DOI: 10.7860/JCDR/2026/81651.22845

Original Article

Pathology Section

Clinicopathological Analysis of Plasmablastic Lymphoma Cases: A Cross-sectional Study from a Tertiary Care Cancer Centre in Kerala, India

CM SIMI[1], REKHA A NAIR[2], AV JAYASUDHA[3], PRIYA MARY JACOB[4], SREEJITH G NAIR[5], KM JAGATHNATH KRISHNA[6]

ABSTRACT

Introduction: Plasmablastic Lymphoma (PBL) is an aggressive lymphoid neoplasm composed of large atypical B cells with plasmablastic or immunoblastic morphology and a terminal B-cell differentiation phenotype predominantly presenting at extranodal sites. PBL is rare comprising 1% of large B-cell lymphomas. Most PBLs occur in the context of immune deficiency/dysregulation.

Aim: To analyse the morphology, immunophenotype, clinical details and diagnostic challenges in cases diagnosed as PBL.

Materials and Methods: The present study was a cross-sectional cohort study analysing cases of PBL diagnosed during 2011 to 2021 in the Department of Pathology, Regional Cancer Centre, Thiruvananthapuram, Kerala, India. Morphology and Immunohistochemistry (IHC) (CD45, CD3, CD5, CD20, CD79a, Pax5, CD38, CD138, MUM1, EMA, Kappa, Lambda, CD56, CD30, Alk-1, Ki-67) of tumour cells were reviewed. Epstein-Barr Virus (EBV) by Rapid in Situ Hybridisation (RISH) was also documented. Clinical details including patients age, sex, clinical presentation were elaborated using descriptive statistics. Treatment details and overall survival also noted.

Results: During the study period there were a total of 36 cases. The median age at presentation was 57 years (range: 10 to 85 years). Six cases (16.7%) had associated HIV, 26 cases (72.2%) had extranodal disease. Tumour cells in all cases were positive for CD138 and MUM1, and negative for CD20, PAX5, and T-cell markers with a high Ki-67 proliferation index (80-95%). Leukocyte Common Antigen (LCA) were negative in 22 cases (61.11%) or weakly positive in 14 cases (38.9%), CD 79a was faintly positive in one case (2.8%) and weak Pax5 positivity was seen in two cases (5.6%). EBV was positive in 21 cases (58.3%) Median overall survival was 17.5% for 3-year in the present study.

Conclusion: PBL is a rare aggressive lymphoma having association with HIV, predominant extranodal location, and characteristic IHC pattern. Lymphoproliferative neoplasms with plasmablastic morphology share many morphologic and immunophenotypic similarities and diagnosis requires integration of clinical morphological and IHC findings.

Keywords: Epstein-Barr virus, Large B-cell lymphoma, Lymphoproliferative neoplasms

INTRODUCTION

The PBL is a highly aggressive lymphoid neoplasm characterised by large, atypical B cells with plasmablastic or immunoblastic morphology and a terminal B-cell differentiation phenotype [1-3]. It predominantly arises from the extranodal sites such as nasal and oral cavities, gastrointestinal tract, bone, soft-tissues, and skin [1,3]. However, nodal involvement can occur in the absence of detectable extranodal disease. PBL is a rare entity, accounting for approximately 1% of all large B-cell lymphomas [1,2,4]. PBL is most frequently observed in immune deficiency or dysregulation with a strong association with HIV infection and immunosuppressive therapy following bone marrow transplantation, solid organ transplantation, or autoimmune disease [1,4-6]. Nonetheless, PBL can also develop in elderly individuals without overt immunodeficiency, where immunosenescence may contribute to its pathogenesis. PBL is invariably associated with Epstein-Barr virus (EBV) infection, EBV negativity does not exclude the diagnosis [6-9]. Additionally, PBL can emerge secondarily through the transformation of pre-existing lymphoproliferative disorders, such as follicular lymphoma or chronic lymphocytic leukaemia/small lymphocytic lymphoma [1,6].

The PBL exhibits a destructive infiltrate composed predominantly of large immunoblastic and plasmablastic cells. A starry-sky pattern and high mitotic activity may be observed. In rare cases, the infiltrate includes a minor component of intermediate-sized lymphoplasmacytoid cells and plasma cells [10-13]. Immunohistochemically, PBL is characterised by absence of CD20 expression, along with reduced or absent expression of PAX5 and CD45. CD79a is positive in approximately 40% of cases [1,6]. Markers associated with plasma cell differentiation, including CD138 and CD38, are expressed in the majority of cases [1,3,6]. MUM1 is consistently positive. Additionally, CD10, CD56, and CD30 expression is observed in 20-30% of cases, which may lead to diagnostic challenges by mimicking other lymphoproliferative neoplasms. EBV is demonstrable in approximately 60% of cases, further supporting its role in PBL pathogenesis [14,15].

