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Case Report

Plasmablastic lymphomaof the ileum with longer survival time: a rare case report and review

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Abstract: Plasmablastic lymphoma (PBL) is a rare type of diffuse large B-cell lymphoma (DLBCL) that was originally reported in the oral cavity of HIV-positive patients. In parallel, some cases of extraoral PBL have also been observed in HIV-negative patients. 7 cases of small intestine PBL have also been reported since 2010. PBL patients usually have a short survival time and a poor prognosis. Our survival curve analysis of these 7 small intestine PBL cases from the PubMed database revealed that 6 died during the follow-up period (0 to 25 months), whereas only 1 case was followed-up until 24 months and remains alive. The observed median survival time appeared to be 10 months. We report a new case of a 33-year-old female HIV-negative patient who was diagnosed with ileum PBL as determined following its surgical removal. Further analysis of the immune phenotype of these tumor cells showed positive staining for CD138, MUM-1, and PAX-5 markers but negative staining for CD20, CD45, and CD79a markers. The cell proliferation marker Ki-67 showed high expression (90%); however, the Epstein-Barr encoding region in situ hybridization appeared negative, and clinical staging was IIEA. The patient received seven cycles of CHOP-E chemotherapy postoperatively; and a follow-up at 30 months postoperatively showed that the patient remains alive. This case appears to be the longest reported survival time for any small intestine PBL.

Keywords: Plasmablastic lymphoma, ileum, epstein-barr virus negative, human immunodeficiency virus negative

Introduction

Sixteen cases of highly malignant plasmablastic lymphoma (PBL) in the oral cavity with special immune phenotypes of invasive non-Hodgkin lymphoma (NHL), including 15 cases of HIV-positive patients, were reported for the first time in 1997 by Delecluse et al. [1]. In 2008, the WHO classified these cases as DLBCL [2]. All of these cases specifically involved the oral cavity of HIV-positive patients; however, many cases have recently been diagnosed as being extraoral in HIV-negative patients. Many of these cases involved organ transplantation, steroid hormone therapy and autoimmune diseases [3]. These extraoral PBL cases have primarily been identified in the lymph nodes [4], skin [5], neck [6], lung [7], and gastrointestinal tract [8, 9]. An online search of the PubMed database revealed that 7 original cases of small intestine PBL have been reported since 2010 [9-14].

The overall survival of PBL patients has been short with a poor prognosis. The median survival time of HIV-positive patients was 15 months but only 9 months in HIV-negative patients [15, 16]. The survival curve analysis of these 7 small intestine PBL patients revealed that only 1 patient was followed up for 24 months and remains alive, whereas 6 others died after diagnosis. The median survival time was 10 months. Herein, we report a 33-year-old female HIV-negative patient who after the excision of local lesions had a pathologically proven ileum PBL and had undergone 7 cycles of CHOP-E chemotherapy. She is surviving after 30 months and has the longest survival time among all the small intestine PBL patients reported thus far.

Case report

A 33-year-old female patient with an inadvertently discovered 5-cm mass in the right lower

