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POST-TRANSPLANT LYMPHOPROLIFERATIVE DISORDER: CLINICAL INSIGHTS AND REAL-WORLD ANALYSIS AT A SPECIALIZED CENTER IN NORTHEASTERN BRAZIL

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ABSTRACT

Post-Transplant Lymphoproliferative Disorders (PTLD) comprise a heterogeneous group of lymphoid or plasmacytic neoplasms with highly variable presentations, occurring in the setting of immunosuppression following transplantation. Epstein-Barr virus (EBV)-positive PTLD accounts for 60–80% of cases. Due to the rarity of the disease, no phase 3 clinical trials have been conducted to establish standardized treatment protocols, making its management particularly challenging. **Objective:** to characterize the profile of patients diagnosed with PTLD following kidney, liver, or hematopoietic stem cell transplantation at a specialized center in Northeastern Brazil. **Methodology:** a retrospective, observational, and single-center cohort study based on medical record analysis. **Results:** The analysis of the frequency of PTLD by transplanted organ group showed 3.7 cases per 1000 hematopoietic stem cell transplants, 7.0 cases per 1000 kidney transplants and 7.5 cases per 1000 liver transplants. The mean survival time for all patients was 438 days. Patients who achieved complete response had a better overall survival (OS) of 87.5% at 1 year, while those who did not achieve complete response had an OS of 22.2% at 1 year (p=0.00012).
Conclusion: PTLD is commonly an aggressive disease with poor OS, possibly influenced by factors such as age, transplanted organ, comorbidities, early death, and delayed diagnosis.

Keywords: Post-transplant lymphoproliferative disorder, Epstein-Barr virus, solid organ transplantation, hematopoietic stem cell transplantation.

INTRODUCTION

Patients who undergo solid organ transplantation (SOT) or hematopoietic stem cell transplantation (HSCT) face a well-documented three- to fivefold increase in malignancy risk compared to the general population[1,2]. Among these malignancies, skin cancers and lymphomas are the most prevalent, collectively accounting for up to 80% of cases[3]. Specifically, lymphomas comprise approximately 20% of malignancies diagnosed in solid organ transplant recipients[3].

Post-transplant lymphoproliferative disorders (PTLD) encompass a diverse spectrum of lymphoid or plasma cell neoplasms that develop in the context of post-transplant immunosuppression. These conditions range from benign lymphoproliferations to aggressive lymphomas and are recognized as an ultra-rare but potentially fatal complication of transplantation.

The incidence of PTLD differs between transplant types. In allogeneic HSCT recipients, cumulative incidence reaches approximately 4%[4], while in SOT recipients, it varies from 1% to 16%[5].

Several risk factors contribute to PTLD development, including the intensity of T-cell immunosuppression, the choice of immunosuppressive regimen, and the recipient's Epstein-Barr virus (EBV) serological status. Additional contributing factors include post-transplant duration, recipient age, and ethnicity[6,7].

The incidence of PTLD following SOT is strongly influenced by the type of organ transplanted, correlating with the level of immunosuppression required[8]. Although PTLD is less common post-HSCT, identified risk factors include human leukocyte antigen (HLA) mismatch between donor and recipient, donor T-cell depletion, and graft-versus-host disease[7].

A bimodal PTLD incidence pattern has been described in SOT recipients. An early-onset peak occurs primarily within the first year post-transplant, predominantly affecting EBV-positive individuals with extranodal involvement, often including the grafted organ. A second, late-onset peak typically manifests 5 to 15 years post-transplant, frequently in EBV-negative patients with nodal disease[9,10]. In HSCT recipients, PTLD generally develops within the first year[6].

The use of T-cell depleting agents, such as polyclonal antithymocyte globulin (ATG), has been strongly associated with PTLD development in post-SOT patients, particularly in European cohorts[5].

The impact of maintenance immunosuppressive regimens on PTLD risk remains unclear, with conflicting findings in the literature. Tacrolimus has been implicated in PTLD pathogenesis among adult transplant recipients, especially in those who did not receive induction therapy[5].

Late-onset, EBV-negative PTLD is linked to advanced age (>60 years), prolonged immunosuppression, and a history of pre-transplant malignancy[5,11].