The PBL exhibits significant morphological and immunophenotypic overlap with several other lymphoproliferative disorders like ALK-positive large B-cell lymphoma, plasma cell myeloma, and extracavitary/solid primary effusion lymphoma [16,17]. Given its aggressive clinical behaviour and distinct therapeutic considerations, accurate identification of PBL and differentiation from other neoplasms with plasmacytoid morphology are crucial [18-20]. PBL is associated with a poor prognosis, with a median overall survival ranging from 6 to 32 months when treated with conventional chemotherapy [21-23].

Most of the published literature are focused on isolated case reports with literature reviews or case series [23-25]. The aim of present study was to analyse the morphology, immunophenotype, clinical details and cases diagnosed as PBL and also to analyse the morphology and immunophenotype of cases diagnosed as PBL.

MATERIALS AND METHODS

This was a cross-sectional cohort study conducted at a tertiary care cancer centre. Study population included all the cases of PBL diagnosed in the Division of Pathology, Regional Cancer Centre, Thiruvananthapuram from January 2011 to December 2021 (11 years). Study was approved by Institutional Scientific Review committee and ethical committee (HEC No.50/2024).

Inclusion criteria: Cases of nodal and extranodal PBL using morphology and IHC during 2011 to 2021 were included in the study.

Exclusion criteria: Cases of PBL for which slides and blocks could not be retrieved from the archives were excluded from the study.

Study Procedure

The details of cases selected for the study were collected using a proforma. Patient details like age, gender, clinical presentation, sites of involvement extranodal or nodal, HIV status, radiology findings, clinical stage, pattern of care were noted from medical records. Complete blood counts, Serum immunoglobulin assay, Lactate Dehtdrogenase (LDH) values were also noted. Data collection was done by retrieving the case sheets of the 36 cases. The follow-up details and survival data were accessed from case records or by directly enquiring via phone.

Morphology of tumour cells in haematoxylin-eosin sections and IHC were reviewed, and findings were summarised. The panel of antibodies used in IHC depicted in [Table/Fig-1].

S. No.	IHC antibodies	Clone
1	CD45	DAKO-2B11+PD7/26
2	CD3	Biocare-BC33
3	CD5	Biocare-AC7
4	CD20	DAKO-L26
5	CD79a	DAKO-JCB117
6	Pax5	DAKO-DAKPAX5
7	CD138	DAKO-M115
8	MUM1	DAKO-MUM1p
9	CK	DAKO-AE1/AE3
10	Kappa	Biocare-L1C1
11	Lambda	Biocare-N1012
12	CD30	DAKO-BerH2
13	ALK-1	DAKO-ALK1
14	Ki-67	Biocare-SP60.

[Table/Fig-1]: The panel of antibodies used in immunohistochemistry.

EBV by Rapid In-situ Hybridisation (RISH) (Biocare) studies were also done. Bone marrow aspirates and bone marrow trephine biopsies performed as a part of staging were also reviewed. Bone marrow aspirates were assessed for the morphology of plasmacytoid cells and percentage of plasmablasts. Pattern of infiltration was noted in bone marrow trephine biopsy. Immunohistochemistry done in bone marrow trephine biopsy was also reviewed.

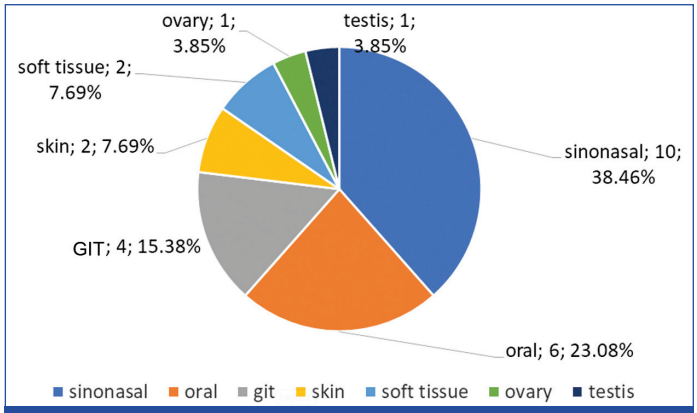
STATISTICAL ANALYSIS

The data were summarised using appropriate descriptive statistics (counts, percentages, mean, median, standard deviation etc). The overall survival probabilities were estimated using Kaplan-Meier method and corresponding survival comparison using log rank test. A p-value <0.05 was considered significant. All data were analysed using Statistical Package for the Social Sciences (SPSS) software version 28.0.