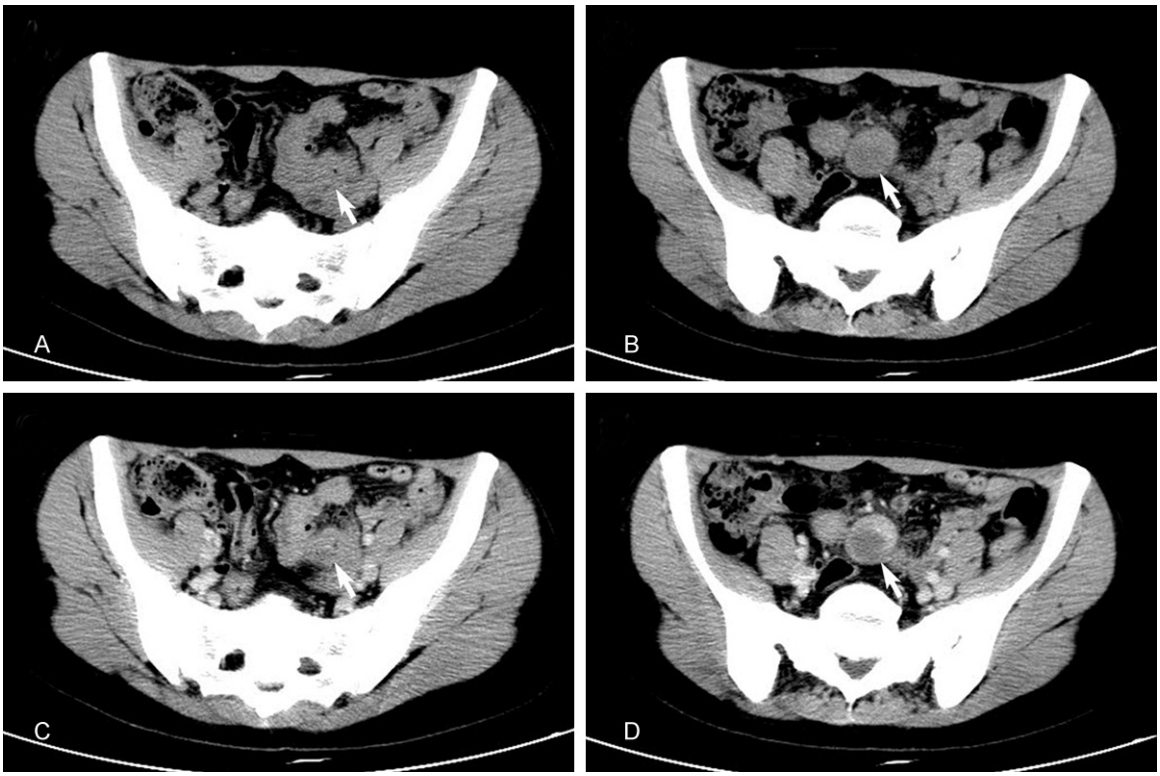

Figure 1. CT imagess of PBL in the ileum of a 33-year-old female. A. Plain CT scan shows a mass in small intestine (white arrow); B. Plain CT scan shows enlarged lymph node in the retroperitoneal regions (white arrow); C. Venous phase enhanced CT scan shows the mass (white arrow); D. Venous phase enhanced CT scan shows the enlarged lymph node with low density in the center (white arrow). CT, computed tomography.

abdomen reported to the hospital in February 2013. She initially did not display any discomforting symptoms; however, the mass gradually grew and increased to 10 cm by December 2013. During this time, the patient started to feel lower back pain and abdominal distension, accompanied by symptoms such as nausea, vomiting, loss of appetite and weight loss of 5 kg in 1 month but without fever or night sweats. The abdominal computed tomography (CT) in plane scan (**Figure 1A**, **1B**) indicated a thickening of the small intestine wall in the pelvic region, showed no lumen expansion or obstruction, and showed frequent enlargement of proximal mesenteric and retroperitoneal lymph nodes. The enhanced scan (**Figure 1C**, **1D**) demonstrated moderate intestine wall enhancement and a low-density necrotic area in the lymph nodes. CT scan was considered for lymphoma diagnosis. The bone marrow biopsy revealed active proliferation and an obvious increase in the ratio of granulocytes and erythrocytes. Additionally, a slight shift in the proportion of eosinophils and neutrophils was observed along with an increase in the alkaline phosphatase (ALP) integral. The erythroid hyperplasia was relatively low, and the megakaryocytes actively proliferated; scattered platelets were also observed. Serologic testing revealed that the patient was HIV (-) and HBsAg (+), in addition to showing normal ranges of CEA, AFP, CA125 and CA199 levels.

