World Journal of Medical Case Reports
2026, Vol. 7, No. 3, pp. 40–43
https://doi.org/10.11648/j.wjmcr.20260703.12

Case Report

Diagnostic Challenges and Management of Paroxysmal Nocturnal Hemoglobinuria: A Case Report from Nepal

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Abstract

This case report focuses on a 26-year-old man from Nepal who was diagnosed with paroxysmal nocturnal haemoglobinuria (PNH), an uncommon and potentially life-threatening haematological disorder. PNH is characterised by chronic intravascular haemolysis, bone marrow failure, and an increased risk of thrombosis, which can contribute to considerable clinical complications. The patient presented with several symptoms, including generalised weakness, jaundice, recurrent episodes of nosebleeds, dark-coloured urine, and pain in the large joints during the winter season. These symptoms had developed over time and reflected the varied clinical manifestations that can occur in patients with PNH. On clinical examination, the patient had scleral icterus and hepatomegaly, supporting the presence of an underlying haemolytic condition. Laboratory investigations demonstrated severe anaemia, leukopenia, an elevated lactate dehydrogenase level, and a significant PNH clone identified through flow cytometric analysis. Bone marrow examination also revealed findings that were consistent with the diagnosis of PNH. The combination of the patient's clinical presentation, laboratory abnormalities, flow cytometry findings, and bone marrow results helped establish the final diagnosis. This report highlights the diagnostic difficulties associated with PNH because of its rarity and diverse clinical presentation, which may delay accurate recognition of the condition. It also reviews the available treatment approaches, including eculizumab and corticosteroids. Overall, the case emphasises the importance of maintaining clinical awareness and achieving a timely and accurate diagnosis to support the effective management of this rare and potentially fatal haematological disorder.

Keywords

Paroxysmal Nocturnal Hemoglobinuria, Nepal, Intravascular Hemolysis, Flow Cytometry, CD55, CD59, Eculizumab, Resource-limited Setting

1. Introduction

1.1. Epidemiology of PNH

One Uncommon Acquired Haematopoietic Condition Is Paroxysmal Nocturnal Haemoglobinuria (PNH). According to Studies, There Are Between One and Ten Clinically Significant Instances for Every Million Persons. It Mainly Affects Adults, and Those in Their Thirties Usually Experience Its Peak Onset [1, 9]. Males and Females Are Equally Affected

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Received: 3 June 2026; **Accepted:** 17 June 2026; **Published:** 12 November 2026

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by PNH, Although It Is Caused by an Acquired Mutation of a Gene on the X Chromosome [2].

1.2. Pathophysiology and Diagnosis

Bone Marrow Failure, Thrombosis, and Persistent Intravascular Haemolysis Are the Hallmarks of Paroxysmal Nocturnal Haemoglobinuria (PNH), a Clonal Haematopoietic Stem Cell Illness. It Results from an Acquired Defect in Glycosylphosphatidylinositol (GPI)-anchored Proteins, Specifically CD55 and CD59. The PIGA Gene (phosphatidylinositol Glycan Anchor Biosynthesis, Class A), Which Is in Charge of Producing GPI Anchor Proteins, Is the Site of the Acquired Mutation [4-7]. Red Blood Cells (RBCs), White Blood Cells, and Platelets Are Among the Blood Cells That Are Shielded from Complement-mediated Harm by Regulatory Proteins. CD55 Inhibits the Activity of C3 Convertases, While CD59 Prevents the Formation of the Membrane Attack Complex (MAC) [6]. Complement-mediated Cell Lysis and Other Clinical Symptoms Are Caused by Deficiencies in These Proteins. The Gold Standard for Diagnosis Is Flow Cytometry Using Antibodies Against CD55 and CD59 [8, 10].

1.3. Diagnostic Challenges and Treatment

Due to Its Rarity, PNH Is Often Misdiagnosed, Leading to Significant Delays in Achieving a Definitive Diagnosis [10, 13]. Allogeneic Bone Marrow Transplantation (BMT) Is Still a Possibly Curative Option for Certain PNH Patients. Eculizumab, a Humanised Monoclonal Antibody That Targets Complement Protein C5, Is a Well-known and Successful Treatment for Patients with Haemolytic PNH [5, 10, 17].