RESULTS

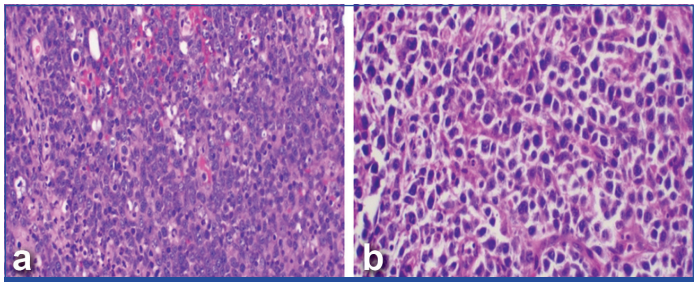
There were a total of 36 cases with M±SD of 52.78±18.32 years. Median age was 57 years (range: 10 to 85 years). Among 36 cases, 28 (77.8%) were male and 8 (22.2%) were female. Two of the patients were below 20 years, in that one was a case of Turners syndrome and other was a retro positive case. Six (16.7%) patients were HIV positive. Two were HCV positive and two cases positive for HBAg. The increased risk of autoimmune diseases in Turner's syndrome patients could have potentially increased the risk of lymphoma development.

Most of the patients (72.2%) presented with extranodal disease (26/36). [Table/Fig-2]. In the sinonasal area, maxillary sinus was the common site involved. In the oral cavity, the gingiva and palate were the most commonly affected sites. Among the four cases involving GIT, two cases involved stomach, one case each in oesophagus and stomach. Ten out of 36 cases (27.8%) presented with primary nodal disease, cervical lymph node being commonly involved. Seven out of 26 extranodal cases had associated lymphadenopathy also. Lytic lesions in vertebra were seen in one case, this patient had generalised disease. Stage 4 involvement was seen in two cases. Complete blood counts were within normal limits in all cases. Serum immunoglobulin assay showed mild elevation of IgG in six cases. LDH was mildly raised in 12 cases. LDH is increased in PBL as compared to Plasma cell myeloma which is a close differential.



[Table/Fig-2]: Extranodal sites of involvement in plasmablastic lymphoma.

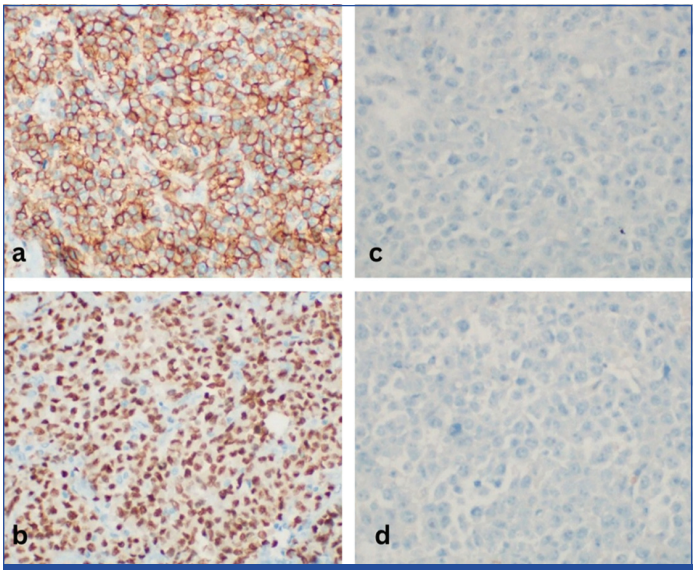
Histopathological examination showed a destructive infiltrate composed of large immunoblastic and plasmablastic cells. Plasmablastic morphology was seen in 60% of cases and immunoblastic morphology was seen in 40% of cases [Table/Fig-3]. Predominant cells are large and non cohesive, with abundant cytoplasm and large vesicular nuclei with prominent nucleoli. Lymphoplasma cytoid cells and plasma cells were seen in a few cases (14.4%).



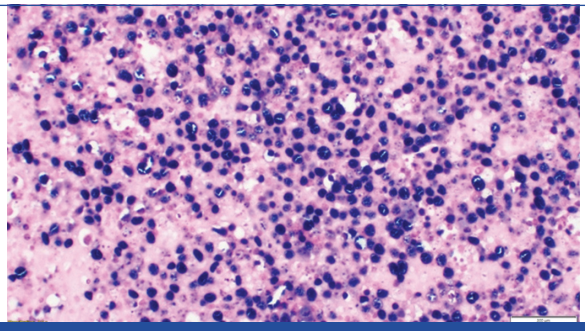
[Table/Fig-3]: Plasmablastic lymphoma morphology (a) Plasmablastic morphology (H&E, 40x); (b) Immunoblastic morphology (H&E, 40x).

On IHC all the cases expressed CD138 [Table/Fig-4a]. IHC for MUM1 was also positive in all cases [Table/Fig-4b]. LCA was negative in most of the cases (60%) and weakly positive in 40% of cases and CD20 expression was absent in all cases [Table/Fig-4c,d]. PAX5 was weakly positive in two cases. Weak CD 79a positivity was seen in one case. All the cases showed a high Ki-67 proliferation index (80-95%). Variable CD30 expression was seen in four cases. CD4 was expressed in 3 cases. Aberrant expression of CD3 was present in two cases. Focal weak cytokeratin positivity was seen in one case. IHC for ALK was negative in all cases. EBV testing by RISH [Table/Fig-5] was positive

in 21 cases (58%). IHC for Kappa and lambda showed light chain restriction in 6 cases. Cyclin D1 was negative in all cases.