On December 17, 2013, the patient underwent laparoscopic examination at the First Affiliated Hospital of Dalian Medical University. This examination revealed a mass with a diameter of approximately 5 cm located on the ileocecal valve of the ileum and corresponding mesentery, in addition to multiple lymph nodes enlargement and fusion. Next, the small intestine was resected after opening the abdomen. The intraoperative frozen mass showed malignant tumors in the small intestine. Further gross examination of the 8-cm-long small intestine exhibited an ulcerative lesion measuring 6 cm × 3.5 cm surrounding the entire lumen approximately 1.4 cm from one margin. The cut face

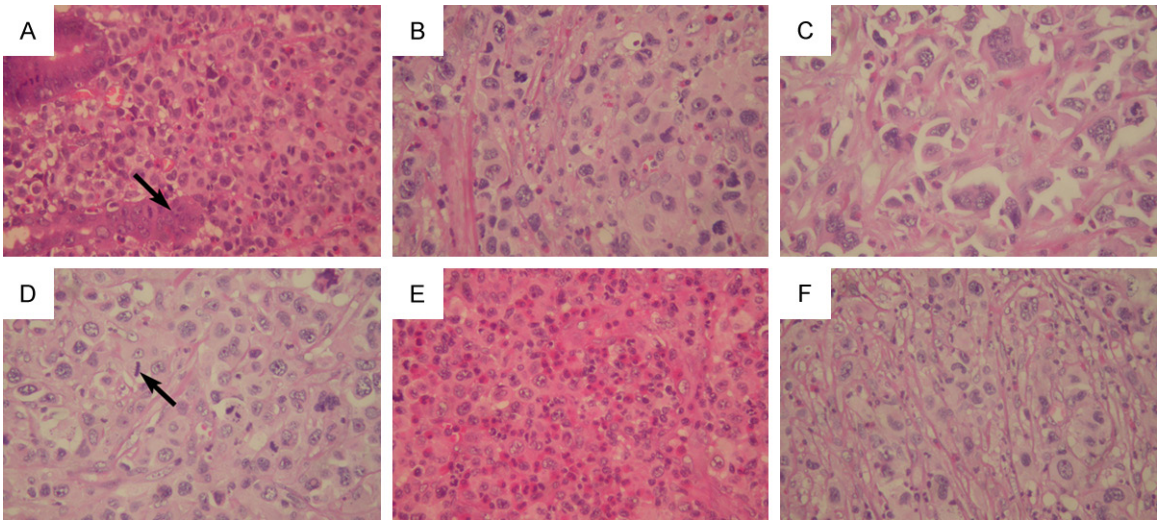

Figure 2. Histological characterization using hematoxylin and eosin staining. A. Infiltration of tumor cells into the small intestinal mucosa (the black arrow indicates the small intestine gland); B. Discohesive cells presenting varying sized and shaped vesicular nuclei, obvious centrally located nucleoli, as well as an abundant and pale eosinophilic cytoplasm; C. Presence of many multilobated and giant cells. D. Tumor cells showing high mitotic activity (black arrow); E. Presence of many eosinophils in the background; F. Tumor presenting a nest growth pattern separated by fibrous collagen similarly to that in a poorly differentiated carcinoma. (magnification A-F × 400).

of the lesion was grayish white and delicate across the full thickness of the intestine. The complete small intestine was diffusely infiltrated by discohesive, large neoplastic cells with abundant pale-stained acidophilic cytoplasm and eccentrically or centrally located nuclei. These nuclei were irregular, round, oval, convoluted, or kidney-shaped, with obvious nucleoli. Some of these even showed multiple or lobulated nuclei with apparent pleomorphism. Numerous mitotic figures and eosinophilic granulocytes were evident in the background and local area showed nests growth way (**Figure 2**). The immunohistochemical analysis for the plasma cell marker CD138 (**Figure 3A**) and MUM-1 (**Figure 3B**) showed diffuse positive staining, whereas CD43 (**Figure 3C**) and CD30 (**Figure 3D**) markers on neoplastic cells showed positive staining. The expression for lambda light chain was positive (**Figure 3E**), whereas kappa light chain expression appeared negative (**Figure 3F**), thus indicating light chain restriction. Additionally, the expression of PAX-5 protein was positive but very week (**Figure 3G**). However, the expressions of many other markers, such as CD20, CD45, CD79a (**Figure 3H-J**), CD10, EMA, CD3, CD56, CD34, CD117, ALK, HMB-45, S-100, CK, ACTIN, CD2, CD4, CD7, CD8, GRAN-B and Syn were negative (data not shown). The Ki-67 marker staining was approximately 90% (**Figure 3K**). Furthermore, the Epstein-Barr encoding region (EBER) in situ hybridization for EBV-encoded RNA to detect EBV infection also showed negative signal (**Figure 3L**). Overall, these morphological and immunohistochemical features helped establish a PBL diagnosis.

