or creates distress in others". It is a generalized term used to cover a wide range of disorders, including attention deficit hyperactivity disorder (ADHD), anxiety disorders, and others. ADHD is a type of behavior disorder, now classified under neurodevelopmental disorder, defined by a persistent pattern of inattention and/or hyperactivity that interferes with daily life. ADHD is divided into two domains, attention and hyperactivity, with a requirement of at least six symptoms in one domain for a diagnosis. Anxiety disorders, apart from generalized anxiety disorder, which is impartial to precipitating factors, are all identified by excessive fear and anxiety focused on specific triggers. Mood disorders are a group of psychiatric conditions distinguished by significant disturbances in emotional state that last for prolonged periods. Disruptive mood dysregulation disorder (DMDD) is a type of depressive mood disorder that is characterized by intense and recurrent temper outbursts that occur three or more times each week for a year or more [5].

While much of the existing clinical data depicts the connection between PVL and cerebral palsy in premature infants, the correlation of psychiatric manifestations in children with PVL remains insufficiently explored. Here we introduce a case of a young female with PVL exhibiting depressive features and signs of a behavioral disorder. To our knowledge, case reports detailing the aforementioned condition are sparsely available in English publications, with the only other accessible report mentioning a similar case in a middle-aged female [6]. This raises an interest in the long-term psychiatric outcome and behavioral consequences of PVL and its treatment.

## Case Presentation

A 10-year-old female with an existing history of PVL and a known physical disability presented to the clinic with her parents for a comprehensive evaluation due to multiple behavioral issues. The patient's parents reported that she "behaved like an animal from the minute she walked into the house". She displayed aggressive tendencies, biting, scratching, and hitting her parents when subjected to controlling behavior. The patient had multiple periods of these behaviors and could "switch off or on" these moods. Per her parents, she would come home from school stressed, yelling, kicking, and throwing objects around the house. She would also often resist sleeping.

Upon evaluating the patient, she disclosed that she would feel anxious both in school and at home. She reported having difficulties in school and that there was "too much going on". She mentioned that she had friends, but believed that they did not treat her normally. She reported that she frequently felt sad and constantly questioned why she was alive. She admitted to a lack of energy, a lack of drive, feelings of hopelessness, helplessness, and worthlessness. She insisted that she felt she was a "big girl" and frequently demonstrated oppositional behavior to parental authority.

Inquiry into her care history revealed that she was at a specialized school for children with physical disabilities from 18 months to 5 years, after which she continued to see her pediatrician, who started her on Lexapro (Escitalopram) 2.5 mg. She reportedly had no problems taking the medication. Baseline blood investigations were conducted and found to be inconclusive. Lexapro dosage was increased to 7.5 mg, and the patient was initiated on Olanzapine 1.25 mg. Lamictal (Lamotrigine) 100 mg was also gradually introduced to her regimen. She was regularly reevaluated and closely monitored for any unfavorable changes in behavior or mood.

## Literature review

Periventricular Leukomalacia is a brain tissue injury characterized by death or damage to the white matter surrounding the ventricles of the brain. PVL is classically considered in relation with neurodevelopmental deficits like cerebral palsy and has a growing library of literature on the same. However, studies detailing its direct impact on psychopathology remain few.

A review of literature uncovers some related cohort studies [7], and a single published case in English elaborating the neuropsychological outcomes of a patient with PVL [6]. The case reported was regarding a 34-year-old married female with PVL and treatment resistant bipolar affective disorder. It is worth noting that our case is the only other report, to our knowledge, that brings to light the psychiatric consequences of PVL. More significantly, our report elaborates on symptoms of ADHD, anxiety and DMDD in a child of ten years implying the possibilities of other such undocumented cases in children with PVL.

In the studies available, it was made evident that most of the patients with PVL, including our own, had developed some type of behavioral or mood disorders or both in addition to neurological deficits. This suggests that there is a marked correlation between PVL and psychiatric conditions but due to lack of consistent follow-up for psychological welfare there is minimal literature available.

## Discussion

In cases of conditions with significant neurological pathology, the possibility of developing psychiatric disorders remains underrecognized. This case contributes to the currently sparse yet continuously evolving field of literature elucidating the correlation between neuroanatomy and psychiatry.

The basis of mood dysregulation in patients with PVL can be traced back to its etiology: ischemia and inflammation of brain tissue during perinatal development. Some existing studies suggest that the accelerated loss of subplate neurons due to impaired tissue perfusion during intrauterine brain development may be strongly associated with subsequent motor, visual and cognitive defects [8]. Subplate neurons, present in periventricular white matter, are vulnerable to tissue ischemia. These cells play a crucial role in axonal targeting which is necessary for formation of mature thalamocortical connections, and under normal conditions, undergo programmed apoptosis during the third trimester of gestation [9]. Wu Jeong Hwang et al. elaborate on how the disruption of neural pathways between thalamus and cortex has been implicated in various mood disorders [10].

The case we presented, a ten-year-old girl with documented history of PVL, exhibiting frequent inappropriate emotional outbursts, periods of aggressive behavior, symptoms of anxiety, inattention, and suicidal ideation, aligns with prior research that suggest a pathophysiological basis predisposing her for psychiatric comorbidities like Disruptive mood dysregulation disorder, Attention deficit hyperactivity and anxiety. PVL has also been linked with neurodevelopmental delays in children, which may contribute to impaired social functioning and difficulties in behavioral management.

Our case and others like it, bring into focus salient concerns regarding the amplified focus on neurological conditions leading to underdiagnosis of psychiatric symptoms. This case substantiates the requirement for multidisciplinary management of children with PVL. Increased awareness amongst pediatricians, neurologists and mental health professionals could help in early identification and timely intervention. From a research perspective, further studies are

warranted to explore how early white matter injury can predispose to affective syndromes. Further expanding this line of inquiry may contribute to a more holistic understanding of neuropsychiatric basis for disease.