[Table/Fig-4]: Plasmablastic lymphoma Immunohistochemistry (a) CD 138 positive in neoplastic cells (40x) (b) MUM-1 positive in neoplastic cells (40x); (c) Leukocyte common antigen negative in neoplastic cells (40x); (d) CD20 negative in neoplastic cells (40x).



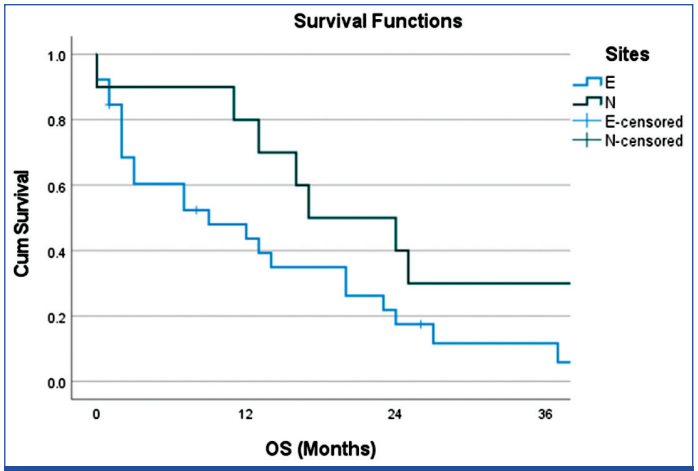
[Table/Fig-5]: Epstein-Barr virus by rapid in situ hybridisation showing strong nuclear positivity in neoplastic cells (40x).

Bone marrow aspirate and biopsy was done in all the cases. Bone marrow involvement was seen only in two cases. Peripheral smear was within normal limits in all cases.Treatment details were available in 30 patients. 22 patients received CHOP chemotherapy (cyclophosphamide, vincristine, doxorubicin, and prednisone), six patients received dose adjusted EPOCH (infusional etoposide, vincristine, and doxorubicin with bolus of cyclophosphamide and prednisone) regimens. Four patients in addition received local radiotherapy as these cases had bulky disease.

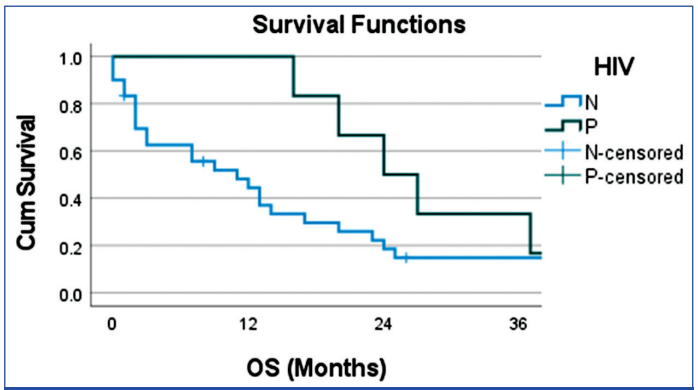
The overall survival of patient group for three years was 17.5% (SE=6.7%) [Table/Fig-6]. Three year overall survival for extranodal cases were 11.6% (7.1%) and that for nodal cases were 30.0% (SE=14.5%) which was not statistically significant [Table/Fig-7]. Three year overall survival for HIV positive cases were 14.8% (6.8%) and that for HIV negativecases were 33.3% (SE=19.2%) which was also not statistically significant [Table/Fig-8]. Further comparison of gender was also not statistically significant.

Survival time (years)	Variables		Survival probability% (SE%)	p-value
3	Overall survival		17.5 (6.7)	-
	Sex	Female	25.0 (15.3)	0.648
		Male	14.9 (7.3)	
	Sites	Extranodal	11.6 (7.1)	0.109
		Nodal	30.0 (14.5)	
	HIV	Negative	14.8 (6.8)	0.113
		Positive	33.3 (19.2)	

[Table/Fig-6]: Overall survival comparison for plasmablastic lymphoma.



[Table/Fig-7]: Comparison of overall survival in nodal and extranodal cases.



[Table/Fig-8]: Comparison of overall survival in HIV positive and negative cases.

DISCUSSION

The PBL is an uncommon and aggressive subtype of B-cell lymphoma, associated with poor clinical outcomes. PBL was initially described in 1997 and was most commonly found in the oral cavity of individuals with HIV [26]. In 2008, WHO officially recognised it as a distinct and rare form of large B-cell lymphoma. It primarily affects males and accounts for roughly 2% of AIDS-related lymphomas [27-29]. Since its initial description, PBL has also been reported in extraoral locations, particularly the gastrointestinal tract and skin [30-32]. Moreover, it has been identified in other immunocompromised settings, including post-transplant patients, those with systemic autoimmune diseases, and in the context of age-related immune decline.The median age at presentation and male predominance in the present study were comparable to other studies [19-25].