EBV-positive PTLD accounts for 60–80% of cases[9] and typically arises in the setting of immunosuppression-induced impairment of EBV-specific cytotoxic T-cell surveillance[12].

Persistently elevated EBV DNA titers are strongly associated with PTLD risk, and EBV-DNA monitoring has proven effective in identifying high-risk post-transplant patients[9].

Cutoff values for EBV viremia prompting intervention vary widely. No standardized threshold defines "high EBV load," with some studies suggesting intervention at 1,000 EBV copies/mL[13,14] or 10,000 copies/mL[15] in HSCT recipients, while in SOT recipients, thresholds of 4,000 or 10,000 copies/mL are commonly proposed[5,16].

Preemptive rituximab therapy has been shown to effectively reduce PTLD incidence in high-risk patients[9].

The clinical presentation of PTLD varies widely, ranging from incidental diagnoses to severe and rapidly progressing cases. Common symptoms include fever, night sweats, weight loss, and lymphadenopathy. Gastrointestinal manifestations, such as obstruction, may also occur. In most cases, symptoms are site-specific and depend on the extent of disease involvement[9,12].

Extranodal involvement is frequently observed, affecting more than half of the cases at diagnosis[9,12]. The most commonly involved sites include the gastrointestinal tract and the central nervous system (CNS)[9]. Isolated bone marrow infiltration is considered rare[9].

Confirming PTLD diagnosis requires histopathological and immunophenotypic analysis to establish the presence of a clonal lymphoid process in patients with a prior history of solid organ transplantation (SOT) or hematopoietic stem cell transplantation (HSCT). Staging should then be performed using whole-body fluorodeoxyglucose positron emission tomography/computed tomography (FDG-PET/CT) or contrast-enhanced computed tomography (CT) scans of the neck, thorax, abdomen, and pelvis. In cases of unexplained cytopenias, bone marrow biopsy is also warranted[9].

To assess EBV association, the most sensitive and specific method for histological specimens is the detection of EBV-encoded RNA through in situ hybridization (EBER-FISH)[14]. Alternatively, viral proteins such as LMP1 can be identified via immunohistochemistry, though this method has lower sensitivity due to variability in protein expression in PTLD biopsies[14].

The International Prognostic Index (IPI) for non-Hodgkin lymphoma, although not specifically developed for PTLD, has demonstrated value in PTLD, as established in the PTLD-1 study, and can be utilized in clinical practice[17].

Among monomorphic PTLD subtypes, diffuse large B-cell lymphoma (DLBCL) is the most prevalent, accounting for approximately 50–75% of cases[18]. Rarer subtypes, such as plasma cell, T-cell, and NK-cell PTLDs, are less frequently EBV-associated, with reported rates of up to 37%[9]. Limited data exist regarding rare plasma cell variants, including plasmacytoma-like lesions and plasma cell myeloma, which have historically been classified as PTLD in certain studies[11,19,20].

Historically, PTLD treatment strategies have included immunosuppression reduction, radiotherapy, anti-CD20 monoclonal antibody therapy, and chemotherapy. However, due to the rarity of the disease, phase 3 clinical trials specifically addressing PTLD management are lacking.

Managing PTLD presents several challenges, particularly because treatment must balance disease control with the risk of complications. (1) Reducing immunosuppression can trigger graft-versus-host disease (GvHD) and increase the likelihood of transplant rejection. (2) Standard lymphoma-directed chemotherapy in transplant recipients carries a considerable risk of treatment-related mortality, which can reach up to 7–11%[10,21].

Several important clinical trials highlight risk-stratified sequential therapy incorporating rituximab with or without chemotherapy as a rational treatment strategy in patients with CD20+ PTLD who do not respond to isolated immunosuppression reduction.[9,19]

Patients with disease refractory to initial therapy have an extremely poor prognosis and represent a patient population in need of novel, effective therapies[21].

Emerging therapies, such as EBV-specific cytotoxic lymphocytes, have shown promise in treating relapsed/refractory EBV-positive PTLD, and one such agent, tabelecleucel, has been approved for commercial use[21]. However, further clinical trials are needed to assess the safety and efficacy of autologous chimeric antigen receptor T-cell (CAR-T) therapy in PTLD patients[9].