Finally, the patient postoperatively received 7 cycles of CHOP-E [intravenous cyclophosphamide (1,200 mg, day 1), intravenous epirubicin (60 mg, day 1), intravenous vincristine (2 mg, day 1) and prednisone (100 mg, days 1-5), and intravenous etoposide (100 mg, days 1-3)] chemotherapy, with each cycle consisting of 21 days. The follow-up at 30 months post-operation did not show any signs of relapse.

Discussion

PBL-related reports have been on the rise, and epidemiological studies have indicated that PBL can occur in patients with or without AIDS. The incidence rate of PBL is approximately 69% in HIV-positive patients with a median onset age of 38 (male/female, 7/1); however, it is 31% in HIV-negative patients with a median onset age of 57 years (male/female, 1.9/1) [15-17]. The overall incidence rate is relatively higher in adult males than females. However, complete information regarding PBL pathogenesis

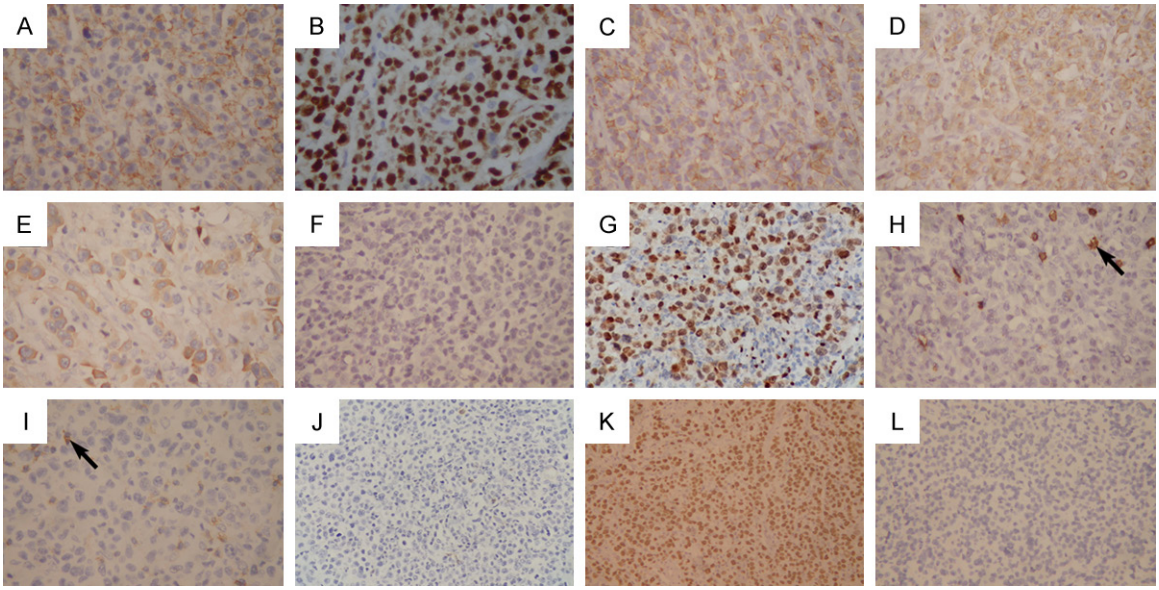

Figure 3. Immunohistochemical staining and *in situ* hybridization. A. Positive expression of plasma cell marker CD138; B. Strong positive expression of plasma cell marker MUM-1; C. Diffuse positive staining of tumor cells for CD43; D. Diffuse positive staining of tumor cells for CD30 in a membrane/Golgi pattern; E. Positive staining for lambda light chain in tumor cells; F. Negative staining for kappa light chain in tumor cells; G. Weak positive expression of PAX-5 protein; H-I. Negative staining for CD20 and CD45 in tumor cells; reactive lymphocytes in the background appeared positive (black arrow); J. Negative staining of tumor cells for CD79a; K. Ki-67 index of the tumor cells (approximately 90%); L. Negative EBV-encoded RNA in tumor cells as assessed using EBER *in situ* hybridization. (magnification A-I × 400; J-L× 200).

Table 1. Clinical features of small intestine plasmablastic lymphomas

No.	Author	Age	Gender	Location	Stage	Treatment	Follow up (months)
1	Cha et al [10]	60	M	Jejunum	IV	CHOP, ESHAP	Alive (24)
2	Wang et al [11]	55	M	Small intestine	IV	CHOP	Died (1.5)
3	Bahari et al [12]	17	F	Small intestine	ND	Without receiving therapy	Died after diagnosis