In a study by Tchernonog E et al., on analysis of 135 patients from the lysa group, median age was 58 years and had male predominance [20]. Another study by Elyamany G et al., also showed male predominance and median age was 51 yrs [28]. PBL commonly presents with extranodal disease, with sinonasal site being common in the present study whereas oral cavity was the common site in other studies [19-25]. HIV positive patients accounted for 16% of cases in present study which was less compared to literature reviews which showed HIV association in 31 to 62% of cases [19,20,33-36]. PBL is characterised histologically by a diffuse infiltrate of atypical large cells with plasmablastic or immunoblastic morphology, high proliferation index. In this study 60% of cases showed plasmablastic morphology and 40% showed immunoblastic morphology.

The neoplastic cells in PBL exhibit an immunophenotype characterised by expression of plasma cell markers and diminished or absent expression of B-cell markers. A hallmark of PBL is the lack or weak expression of mature B-cell markers such as CD20, CD79a, and PAX5, alongside strong positivity for plasma cell-associated markers like CD138 and MUM 1 [36-40]. In th present study, all biopsy specimens demonstrated expression of the plasma cell markers MUM-1 and CD138. CD20 was consistently

negative across all cases, while PAX5 and CD79a were absent in the majority. Epstein-Barr virus-encoded RNA (EBER) (by RISH) positive in 58 % of cases, comparable to the western data (60 to 70%) [1,6,19,33,34]. EBER expression was observed in 62% of tested cases in LYSA group study by Tchernonog E et al., [20].

Lymphoproliferative neoplasms with plasmablastic morphology share many morphologic and immunophenotypic similarities [16,41-45]. The other lymphoproliferative neoplasms that typically present with plasmablastic morphology are plasmablastic myeloma, Primary Effusion Lymphoma (PEL), Human Herpesvirus 8 (HHV8)–positive diffuse large B-cell lymphoma, not otherwise specified, and Anaplastic Lymphoma Kinase (ALK)–positive large B-cell lymphoma [16,17]. So it is important to differentiate PBL from these entities. Differentiating features between these entities are given in [Table/Fig-9]. Common among these entities is plasmablastic myeloma. Accurately differentiating PBL from PBM is clinically essential, as the two conditions require markedly different treatment approaches [36-40]. Although they are morphologically indistinguishable and share numerous immunophenotypic characteristics, key distinctions exist. Both PBL and PBM typically express plasma cell markers such as MUM1, CD138, and CD38, while lacking conventional B-cell markers like CD19, CD20, and PAX5. However, PBL particularly in HIV-positive patients frequently shows positivity for EBER a feature that is rarely seen in PBM. In contrast, cyclin D1 is often expressed in a subset of PBM cases but is generally absent in PBL. Aberrant expression of CD117 may also be seen in PBM, yet it has not been reported in PBL. Consequently, in cases exhibiting plasmablastic morphology, EBER positivity favours a diagnosis of PBL, whereas the presence of cyclin D1 or CD117 expression suggests PBM [1,6]. Distinguishing PBL from PBM also requires careful integration of clinical, radiological, and laboratory findings. Additionally, patients with PBM typically exhibit a significant serum monoclonal immunoglobulin, a feature generally absent in PBL.

Malignancy	Immunophenotype	Clinical findings
Plasmablastic lymphoma	Positive for plasma cell markers including CD38, CD138, IRF4/MUM-1, Lack of pan-B cell markers, Cyclin D1-ve, HHV8 -ve EBER +ve	Association with immunosuppression
Plasmablastic myeloma	Positive for plasma cell markers CD38,CD138, IRF4/MUM-1, cyclin D1+/-, EBER -ve, HHV8 -ve	Myeloma defining events include end organ damage attributable to the plasma cell proliferation such as hypercalcaemia, renal impairment, anaemia and lytic bone lesions. Monoclonal serum or urine immunoglobulin, serum free light chain ratio ≥100
ALK-positive large B-cell lymphoma	Plasma cell markers expressed: CD38, CD138, IRF4/MUM-1, ALK positivity. Lack of pan-B cell markers and CD30. EBER -ve, HHV8 -ve	Not typically associated with HIV infection or EBER expression.
Primary effusion lymphoma/ Extra-cavitary primary effusion lymphoma	Expression of pan B cell markers (CD19,CD20, CD79a and PAX5) HHV8 +ve. EBER +ve in 65% of cases	PEL manifests clinically as pleural or pericardial effusion or ascites. Extracavitary variants of PEL are extremely rare.

[Table/Fig-9]: Lymphomas with plasmablastic differentiation.