The type of transplanted organ significantly influences overall survival (OS). Reports indicate an OS rate of 53% in lung transplant recipients, compared to 70% and 69% in liver and kidney transplant recipients, respectively[22].

Although disease progression remains the primary cause of mortality, infection-related complications account for up to 42% of deaths within this patient population[9,23].

The objective of our study was to evaluate the profile of PTLD patients following kidney, liver, and allogeneic hematopoietic stem cell transplantation between 2014 and 2024 at a specialized center, as well as to analyze overall survival and risk variables associated with the disease in a real-world setting.

MATERIALS AND METHODS

We assessed the profile, treatment, and outcomes of patients who developed post-transplant lymphoproliferative disorder (PTLD) following solid organ or bone marrow transplantation at our

institution between 2014 and 2024. During this period, 269 allogeneic hematopoietic stem cell transplants, 847 kidney transplants, and 1,606 liver transplants were performed.

Inclusion criteria comprised patients aged 18 to 80 years with a confirmed diagnosis of PTLD, as defined by the World Health Organization (WHO), verified through tissue biopsy.

A total of 21 patients were identified with PTLD. Of these, two were excluded due to having undergone treatment at another institution, rendering their data unavailable. Consequently, 19 patients were included in the study.

This study represents a single-center, retrospective, observational cohort based on medical record analysis.

Descriptive statistics were calculated for all patients. The frequency of PTLD was analyzed according to the transplanted organ. Overall survival was measured from the time of PTLD diagnosis until death and was estimated using the Kaplan-Meier method.

Disease staging was classified into early-stage disease (Lugano stages I and II) and advanced disease (Lugano stages III and IV). Response evaluation was performed using PET/CT or CT, categorizing patients as having complete response, partial response, stable disease, or refractory disease.

RESULTS

Baseline characteristics

The study cohort consisted of 19 patients diagnosed with PTLD following solid organ transplantation (SOT) or hematopoietic stem cell transplantation (HSCT). The median age at diagnosis was 56 years (range: 19–73 years).

Eighteen patients were SOT recipients (12 liver transplants and 6 kidney transplants), while only one patient had undergone HSCT.

The mean time interval between transplantation and PTLD diagnosis was 70 months (mean: 80.2 ± 18 months).

Most patients (63.16%) had at least two comorbidities. The most common non-transplant-related comorbidities were hypertension (57.89%), diabetes mellitus (42.10%), and a prior history of solid malignancy (36.84%), including colon cancer (1), squamous cell carcinoma (4), ovarian teratoma (1), conjunctival carcinoma (1), and clear cell carcinoma (1). Other comorbidities included dyslipidemia (2), epilepsy (2), hemochromatosis (2), hypothyroidism (2), Factor V Leiden mutation (1), and thyroid nodule (1).

The demographic and baseline characteristics of the patients are presented in Table 1.

TABLE 1 - Characteristics of patients with PTLD at diagnosis

		Type of organ transplanted		
	Total (N=19)	Liver (N=12)	Kidney (N=6)	Bone marrow (N=1)
Feature				
Gender				
Feminine	11 (57.9%)	5 (41.66%)	3 (50%)	0
Masculine	8 (42.1%)	7 (58.34%)	3 (50%)	1
Age at diagnosis of PLTD				
0-19 years	1 (5.26%)	1 (8.33%)	0	0
20-34 years old	3 (15.78%)	2 (16.67%)	1 (16.66%)	0
35-49 years old	4 (21.05%)	0	3 (50%)	1
50-64 years old	4 (21.05%)	3 (25%)	1 (16.66%)	0
65-70 years old	3 (15.78%)	2 (16.67%)	1 (16.66%)	0
>70 years	4 (21.05%)	4 (33.33%)	0	0
Number of transplants				
First	18 (94.74%)	11 (91.66%)	6 (100%)	1