4	Cao et al [13]	75	F	Duodenal	IVA	CHOP	Died (2)
5	Koike et al [14]	65	F	Duodenal and Jejunum	IV	Without receiving therapy	Died (3)
6	Luria et al [9]	41	M	Terminal ileum	ND	Hyper-CVAD+Velcade	Died (17)
7	Luria et al [9]	65	M	Terminal ileum and cecum	ND	Hyper-CVAD+rituximab, auto-HSCT	Died (25)
8	Current	36	F	Ileum	IIEA	CHOP-E	Alive (30)

ND: Not described; M: Male; F: Female.

is lacking; MYC gene rearrangement may play an important role in PBL onset [18]. MYC gene rearrangement has been linked with PBL cell morphology and an aggressive clinical course. This is the first and most common chromosomal abnormality identified in PBL [19, 20]. Additionally, EBV infection has also been closely related to PBL onset [21]. The gastrointestinal tract is the most prone to extraoral PBL, especially in HIV-negativepatients [16]. We successfully treated an ileum PBL patient and reported a summary for the small intestine PBL (**Tables 1**, **2**).

The pathological diagnosis of PBL resembles B immune cells or plasma cells with large heterogeneous diffuse lymphoid cells proliferation. These tumor cells are round or oval with abundant cytoplasm and obvious nucleoli. In their background, small mature lymphocytes, apoptotic body and macrophages can be observed, which form a “starry sky” appearance [2]. However, this morphology is difficult to distinguish from other types of lymphoma; the diagnosis remains dependent on a comprehensive analysisof the clinical characteristics, tumor cell immune phenotype and EBER detec-

Table 2. Immunohistochemistry analysis of small intestine plasmablastic lymphomas

No.	Author	MUM-1	CD138	CD38	CD20	CD45	CD79a	PAX-5	CD43	CD30	HIV	EBER	Ki-67
1	Cha et al [10]	+	-	ND	-	ND	-	ND	ND	-	-	-	70%
2	Wang et al [11]	-	+	+	-	-	+	ND	ND	-	-	ND	80%
3	Bahari et al [12]	ND	+	ND	-	ND	+	ND	ND	-	ND	ND	ND
4	Cao et al [13]	+	+	ND	-	+	-	-	ND	-	-	-	80%
5	Koike et al [14]	ND	+	ND	-	ND	+	ND	ND	ND	-	+	ND
6	Luria et al [9]	+	-	ND	-	-	+	+	ND	+	ND	+	75%
7	Luria et al [9]	ND	+	ND	+	ND	+	ND	ND	ND	-	ND	100%
8	Current	+	+	Not done	-	-	-	+	+	+	-	-	90%

ND: Not described; +: Positive; -: Negative.