Another close mimicker of PBL morphologically and immunohistochemistry wise is Primary Effusion Lymphoma (PEL) and extracavitary primary effusion lymphoma [6,44]. Primary effusion lymphoma is a rare aggressive B-cell lymphoma that is seen mostly in HIV positive individuals manifesting as pleural or pericardial effusion or ascites. Extracavitary variants of PEL are extremely rare. Immunophenotypically the tumour cells are negative for pan–B-cell markers (PAX5,CD19, CD20, and CD79a) and positive for plasma cell markers and EBER. IHC for HHV8 is necessary to distinguish PBL and PEL. Another differential for PBL is HHV8 positive diffuse large B-cell lymphoma. Immunophenotypically, HHV8 positive diffuse large B-cell lymphoma often shows variable expression of pan B-cell markers and less consistent CD138 and CD38 expression and negative for EBER. ALK positive large B cell lymphoma has common features of plasmablasts. The tumour cells are negative or weakly positive for B-cell markers but positive for plasma cell markers including CD138 and MUM1. ALK positive large B-cell lymphoma shows unique expression of ALK protein [41,42].

The PBL presents significant diagnostic challenges due to its overlapping features with other lymphomas and plasma cell neoplasms. Most of these cases were referral cases from outside hospitals that were reported as poorly differentiated neoplasms. Clinical correlation and a broad panel of immunohistochemical markers were done to diagnose these cases.

Limitation(s)

Immunohistochemistry for HHV8 could not be done in all cases as it was not available in our centre. However in difficult cases it was performed outside centre. FISH for MYC gene rearrangement was also not done in the present study.

CONCLUSION(S)

The PBL is a rare and aggressive form of large B-cell lymphoma. The WHO primarily links it to HIV infection, it extends beyond patients with HIV, with a significant proportion of cases occurring in immunocompetent patients. The disease is often associated with the EBV. Accurate diagnosis of PBL requires the integration of clinical and morphological findings, along with the careful application of IHC stains to distinguish it from other neoplasms with plasmablastic features. Lymphoproliferative neoplasms exhibiting plasmablastic morphology represent a subset of aggressive B-cell lymphomas with overlapping morphological and immunophenotypic profiles. A comprehensive IHC panel is imperative for a definitive diagnosis of PBL. IHC evaluation for ALK and HHV8 along with EBER in-situ hybridisation is often critical for establishing a definitive diagnosis in cases displaying aoverlapping immunophenotype.

REFERENCES

[1] Campo E, Stein H, Harris NL, Plasmablastic lymphoma. In: Swerdlow SH, Campo E, Harris NL, et al, eds. WHO Classification of Tumours of Haematopoietic and Lymphoid Tissues. Revised 4th ed. Lyon, France: IARC Press; 2017 321-22.
[2] Ramirez-Gamero A, Martínez-Cordero H, Beltrán BE, Florindez J, Malpica L, Castillo JJ. Plasmablastic lymphoma: 2024 update on diagnosis, risk stratification, and management. Am J Hematol. 2024;99:1586-94.
[3] Di Ciaccio PR, Polizzotto MN, Cwynarski K, Gerrie AS, Burton C, Bower M, et al. The influence of immunodeficiency, disease features, and patient characteristics on survival in plasmablastic lymphoma. Blood. 2024;143:152-165.
[4] Cattaneo C, Re A, Ungari M, Peli A, Casari S, Castelnuovo F, et al. Plasmablastic lymphoma among human immunodeficiency virus-positive patients: Results of a single center's experience. Leuk Lymphoma. 2015;56(1):267-69.
[5] Castillo JJ, Bibas M, Miranda RN. The biology and treatment of plasmablastic lymphoma. Blood. 2015;125(15):2323–30.
[6] Stein H, Harris N, Campo E. Plasmablastic lymphoma. In: Swerdlow S, Campo E, Harris N, et al., eds. WHO Classification of Tumours of the Haematopoietic and Lymphoid Tissues. 4th ed. IARC; 2017:321-22.
[7] Castillo J, Pantanowitz L, Dezube BJ. HIV-associated plasmablastic lymphoma: Lessons learned from 112 published cases. Am J Hematol. 2008;83:804-09.
[8] Loghavi S, Alayed K, Aladily TN, Zuo Z, Ng SB, Tang G, et al. Stage, age, and EBV statusimpact outcomes of plasmablastic lymphoma patients: A clinicopathologic analysis of 61 patients. J Hematol Oncol. 2015;8:65.
[9] Bailly J, Jenkins N, Chetty D, Mohamed Z, Verburgh ER, Opie JJ. Plasmablastic lymphoma: An update. Int J Lab Hematol. 2022;44(8):54-63.
[10] Jessa R, Chien N, Villa D, Freeman CL, Slack GW, Savage KJ, et al. Clinicopathological characteristics and long-term outcomes of plasmablastic lymphoma in British Columbia. Br J Haematol. 2022;199:230-38.
[11] Florindez JA, Alderuccio JP, Reis IM, Lossos IS. Survival analysis in treated plasmablastic lymphoma patients: A population-based study. Am J Hematol. 2020;95(11):1344-51.