Second	1 (5.26%)	1 (8.33%)	0	0
Time between transplant and PTLD				
<1 year	7 (36.84%)	5 (41.66%)	1 (16.66%)	1
Between 1-5 years	1 (5.26%)	1 (8.33%)	0	0
Between 5-10 years	6 (31.57%)	4 (33.33%)	1 (16.66%)	0
>10 years	5 (26.31%)	2 (16.67%)	4 (66.67%)	0
Comorbidities				
None	2 (10.53%)	1 (8.33%)	0	1
1	5 (26.31%)	3 (25%)	2 (33.33%)	0
≥2	12 (63.16%)	8 (66.67%)	4 (66.67%)	0
HAS	11 (57.89%)	7 (58.33%)	4 (66.67%)	0
DM	8 (42.10%)	8 (66.67%)	0	0
Previous solid neoplasm	7 (36.84%)	4 (33.33%)	3 (50%)	0

DISEASE CHARACTERISTICS AND RISK FACTORS

The majority of patients (94.7%) had been receiving at least two immunosuppressive agents since transplantation, including all liver and kidney transplant recipients. The only HSCT recipient had received a single initial immunosuppressant, cyclosporine.

Four patients (21.05%) underwent induction therapy with anti-thymocyte globulin (ATG), three of whom were kidney transplant recipients. Only one kidney transplant recipient received induction with daclizumab (anti-IL-2).

Among the initial immunosuppressive regimens, the most commonly used agents were tacrolimus (84%) and corticosteroids (94.7%). Mycophenolate was administered to 8 patients (42%), cyclosporine to 4 patients (21.05%), and azathioprine to 2 patients (10.53%).

Regarding post-transplant viral reactivations, six patients had documented cytomegalovirus (CMV) reactivation, with one developing chorioretinitis. One patient had herpes zoster, and another had herpes labialis. Seven patients had no recorded treatment for viral reactivation, and data were unavailable for five patients due to limitations in accessing complete medical records.

The primary clinical manifestations at diagnosis included multiple lymphadenopathies, intra-abdominal masses, and/or gastric/intestinal mucosal thickening. Ten patients (52.63%) reported at least one B symptom, such as weight loss, fever, and/or night sweats. One patient presented with pancytopenia and hemophagocytic syndrome as the initial manifestation of PTLD.

Serum LDH levels were assessed in 14 patients, with most (52.63%) showing elevated LDH at diagnosis.

Histopathological analysis revealed a predominantly monomorphic presentation (73.68%), with DLBCL being the most common subtype (85.71% of monomorphic cases). Other histological subtypes included polymorphic PTLD (3 cases), multiple myeloma (1 case), and EBV-associated mucocutaneous ulcer (1 case).

Most cases exhibited a high mitotic proliferation index, with a median Ki-67 of 80%.

Immunohistochemical analysis for EBV-LMP1 was performed in 11 patients, with two testing positive and nine negative.

EBV viremia at diagnosis was found to be significantly elevated in eight patients, all of whom had persistently high PCR levels (>1000 copies). Four patients tested negative for EBV-PCR, while one patient underwent serological testing only, showing IgG+/IgM+ results.

None of the patients received preemptive rituximab for elevated EBV viremia.

Three patients died before staging and treatment initiation. One patient diagnosed with EBV-associated mucocutaneous ulcer was classified as having localized disease. The patient diagnosed with multiple myeloma was excluded from the initial staging analysis due to the specific staging criteria for this condition.

Among the 15 staged patients, 14 (73.68%) had advanced disease (stage III or IV) at diagnosis, with 11 exhibiting extranodal dissemination to one or more organs beyond the lymphatic system. The sites of infiltration included the central nervous system (1), bone marrow (2), liver (2), intestine and colon (3), stomach and ovary (1), lung and ovary (1), and lung and adenoids (1).

All disease characteristics and risk factors are summarized in Table 2.