2. Case Report

2.1. Clinical Presentation

A 26-year-old Male from Rampur, Nepal, Arrived at the Medicine Outpatient Department Complaining of Nosebleeds for the Previous Ten Days, Yellowish Discolouration of the Skin and Eyes for the Previous Five Years, and Generalised Weakness. While Ascending Upward, He Reported Feeling Weak and Exhausted as Well as Having Shortness of Breath (SOB). Without Any Discernible Aggravating or Alleviating Causes, the Weakness and SOB Began Subtly and Happened Sporadically. He Also Experienced Occasional Episodes of Dark Colored Urine in the Morning, But No Clay Colored Stools. The Nosebleeds Occurred 2-3 Times a Day, with About 5 Ml of Blood Per Episode. There Was No Bleeding from Other Orifices. Additionally, the Patient Reported Occasional Photophobia and Pain in the Large Joints (knees and Hips) During the Winter Season.

2.2. Medical History

Chest Discomfort, Palpitations, Orthopnea, Paroxysmal Nocturnal Dyspnoea (PND), Reduced Urine Output, Foamy Urine, Stomach Pain, Nausea, or Vomiting Were All Denied by the Patient. He Has No History of Hypertension, Diabetes Mellitus, or Pulmonary Tuberculosis. The Patient Is a Non-smoker and Consumes Alcohol Occasionally.

2.3. Physical Examination

The Patient Was Found to Be Afebrile, with a Blood Pressure of 110/70 mmHg, a Pulse Rate of 70 Beats Per Minute, and a Respiratory Rate of 15 Breaths Per Minute. In the Room Air, His Oxygen Saturation Was 98%. The Patient Was Awake, Composed, and Cognisant of Time, Location, and People. Hepatomegaly and Scleral Icterus Were Found on Physical Examination.

2.4. Initial Laboratory Investigations

The Patient's Test Results Revealed a Platelet Count of 184,000/mm3, a Leukocyte Count of 3200/mm3, and a Haemoglobin Level of 6.7 g/dL. The Biochemical Findings Showed a Reticulocyte Count of 3.2% and an Increased LDH Level of 2447 U/L (normal Range 140-280 U/L). Due to the Unavailability of Further Investigations, He Was Referred to a Tertiary Care Centre for Advanced Management.

2.5. Further Diagnostic Investigations

Over Time, the Patient Was Monitored, and Later Reports Showed the Following: Both the Direct and Indirect Coombs Test Was Negative, D-dimer Levels Were 0.1 ng/mL, and the Anti-nuclear Antibody and Anti-double-strand DNA Assays Were Negative. A Peripheral Blood Smear Showed Evidence of Reticulocytosis. Flow Cytometry Analysis Identified a PNH Clone in Granulocytes (92.10%), Monocytes (84.80%), and Red Blood Cells (61.70%).

2.6. Diagnosis and Management

A Moderately Hypercellular Marrow with Erythroid Predominance and Minor Megaloblastosis Was Found During Bone Marrow Aspiration. The Diagnosis of Paroxysmal Nocturnal Haemoglobinuria (PNH) Was Confirmed by Flow Cytometry, Which Revealed the Lack of CD55/59. Due to the Family's Financial Situation, the Patient Was Started on Oral Iron, Oral Folic Acid, and Steroids Instead of the Anticipated Eculizumab Medication. As of Right Now, the Patient Is Doing Well.

3. Discussion

3.1. Diagnostic Challenges in Resource-Limited Settings

PNH Is an Uncommon and Possibly Lethal Haematological Condition That Presents Substantial Diagnostic Difficulties, Particularly in Environments with Limited Resources. The Stated Incidence Is Between One and Ten Instances Per Million Individuals, Although Many Cases Are Probably Undetected [9]. Patients with PNH May Exhibit Bone Marrow Problems, Including Aplastic Anaemia or Signs of Haemolytic Anaemia and Unexplained Thrombosis, as Found in Classical PNH. However, in Certain Instances, There Can Be Absolutely No Symptoms or Presentation [10].

3.2. Clinical Manifestations and Differential Diagnosis

PNH Typically Presents as Major Vein Thrombosis and Develops Intravascular Haemolytic Anaemia and Pancytopenia, Often Associated with Bone Marrow Abnormalities Ranging from Mild to Severe. As Mentioned Earlier, the Condition Is Characterised by a Deficiency in CD55 and CD59. However, Diseases Such as Autoimmune Thrombocytopenia, Haemolytic Anaemia, and Systemic Lupus Erythematosus, Which Can Cause Symptoms Like PNH, Can Also Exhibit Abnormalities in These Proteins [3, 11, 12].