Table 3. Differential diagnosis of plasmablastic lymphomas using immunohistochemistry

Marker	Current	PBL	ALCL	DLBCL	ALK$^+$DLBCL	BL	GIST	Melanoma	NEC
MUM-1	+	+	+	+/-	+	-	-	-	-
CD138	+	+	-	-	+	-	-	-	-
CD38	ND	+	-	-	+	-	-	-	-
CD20	-	-/+	-	-/+	-	+	-	-	-
CD45	-	-/+	+	+	-/+	+	-	-	-
CD79a	-	-/+	-	+	-/+	+	-	-	-
PAX-5	+	-/+	-	+	-/+	+	-	-	-
CD10	-	-/+	-	-/+	-/+	+	-	-	-
EMA	-	-/+	-/+	-	-/+	-	-	-	+
CD43	+	NS	+	-/+	-/+	-	-	-	-
CD30	+	-/+	+	-/+	-/+	-	-	-	-
CD3	-	-	+	-	-	-	-	-	-
CD56	-	-/+	-/+	-	-	-	-	-	+
CD34	-	-	-	-	-	-	+	-	-
CD117	-	-	-	-	-	-	+	-	-
ALK	-	-	±	-	+	-	-	-	-
HMB45	-	-	-	-	-	-	-	+	-
S-100	-	-	-	-	-	-	-	+	-
CK	-	-	-	-	-	-	-	-	+
EBER	-	+/-	-	-/+	-	+/-	-	-	-
Other	Syn -							melan +	Syn, CgA +

ND: Not done; NS: Not studied; PBL: Plasmablastic lymphoma; ALCL: Anaplastic large cell lymphoma; DLBCL: Diffuse large B-cell lymphoma; ALK$^+$DLBCL: ALK$^+$ diffuse large B-cell lymphoma; BL: Burkitt's lymphoma; GIST: Gastrointestinal stromal tumor; NEC: neuroendocrine carcinoma; +: >90% positive; -: >90% negative; +/-: Positive more than negative; -/+: Negative more than positive; ±: Variable expression.

tion. The PBL phenotype usually displays a typical plasma cell phenotype, such as CD138, CD38, and MUM-1 expression but weak or no expression of B cell markers such as CD20, PAX-5, CD45, and CD79a [2, 22]. However, Colomo *et al.* [23] showed that the PBL immune phenotype is vastly different and MUM-1 expression is the only constant positive indicator. Another study by Montes-Moreno S *et al* [24] suggested that a negative or weakly positive expression of PAX-5 and CD20, respectively, as well as the positive expression of Blimp-1 and XBP-1, can be used as a reliable evidence for PBL diagnosis. PBLs are highly proliferative, and Ki-67 expression is often more than 60% [25]. The morphological and immunohistochemical analysis of tumor cells from our female patient showed positive expression of MUM-1, CD138, and PAX-5 but the negative expression of CD20, CD45, ALK and CD79a, as well as high

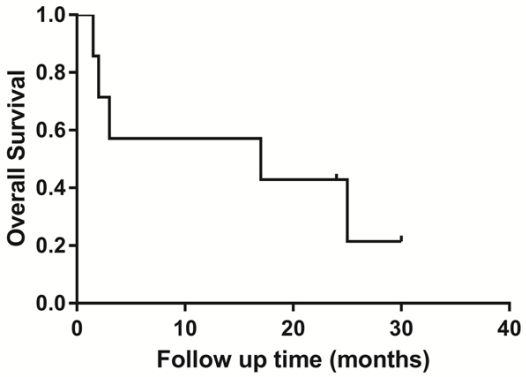

Figure 4. Kaplan-Meier survival curve of eight plasmablastic lymphomas of the small intestine (one patient died immediately after diagnosis).

Ki-67 expression (90%). This was consistent with the PBL diagnosis. Additionally, approximately 82% of HIV-positive and 46% of HIV-negative patients with PBL express EBER [26]; however, the HIV-negative patient in this study did not show positivity for EBER.