TABLE 2 - Disease characteristics and risk factors

		Type of organ transplanted		
	Total (N=19)	Liver (N=12)	Kidney (N=6)	Bone marrow (N=1)
Feature				
Immunosuppressants				
≥2 drugs	18 (94.73%)	12 (100%)	6 (100%)	0
Induction with ATG	4 (21.05%)	0	3 (50%)	1
Tacrolimus	16 (84%)	12 (100%)	4 (66.67%)	0
Cyclosporine	4 (21.05%)	1 (8.33%)	2 (33.33%)	1
Mycophenolate	8 (42%)	4 (33.33%)	4 (66.67%)	0
Azathipine	2 (10.53%)	1 (8.33%)	1 (16.67%)	0
Corticosteroid	18 (94.73%)	12 (100%)	6 (100%)	0
Post-transplant viral reactivations				
None	7 (36.84%)	6 (50%)	1 (16.66%)	0
CMV	6 (31.58%)	2 (16.66%)	4 (66.67%)	0
Others	1 (5.26%)	0	1 (16.66%)	0
No registration	5 (26.32%)	4(33.33%)	0	1
EBV-viremia at diagnosis				
Positive	9 (47.37%)	6 (50%)	3 (50%)	0
Negative	4 (21.05%)	3 (25%)	1 (16.66%)	0
No registration	4 (21.05%)	2(16.66%)	1 (16.66%)	1
Unrealized	2 (10.53%)	1 (8.33%)	1 (16.66%)	0
serum LDH				
High	10 (52.63%)	6 (50%)	3 (50%)	1
Normal	4 (21.05%)	3 (25%)	1 (16.66%)	0
No registration	5 (26.31%)	3 (25%)	2 (33.33%)	0
Symptoms B				
Gifts	10 (52.63%)	6 (50%)	3 (50%)	1

Absent	8 (42.10%)	5(41.67%)	3 (50%)	0
No registration	1 (5.26%)	1(16.66%)	0	0
Histological Presentation				
LDGCB	12 (63.16%)	7(58.33%)	4 (66.67%)	1
MALT	1 (5.26%)	1 (8.33%)	0	0
Burkitt	1 (5.26%)	0	1 (16.66%)	0
Polymorphic subtype	3 (15.79%)	2(16.66%)	1 (16.66%)	0
Multiple Myeloma	1 (5.26%)	1 (8.33%)	0	0
EBV-associated mucocutaneous ulcer	1 (5.26%)	1 (8.33%)	0	0
Ki-67 Index				
10-30%	3 (15.79%)	2(16.66%)	1 (16.66%)	0
31-50%	0	0	0	0
51-80%	8 (42.10%)	5(41.67%)	2 (33.33%)	1
>80%	6 (31.58%)	3 (25%)	3 (50%)	0
Not rated	2 (10.53%)	2(16.66%)	0	0
EBV-LMP1				
Positive	2 (10.53%)	1 (8.33%)	1 (16.66%)	0
Negative	9 (47.37%)	5(41.67%)	3 (50%)	1
Unrealized	8 (42.10%)	6 (50%)	2 (33.33%)	0
Staging				
Initial stage (I or II)	1 (5.26%)	1 (8.33%)	0	0
Advanced disease (III or IV)	14 (73.68%)	8 (66.67%)	6 (100%)	0
Unrealized	4 (21.05%)	3 (25%)	0	1

TREATMENT AND RESPONSE EVALUATION

Among the 19 patients, four experienced early mortality before initiating any treatment. The causes of death included tumor lysis syndrome (1) and abdominal sepsis secondary to malignant tumor obstruction (1), while the cause of death was not recorded for the other two patients.

Fifteen patients (78.94%) underwent treatment. Immunosuppression reduction was incorporated into the initial management of PTLD for all patients, except when graft rejection concerns prevented this approach.

Two patients were treated exclusively with immunosuppression reduction: one achieved resolution of EBV-associated mucocutaneous ulcer, while the other had complete remission of hepatic infiltrative lesions. The remaining 13 patients received immunochemotherapy: 10 patients were treated with CHOP-based regimens, with or without rituximab, 1 pacient received monotherapy with rituximab, 1 underwent treatment with rituximab, methotrexate, and cytarabine (R-MTX-AraC) for CNS involvement, and 1 received a bortezomib-based regimen for multiple myeloma.

Among the 15 patients who received treatment, 9 achieved complete response (60%). Three patients died during the first chemotherapy cycle due to disease-related complications, these included: one patient with Burkitt lymphoma, another patient with DLBCL and CNS involvement, and one patient with polymorphic PTLD, treated with rituximab alone.

Two patients had refractory disease and died before initiating second-line therapy. The response of the multiple myeloma patient has not yet been assessed.

Of the 9 patients who achieved complete response, only one relapsed within six months and died after two cycles of salvage therapy due to septic shock.

Only one patient who achieved complete response experienced graft loss, requiring renal replacement therapy four years after PTLD treatment.