3.3. Misdiagnosis and Flow Cytometry

PNH Is Frequently Misdiagnosed as Haematuria, Iron Deficiency, Haemolytic Anaemia, Megaloblastic Anaemia, Refractory Anaemia, or Myelodysplastic Syndromes Due to Its Rarity [13]. For Instance, Yin Et Al. Described a Case with PNH That Was Misdiagnosed and Treated for Three Years as Iron-deficient Anaemia [14]. Similarly, a Case of PNH That Was First Misdiagnosed as Megaloblastic Anaemia Was Described by Paudyal Et Al. from Nepal [15]. Fatigue Can Lead to a Misdiagnosis and Years of Therapy for Anaemia. To Improve Diagnostic Accuracy, Flow Cytometry Was Used, as It Offers High Sensitivity and Specificity. The Patient's Haemolytic Presentation Was Linked with a Substantial Granulocyte Clone (more Than 50%) Found in the Investigation [8, 10, 16].

3.4. Eculizumab

Haemolytic PNH Patients' Quality of Life Is Much Improved by Eculizumab, a Humanised Monoclonal Antibody That Targets the Terminal Complement Protein C5. It Successfully Lessens the Requirement for Blood Transfusions, Thrombosis Risk, and Haemolysis [17]. The Membrane Attack Complex (MAC), Which Is Essential for Attaching to and Rupturing Bacterial Cell Walls and Killing Microorganisms, Is Created When the Complement Protein C5 Is Broken Down by C5 Convertase Into C5a and C5b. Eculizumab Usage, However, Raises the Risk of Infection. Pyrexia (fever), Headache, Abdominal Distension, Viral Infections, Anxiety, and Renal Impairment Were Among the Major Side Events Linked to the Medication, According to a Multicenter Phase 3 Study by Brodsky Et Al [17].

3.5. Corticosteroids

Short Corticosteroid Courses Have Been Suggested by Several Writers as a Possible Therapy for Acute Haemolytic Exacerbations. However, the Role of Corticosteroids in Alleviating Acute Exacerbations Is Still Debated, as There Is No Experimental Data to Definitively Support Their Effectiveness. However, Their Usage Could Lessen the Intensity and Length of Crises, Possibly Avoiding the Dangers Associated with Long-term Corticosteroid Medication [10, 18].

4. Conclusion

The rare and complicated haematological condition known as paroxysmal nocturnal haemoglobinuria (PNH) is characterised by thrombosis, bone marrow failure, and persistent intravascular haemolysis. It poses diagnostic challenges due to its diverse clinical manifestations and the risk of misdiagnosis. Treatments such as eculizumab and corticosteroids have demonstrated potential benefits in improving patient outcomes, though their effectiveness and associated risks remain subjects of ongoing discussion. In this rare but potentially fatal illness, early and precise diagnosis is crucial for timely action.

5. Patient Consent

The patient gave written informed consent for this case report and all related clinical data to be published. This manuscript does not contain any personally identifying patient information.

Abbreviations

PNH	Paroxysmal Nocturnal Hemoglobinuria
LDH	Lactate Dehydrogenase
PIGA gene	Phosphatidylinositol Glycan Anchor Biosynthesis Class A
RBC	Red Blood Cell
MAC	Membrane Attack Complex
BMT	Bone Marrow Transplantation
SOB	Shortness of Breath
PND	Paroxysmal Nocturnal Dyspnea

Author Contributions

Priya Karna: Conceptualization, Investigation, Writing – original draft, Writing – review & editing

Gaurav Karn: Investigation, Writing – review & editing

Data Availability Statement

The article contains all pertinent data for this case study. If a valid request is made, the corresponding author may provide more information while protecting patient privacy.

Conflicts of Interest

There are no conflicts of interest, according to the authors.

References

[1] Schrezenmeier H, Muus P, Socié G, Szer J, Urbano-Ispizua A, Maciejewski JP, Brodsky RA, Bessler M, Kanakura Y, Rosse W, Khursigara G, Bedrosian C, Hillmen P. Baseline characteristics and disease burden in patients in the International Paroxysmal Nocturnal Hemoglobinuria Registry. Haematologica. 2014; 99(5): 922-929. https://doi.org/10.3324/haematol.2013.093161

[2] Dacie JV, Lewis SM. Paroxysmal nocturnal haemoglobinuria: clinical manifestations, haematology, and nature of the disease. *Ser Haematol.* 1972; 5(3): 3-23.