[12] Morscio J, Dierickx D, Nijs J, et al. Clinicopathologic comparison of plasmablastic lymphoma in HIV-positive, immunocompetent, and post transplant patients: Single-center series of 25 cases and meta analysis of 277 reported cases. Am J Surg Pathol. 2014;38:875-86.
[13] Pasqualucci L, Khiabanian H, Fangazio M, Vasishtha M, Messina M, Holmes AB, et al. Genetics of follicular lymphoma transformation. Cell Reports. 2014;6(1):130-40.
[14] Spender LC, Inman GJ. Inhibition of germinal centre apoptotic programmes by Epstein-Barr virus. Adv Hematol. 2011;2011:829525.
[15] Castillo JJ, Reagan JL. Plasmablastic lymphoma: A systematic review. ScientificWorldJournal. 2011;11:687-96.
[16] Chen BJ, Chuang SS. Lymphoid neoplasms with plasmablastic differentiation: A comprehensive review and diagnostic approaches. Adv Anat Pathol. 2020;27(2):61-74.
[17] Zhou J, Nassiri M. Lymphoproliferative neoplasms with plasmablastic morphology. Arch Pathol Lab Med. 2022;146:407-14.
[18] Mori H, Fukatsu M, Ohkawara H, Oka Y, Kataoka Y, Taito S, et al. Heterogeneity in the diagnosis of plasmablastic lymphoma, plasmablastic myeloma, and plasmablastic neoplasm: A scoping review. Int J Hematol. 2021;114(6):639-52.
[19] Bibas M. Plasmablastic lymphoma. A State-of-the-art review: Part 1-Epidemiology, pathogenesis, clinicopathologic characteristics, differential diagnosis, prognostic factors, and special populations. Mediterr J Hematol Infect Dis. 2024;16(1):e2024007.
[20] Tchernonog E, Faurie P, Coppo P, Monjanel H, Bonnet A, Algarte Génin M, et al. Clinical characteristics and prognostic factors of plasmablastic lymphoma patients: Analysis of 135 patients from the LYSA group. Ann Oncol. 2017; 28(4):843-48.
[21] Mundada MC, Ahmed F, Khera R, Murthy S, Rajappa S, Santa A, et al. Plasmablastic lymphoma: A clinicopathological study from a tertiary care cancer center in South India. South Asian J Cancer. 2020;9:105-108.
[22] Gujral S, Shet TM, Kane SV. Morphological spectrum of AIDS-related plasmablastic lymphomas. Indian J Pathol Microbiol. 2008;51(1):121-24.
[23] Bishnu S, Banerjee S, Bandyopadhyay D, Samui S, Bhattacharya S, Bose D. Plasmablastic lymphoma in HIV patients: Experience at a tertiary care hospital in eastern India. Indian J Cancer. 2015;52(4):563-67.
[24] Li JW, Peng HL, Zhou XY, Wang JJ. Plasmablastic lymphoma: Current knowledge and future directions. Front Immunol. 2024;15:1354604.
[25] Castillo JJ, Winer ES, Stachurski D, Perez K, Jabbour M, Milani C, et al. Clinical and pathological differences between HIV-positive and HIV-negative patients with plasmablastic lymphoma. Leuk Lymphoma. 2010;51(11):2047-53.
[26] Delecluse HJ, Anagnostopoulos I, Dallenbach F, Hummel M, Marafioti T, Schneider U, et al. Plasmablastic lymphomas of the oral cavity: A new entity associated with the human immunodeficiency virus infection. Blood. 1997;89:1413-20.
[27] Stein H, Harris N, Campo E. Plasmablastic lymphoma. In: Swerdlow S, Campo E, Harris NL,et al, eds. WHO Classification of Tumours of the Haematopoietic and Lymphoid Tissues. Lyon:IARC; 2008:256-57.
[28] Elyamany G, Alzahrani AM, Aljuboury M, Mogadem N, Rehan N, Alsuhaibani O, et al. Clinicopathologic features of plasmablastic lymphoma: Single-center series of 8 cases from Saudi Arabia. Diagn Pathol. 2015;10:78.
[29] Harmon CM, Smith LB. Plasmablastic lymphoma: A review of clinicopathologic features and differential diagnosis. Arch Pathol Lab Med. 2016;140(10):1074-78.
[30] Meer S, Perner Y, McAlpine ED, Willem P. Extraoral plasmablastic lymphomas in a high human immunodeficiency virus endemic area. Histopathology. 2020;76(2):212-21
[31] Montes-Moreno S, González-Medina AR, Rodríguez-Pinilla SM, Maestre L, Sánchez-Verde L, Roncador G, et al. Aggressive large B-cell lymphoma with plasma cell differentiation: Immunohistochemical characterization of plasmablastic lymphoma and diffuse large B-cell lymphoma with partial plasmablastic phenotype. Haematologica. 2010;95(8):1342-49.
[32] Hansra D, Montague N, Stefanovic A, Akunyili I, Harzand A, Natkunam Y, de la Ossa M et al. Oral and extraoral plasmablastic lymphoma: Similarities and differences in clinicopathologic characteristics. Am J Clin Pathol. 2010;134(5):710-19.
[33] Chang ST, Liao YL, Lu CL, Chuang SS, Li CY. Plasmablastic cytomorphologic features in plasma cell neoplasms in immunocompetent patients are significantly associated with EBV. Am J Clin Pathol. 2007;128(2):339-44.
[34] Shannon-Lowe C, Rickinson AB, Bell AI. Epstein-Barr virus-associated lymphomas. Philos Trans R Soc Lond B Biol Sci. 2017;372(1732):20160271.
[35] Valera A, Balagué O, Colomo L, Martínez A, Delabie J, Taddesse-Heath L, et al. IG/MYC rearrangements are the main cytogenetic alteration in plasmablastic lymphoma. Am J Surg Pathol. 2010;34(11):1686-94.
[36] Corti M, Minué G, Campitelli A, Narbaitz M, Gilardi L. An aggressive plasmablastic lymphoma of the oral cavity as primary manifestation of acquired immunodeficiency syndrome: Case report and literature review. Int Arch Otorhinolaryngol. 2015;19(4):354-58.
[37] Vega F, Chang CC, Medeiros LJ, Udden MM, Cho-Vega JH, Lau CC, et al. Plasmablastic lymphomas and plasmablastic plasma cell myelomas have nearly identical immunophenotypic profiles. Mod Pathol. 2005;18:806-15.
[38] Ahn JS, Okal R, Vos JA, Smolkin M, Kanate AS, Rosado FG. Plasmablastic lymphoma versus plasmablastic myeloma: An ongoing diagnostic dilemma. J Clin Pathol. 2017;70(9):775-80.
[39] Kim JE, Kim YA, Kim WY, Kim CW, Ko YH, et al. Human immunodeficiency virus-negative plasmablastic lymphoma in Korea. Leuk Lymphoma. 2009;50(4):582-87.
[40] Al Shaarani M, Shackelford RE, Master SR, Mills GM, AlZubaidi Y, Mamilly A, et al. Plasmablastic Lymphoma, a rare entity in bone marrow with unusual immunophenotype and challenging differential diagnosis. Case Rep Hematol. 2019;2019:1586328.
[41] Laurent C, Do C, Gascoyne RD, Lamant L, Ysebaert L, Laurent G, et al. Anaplastic lymphoma kinase-positive diffuse large B-cell lymphoma: A rare clinicopathologic entity with poor prognosis. J Clin Oncol. 2009;27(25):4211-16.
[42] Delsol G, Campo E, Gascoyne RD. ALK-positive large B-cell lymphoma. In: Swerdlow S, Campo E, Harris NL, et al, eds. WHO Classification of Tumours of the Haematopoietic and Lymphoid Tissues. Lyon: IARC; 2008:254-55.
[43] Hsi ED, Lorsbach RB, Fend F, Dogan A. Plasmablastic lymphoma and related disorders. Am J Clin Pathol. 2011;136(2):183-94.
[44] Said J, Cesarman E. Primary effusion lymphoma. In: Swerdlow SH, CampoE, Harris NL, et al, eds. WHO Classification of Tumours of Haematopoietic and Lymphoid Tissues. Rev 4th ed. Lyon, France: International Agency for Research on Cancer; 2017:323-24. WHO Classification of Tumours.
[45] Colomo L, Loong F, Rives S, Pittaluga S, Martínez A, López-Guillermo A, et al. Diffuse large B-cell lymphomas with plasmablastic differentiation represent a heterogeneous group ofdisease entities. Am J Surg Pathol. 2004;28(6):736-47.