Data related to treatment, response assessment and deaths are described in Table 3.

TABLE 3 – Treatment, response assessment and deaths

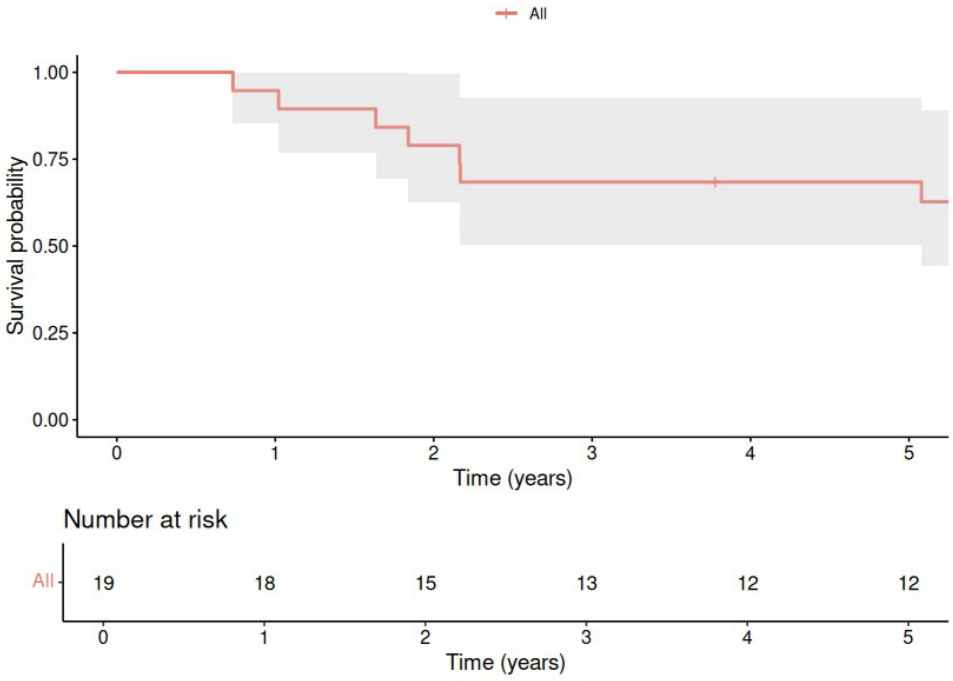
		Type of organ transplanted		
	Total (N=19)	Liver (N=12)	Kidney (N=6)	Bone marrow (N=1)
Feature				
Therapy	15 (78.94%)	10	5	0
Only reduction of ISS	2 (10.53%)	2 (20%)	0	0
Rituximab monotherapy	1 (5.26%)	1 (10%)	0	0
CHOP-based protocols ± R	10 (52.63%)	6 (60%)	4 (80%)	0
Others	2 (10.53%)	1 (10%)	1 (20%)	0
Response to treatment				
Complete answer	9 (60%)	6 (60%)	3 (60%)	0
Refractoriness	2 (13.33%)	2 (20%)	0	0
Death	3 (20%)	1 (10%)	2 (40%)	
Relapse	1 (%)	1 (10%)	0	0
Deaths	11	7	3	1
Early (up to 60 days)	4 (36.36%)	2(28.57%)	2(28.57%)	0
Infectious complication	6 (54.54%)	3(42.85%)	3 (100%)	0
Tumor lysis	1 (9.09%)	1(14.29%)	0	0
No cause described	4 (36.36%)	3(42.85%)	0	1

FREQUENCY ANALYSIS

Analysis of PTLD frequency by transplanted organ group showed:
- Hematopoietic stem cell transplant: 3.7 cases per 1000 transplants;
- Kidney transplant: 7.0 cases per 1000 transplants;
- Liver transplant: 7.5 cases per 1000 transplants.