[3] Ruiz-Delgado GJ, Vázquez-Garza E, Méndez-Ramírez N, Gómez-Almaguer D. Abnormalities in the expression of CD55 and CD59 surface molecules on peripheral blood cells are not specific to paroxysmal nocturnal hemoglobinuria. Hematology. 2009; 14(1): 33-37. https://doi.org/10.1179/102453309X385089

[4] Luzzatto L, Bessler M, Rotoli B. Somatic mutations in paroxysmal nocturnal hemoglobinuria: a blessing in disguise? Cell. 1997; 88(1): 1-4. https://doi.org/10.1016/S0092-8674(00)81850-4

[5] Brodsky RA. Paroxysmal nocturnal hemoglobinuria. Blood. 2014; 124(18): 2804-2811. https://doi.org/10.1182/blood-2014-02-522128

[6] Kinoshita T, Inoue N, Takeda J. Defective glycosyl phosphatidylinositol anchor synthesis and paroxysmal nocturnal hemoglobinuria. Adv Immunol. 1995; 60: 57-103. https://doi.org/10.1016/S0065-2776(08)60584-2

[7] Zacks MA, Garg N. Recent developments in the molecular, biochemical and functional characterization of GPI8 and the GPI-anchoring mechanism. Mol Membr Biol. 2006; 23(3): 209-225. https://doi.org/10.1080/09687860600601494

[8] Rocha JMC, Silva ML, Souza MEL, Murao M, Araújo SS, Santos SM. Detection of PNH cells by flow cytometry, using multiparameter analysis. J Bras Patol Med Lab. 2014; 50(2): 105-114. https://doi.org/10.5935/1676-2444.20140003

[9] Gulbis B, Eleftheriou A, Angastiniotis M, Ball S, Surrallés J, Castella M, Heimpel H, Hill A, Vives Corrons JL. Epidemiology of rare anaemias in Europe. Adv Exp Med Biol. 2010; 686: 375-396. https://doi.org/10.1007/978-90-481-9485-8_22

[10] Parker C, Omine M, Richards S, Nishimura JI, Bessler M, Ware R, Hillmen P, Luzzatto L, Young N, Kinoshita T, Rosse W. Diagnosis and management of paroxysmal nocturnal hemoglobinuria. Blood. 2005; 106(12): 3699-3709. https://doi.org/10.1182/blood-2005-04-1717

[11] Nakamura N, Sugawara T, Shirato K, Kumasaka R, Nakamura M, Shimada M, Fujita T, Murakami R, Shimaya Y, Osawa H, Yamabe H. Paroxysmal nocturnal hemoglobinuria in systemic lupus erythematosus: a case report. J Med Case Rep. 2011; 5: 550. https://doi.org/10.1186/1752-1947-5-550

[12] Luzzatto L, Gianfaldoni G. Recent advances in biological and clinical aspects of paroxysmal nocturnal hemoglobinuria. Int J Hematol. 2006; 84(2): 104-112. https://doi.org/10.1532/IJH97.06117

[13] Kumar R, Dutta S, Kumar H, Lazar AI, Sashindran VK. Diagnostic dilemmas in paroxysmal nocturnal hemoglobinuria. Med J Armed Forces India. 1994; 50(1): 27-30. https://doi.org/10.1016/S0377-1237(17)31033-X

[14] Yin XL, Zhou TH, Peng L, Zhang XH, Wang L, Zhou YL, Chen YS, He YY. A case report of concomitant paroxysmal nocturnal hemoglobinuria and heterozygous β-thalassemia. Ann Hematol. 2011; 90(3): 355-356. https://doi.org/10.1007/s00277-010-1011-4

[15] Paudyal BP, Zimmerman M, Karki A, Neupane H, Kayastha G. Paroxysmal nocturnal hemoglobinuria. JNMA J Nepal Med Assoc. 2005; 44(157): 23-25. https://doi.org/10.31729/jnma.425

[16] Pokhrel B, Gautam S, Khanal S, Pokhrel NB, Shrestha A. A rare and misdiagnosed entity paroxysmal nocturnal hemoglobinuria: a case report. Cureus. 2021; 13(5). https://doi.org/10.7759/cureus.14902

[17] Brodsky RA, Young NS, Antonioli E, Risitano AM, Schrezenmeier H, Schubert J, Gaya A, Coyle L, De Castro C, Fu CL, Maciejewski JP, Bessler M, Kroon HA, Rother RP, Hillmen P. Multicenter phase 3 study of the complement inhibitor eculizumab for the treatment of patients with paroxysmal nocturnal hemoglobinuria. Blood. 2008; 111(4): 1840-1847. https://doi.org/10.1182/blood-2007-06-094136

[18] Issaragrisil S, Piankijagum A, Tang-naitrisorana Y. Corticosteroids therapy in paroxysmal nocturnal hemoglobinuria. Am J Hematol. 1987; 25(1): 77-83. https://doi.org/10.1002/ajh.2830250108