## Conclusion

This case of a young child with periventricular leukomalacia developing disruptive mood dysregulation disorder, attention deficit hyperactivity disorder and anxiety disorder illuminates the possibilities of pediatric patients with PVL developing mood and behavioral disorders. Our case adds to the limited but expanding research base linking later manifestations of psychiatric outcomes to PVL. This case underscores the importance of psychiatric assessment in cases with neuropathology and reinforces the concept of seeing beyond neurodevelopmental deficits to consider possible psychiatric ailments. It emphasizes the need for multidisciplinary assessment, early psychiatric screening and long-term psychiatric monitoring for patients with an existing history of PVL. Finally, this case calls to attention the sparse availability of academic resources detailing this condition and advocates for further investigations into neuropsychiatry and pathophysiology of this disease.

## Declarations

## Ethical Approval

Not Applicable

## Conflicts of interest

The authors declare that they have no financial or professional conflicts of interest related to the content of this paper.

## Funding statement

No funding was received for this work.

## Data Availability

All data are available from the corresponding author upon responsible request.

## Acknowledgments

The authors would like to express their sincere appreciation to the mentors and colleagues who provided valuable insights and guidance.

## Authors contributions

All authors made substantial contributions to the reported work. They gave final approval for this version to be published and agreed on the journal for submission.

## References

- [1] Schizophrenia and other psychotic disorders Case report: schizophrenia and periventricular leukomalacia. (2021). *Psychiatry and Clinical Psychopharmacology* 2013; 23: Supplement S281-S28. <https://psychiatry-psychopharmacology.com/en/schizophrenia-and-other-psychotic-disorders-case-report-schizophrenia-and-periventricular-leukomalacia-132236>
- [2] Kato, A., Ibara, S., Maruyama, Y., & Terahara, M. (2010). Relationship between enlargement of the lateral ventricle

and periventricular leukomalacia in infants. *The journal of obstetrics and gynaecology research*, 36(5), 984–990. <https://doi.org/10.1111/j.1447-0756.2010.01290.x>

- [3] Song, J., Yue, Y., Sun, H., Cheng, P., Xu, F., Li, B., Li, K., & Zhu, C. (2023). Clinical characteristics and long-term neurodevelopmental outcomes of leukomalacia in preterm infants and term infants: a cohort study. *Journal of neurodevelopmental disorders*, 15(1), 24. <https://doi.org/10.1186/s11689-023-09489-7>
- [4] Pascal, A., de Bruyn, N., Naulaers, G., Ortibus, E., Hanssen, B., Oostra, A., de Coen, K., Sonnaert, M., Cloet, E., Casaer, A., D'Haese, J., Laroche, S., Jonckheere, A., Plaskie, K., van Mol, C., Bruneel, E., van Hoestenbergh, M. R., Samijn, B., Govaert, P., & Van den Broeck, C. (2023). The Impact of Intraventricular Hemorrhage and Periventricular Leukomalacia on Mortality and Neurodevelopmental Outcome in Very Preterm and Very Low Birthweight Infants: A Prospective Population-based Cohort Study. *The Journal of pediatrics*, 262, 113600. <https://doi.org/10.1016/j.jpeds.2023.113600>
- [5] Substance Abuse and Mental Health Services Administration. DSM-5 Changes: Implications for Child Serious Emotional Disturbance [Internet]. Rockville (MD): Substance Abuse and Mental Health Services Administration (US); 2016 Jun. 3, DSM-5 Child Mental Disorder Classification. Available from: <https://www.ncbi.nlm.nih.gov/books/NBK519712/>
- [6] Mamtani, H., Shiva, L., Nanjundaswamy, M. H., Kamble, N., Prasad, C., Desai, G., Chandra, P. S., & Thippeswamy, H. (2022). Treatment resistance in bipolar affective disorder with recurrent mania course-Role of periventricular leukomalacia. *Bipolar disorders*, 24(1), 93–96. <https://doi.org/10.1111/bdi.13138>
- [7] Choi, J. Y., Rha, D. W., & Park, E. S. (2016). The Effects of the Severity of Periventricular Leukomalacia on the Neuropsychological Outcomes of Preterm Children. *Journal of child neurology*, 31(5), 603-612. <https://doi.org/10.1177/0883073815604229>
- [8] McQuillen, P. S., & Ferriero, D. M. (2005). Perinatal subplate neuron injury: implications for cortical development and plasticity. *Brain pathology (Zurich, Switzerland)*, 15(3), 250–260. <https://doi.org/10.1111/j.1750-3639.2005.tb00528.x>
- [9] Deng, W., Pleasure, J., & Pleasure, D. (2008). Progress in periventricular leukomalacia. *Archives of neurology*, 65(10), 1291–1295. <https://doi.org/10.1001/archneur.65.10.1291>
- [10] Hwang, W. J., Kwak, Y. B., Cho, K. I. K., Lee, T. Y., Oh, H., Ha, M., Kim, M., & Kwon, J. S. (2021). Thalamic Connectivity System Across Psychiatric Disorders: Current Status and Clinical Implications. *Biological psychiatry global open science*, 2(4), 332–340. <https://doi.org/10.1016/j.bpsgos.2021.09.008>



**Open Access** This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if changes were

made. The images or other third-party material in this article are included in the article's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use,

you will need to obtain permission directly from the copyright holder. To view a copy of this license, visit <https://creativecommons.org/licenses/by/4.0/>.

© The Author(s) 2025