PARTICULARS OF CONTRIBUTORS:
1. Associate Professor, Department of Pathology, Regional Cancer Centre, Thiruvananthapuram, Kerala, India.
2. Director, Regional Cancer Centre, Thiruvananthapuram, Kerala, India.
3. Associate Professor, Department of Pathology, Regional Cancer Centre, Thiruvananthapuram, Kerala, India.
4. Associate Professor, Department of Pathology, Regional Cancer Centre, Thiruvananthapuram, Kerala, India.
5. Professor, Department of Medical Oncology, Regional Cancer Centre, Thiruvananthapuram, Kerala, India.
6. Associate Professor, Department of Cancer Epidemiology and Biostatistics, Regional Cancer Centre, Thiruvananthapuram, Kerala, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:
Dr. CM Simi,
Associate Professor, Department of Pathology, Regional Cancer Centre,
Thiruvananthapuram-695011, Kerala, India.
E-mail: ajusim@gmail.com

PLAGIARISM CHECKING METHODS: [Jain H et al.]
- Plagiarism X-checker: Jul 05, 2025
- Manual Googling: Sep 18, 2025
- iThenticate Software: Sep 20, 2025 (6%)

ETYMOLOGY: Author Origin

EMENDATIONS: 6

AUTHOR DECLARATION:
- Financial or Other Competing Interests: None
- Was Ethics Committee Approval obtained for this study? Yes
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. Yes

Date of Submission: **Jun 29, 2025**
Date of Peer Review: **Jul 23, 2025**
Date of Acceptance: **Sep 22, 2025**
Date of Publishing: **Mar 01, 2026**