There is some overlap between the identification of PBL and other tumors based on immune phenotype (**Table 3**), and we have undertaken this comparison. Anaplastic large cell lymphoma (ALCL) cells are often positive for T cell markers, such as CD2, CD3, CD5, CD7, CD30, CD43 and ALK, whereas these markers are usually absent in PBL [27]. The patient in our report showed a positive expression for CD30 and CD43; this led us to initially consider an ALCL diagnosis. However, other T cell markers were negative in the patient, and our further literature search identified PBL case reports with positive CD30 expression [9]. Additionally, CD43 has been reported to be frequently expressed on T cell lymphomas but with an abnormal expression in B cell lymphomas [28, 29]. CD43-positive expression is primarily correlated with lymphohematopoietic system tumors but can also include B or T cell lymphomas.CD43 is a sensitive marker but is not highly specific for T cells. Moreover, before our observation, CD43 expression has never been observed in small intestine PBL; this aspect warrants attention in future diagnoses. DLBCL is one of the most common types of NHL, and PBL is currently classified as a form of DLBCL. CD20 expression on DLBCL has been diffusely positive; however, negative or weak positive expressions have been observed in PBL. Notably, our patient displayed negative CD20 expression. Additionally, the ALK^+ diffuse large B-cell lymphoma appears to have an immune phenotype similar to that of PBL, with the exception of ALK expression. Burkitt's lymphomas (BL) display high Ki-67 and EBER-positive characteristics; however, the expression of CD20 and CD10 can differentiate them from PBL. Similarly, gastrointestinal stromal tumor (GIST), one of the most common mesenchymal tumors in the small intestine, frequently express CD34 and CD117 markers [30]. The malignant melanomas always expressed S-100, HMB-45 and Melan-A markers [31] and are easily differentiated from PBL. The similarity betweenneuroendocrine carcinoma (NEC) and PBL has also been very high; both expressed CD56 and EMA [10]. However, NEC also expressed Syn, CgA and CK markers. Our patients showed negative staining for CD56, EMA, Syn and CK; NEC was thus eliminated. Overall information based on immunohistochemical positive and negative staining results led us to confirm a PBL diagnosis.

PBL treatment often prioritizes early chemotherapy. According to Castillo *et al.* [32], the total effectiveness rate of chemotherapy was 77% in PBL patients. Complete response (CR) accounted for 46% of this; 31% had a partial response (PR). However, the median survival of patients not accepting chemotherapy was only 3 months. Importantly, the administration of current CHOP or CHOP-like chemotherapy prior to the initial treatment appeared to be effective. However, Castillo *et al*. [33] reported that patients with high recurrence and low survival rate after CHOP did not show a long survival time even after increasing the strength of the treatment by including Hyper-CVAD and CODOX-M/IVAC. Thus, the overall prognosis of PBL is poor, and the median survival time is 14 months. The 5-year survival rate is only 31% [15]. The poor prognosis factors analysis indicated that an age of 60 years or older, clinical stage (stage III or IV), bone marrow infiltration, untreated and immune suppression [16, 32] are the key factors. The patient in our study accepted seven cycles of CHOP-E chemotherapy and is currently alive. This indicated a good prognosis compared with previous reports. We speculate that the young age of our female patient, the clinical stage of IIEA, and no other complications without EBV infection may have produced a better chemotherapy effect. Based

on the previous report, 60% of the PBL patients were clinical stage III or IV at diagnosis [17]. However, the patient in our study was diagnosed at the early stage; it would thus be reasonable to suggest that early diagnosis and timely treatment can help achieve a good prognosis.

As reported above, the median survival time of 7 patients with small intestine PBL was 10 months. Combining previous results with the data from our study, we generated a new survival curve using the Kaplan-Meier method (**Figure 4**) and observed a new median survival time of 17 months based on 8 cases of small intestine PBL. This new case displayed similar characteristics such as onset age, gender, immune phenotype, staging and prognosis compared with previous small intestine PBL cases. However, the diagnosis at an early stage and long-term survival are rare observations.

Disclosure of conflict of interest

None.

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