SURVIVAL ANALYSIS

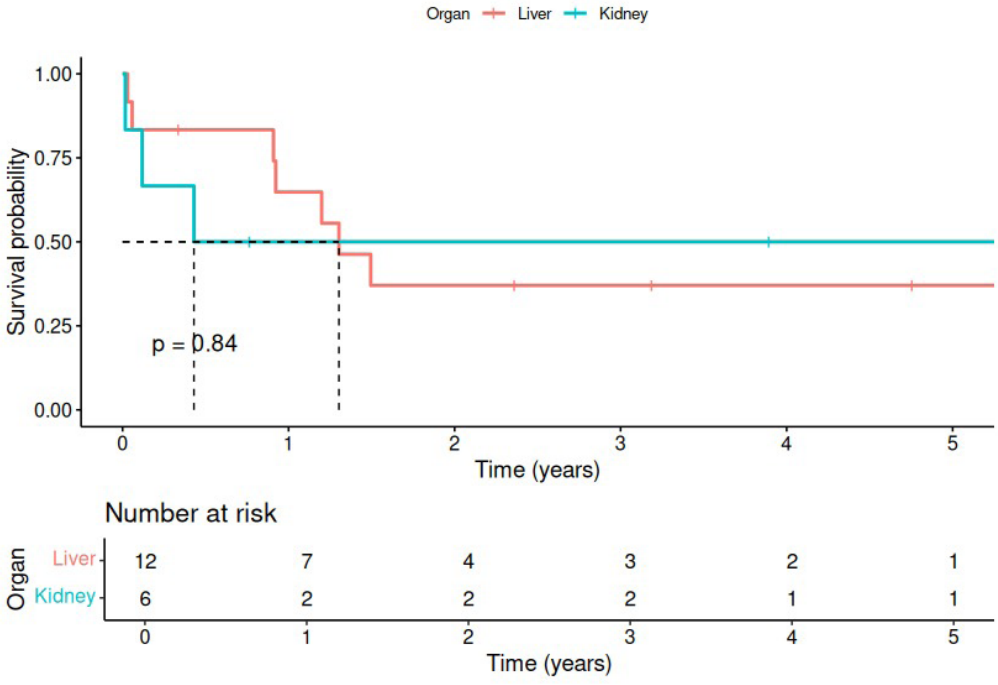
FIGURE 1 – Overall survival after PTLD diagnosis



Source: author.

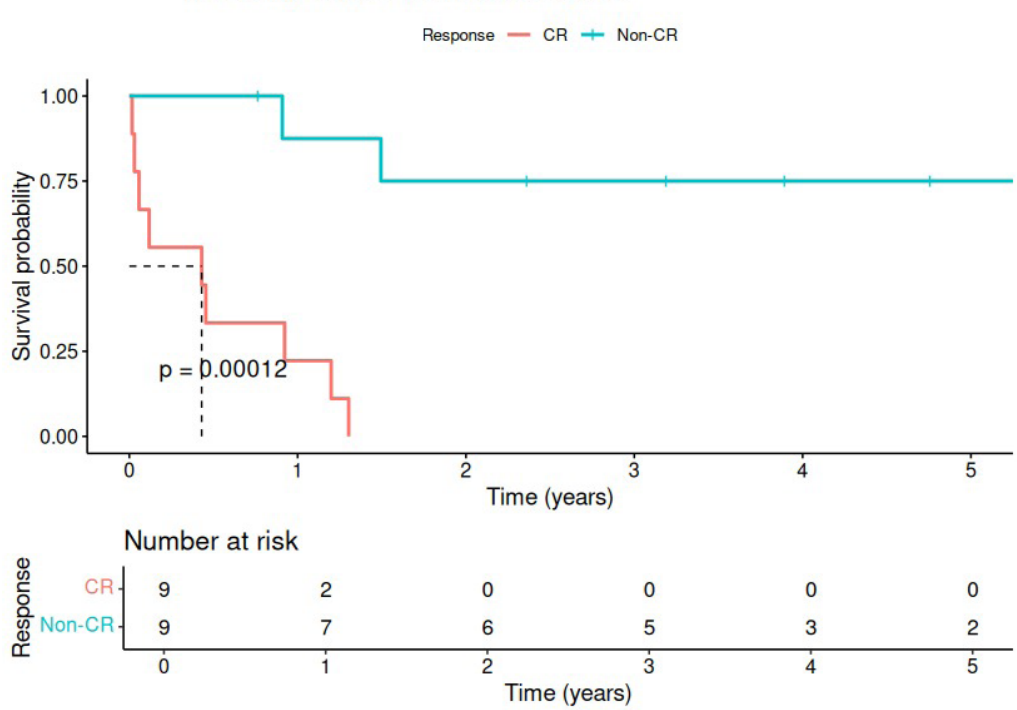
The median survival time for all patients was 438 days (1 year, 2 months, and 11 days). The overall survival rate at 1 year was 55.4%, decreasing to 36.9% at 2 years and remaining stable at 5 years. Patients were censored according to their follow-up duration.

FIGURE 2 – Overall survival by transplanted organ



Source: author.

FIGURE 3 – Overall Survival According to Treatment Response



Source: author.

When comparing survival curves based on treatment response, patients who achieved complete response had significantly better overall survival, with rates of 87.5% at 1 year and 75% at 2 years. In contrast, those who did not achieve complete response had an overall survival rate of 22.2% at 1 year, with statistical significance (p=0.00012).

DISCUSSION

The majority of patients had at least two comorbidities, and more than one-third were aged ≥65 years. This may have contributed to increased mortality and late-onset PTLD, as advanced age and pre-transplant malignancy are recognized risk factors.

The association between PTLD and immunosuppression is evident, with 94.73% of patients receiving ≥2 immunosuppressive drugs since the initial therapy.

None of the patients received preemptive rituximab for elevated EBV viremia, highlighting the challenge of establishing preemptive rituximab use in the post-SOT setting. Nearly all patients in this study were post-SOT recipients, and data on this approach remain scarce in the literature.

Our retrospective analysis revealed that most patients were diagnosed with advanced-stage disease (73.68% were stage III or IV). This likely influenced early mortality, aligning with the aggressive nature of PTLD, as overall survival remained stable beyond the first year.

When comparing survival curves by transplanted organ, 1-year overall survival was 64.8% for liver transplant recipients and 50% for kidney transplant recipients. This reinforces that the transplanted organ is strongly associated with overall survival, as described in the literature. However, our survival

rates were lower than those reported in other studies, and the organ-based survival analysis did not reach statistical significance (p=0.84).

As expected, the most common histological subtype was DLBCL.

Immunohistochemical analysis for EBV-LMP1 was performed in 11 patients, with only 2 testing positive. This underscores the low sensitivity of this method and the need for EBER-FISH to confirm EBV association.

Most deaths (54.54%) were infection-related, possibly due to the inability to completely withdraw immunosuppressive therapy due to graft rejection risk, as well as complications from chemoimmunotherapy.

Univariate analysis between groups did not yield statistically significant results, likely due to the small sample size and varying follow-up durations.

Our study also demonstrated that survival in post-transplant lymphoproliferative disorder is poor after failure of initial therapy, highlighting an urgent need for novel treatments for this ultra-rare disease.

It is noteworthy that, during the study period, two post-liver transplant patients were diagnosed with lymphomatoid granulomatosis, an angiocentric and angio-destructive EBV-associated lymphoproliferation. This condition is characterized by a prominent and reactive polymorphic T-cell infiltrate and was redefined in the 2022 International Consensus Classification as an important differential diagnosis of PTLD[24].

Both patients presented with extranodal pulmonary involvement and were receiving tacrolimus. One patient had lymphoid infiltrates in the lungs and liver, along with supra- and infradiaphragmatic lymphadenopathy, and responded well to corticosteroid therapy. The other patient is still awaiting reassessment after corticosteroid treatment.

Several challenges were encountered in the retrospective data collection, including: undefined initial staging records, unavailable EBV viremia data, incomplete records on viral reactivations, recognized risk factors in the literature and essential information for group comparisons.

Until 2019, EBV-PCR testing was not widely available at our institution, limiting this assessment.

Additionally, the implementation of electronic medical records at our institution was only completed in 2023. Before this, many departments relied solely on physical records and manual documentation. As a result, older records were sometimes incomplete or missing volumes at the time of the study.

Prior to this study, no official database existed for PTLD cases across transplant departments.

CONCLUSION

PTLD is commonly an aggressive disease with poor overall survival, likely influenced by factors such as age, transplanted organ, comorbidities, early mortality, and late diagnosis. Despite its aggressive nature, PTLD often responds well to R-CHOP-based therapies. However, there remains an urgent and unmet need for alternative treatments for cases refractory to initial therapy.

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