Presentation and Clinical Outcomes in Anaplastic Large Cell Lymphoma Patients Diagnosed in Saskatchewan, Canada: A Population-Based Cohort Study

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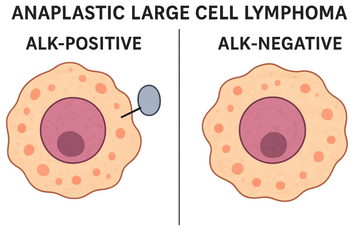
INTRODUCTION

Anaplastic large cell lymphoma (ALCL) is a rare subtype of peripheral T-cell lymphoma accounting for 3-5% of all non-Hodgkin's lymphomas, with distinct clinical and prognostic differences between ALK-positive and ALK-negative subtypes [1,2]. The incidence of ALCL is approximately 0.25 cases per 100,000 people annually, with ALK-positive cases typically affecting younger patients and demonstrating superior outcomes compared to ALK-negative disease [3,4].



Limited population-based data exists for ALCL in Canadian provinces, particularly regarding rural versus urban distribution and treatment outcomes in real-world settings [5].

MATERIALS & METHODS

We conducted a retrospective population-based analysis of all ALCL cases diagnosed in Saskatchewan. Patient demographics, clinical characteristics, pathological features, treatment regimens, and survival outcomes were analyzed using data from the Saskatchewan Cancer Registry, electronic medical records, and pathology reports. Cases were classified as systemic ALK-positive ALCL, systemic ALK-negative ALCL, or breast implant-associated ALCL based on immunohistochemical and molecular testing according to the 2016 WHO classification criteria [6]. Statistical analysis included descriptive statistics for demographic and clinical variables, with survival analysis performed using appropriate methods.

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RESULTS

A total of 31 ALCL patients were identified with a mean age at diagnosis of 47.29 ± 26.54 years. The cohort demonstrated male predominance (61.29% vs 38.71% female) consistent with published literature [7,8]. Notably, 64.52% of cases were ALK-positive, 32.26% were ALK-negative, and 3.23% were breast implant-associated ALCL. This ALK-positive proportion significantly exceeds the typical 31% reported in adult populations from recent international studies [9]. **(Figure 1)**

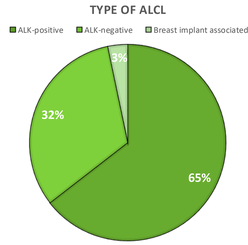

Figure 1

Geographic distribution revealed a striking rural predominance, with 83.87% of patients residing in rural or other non-urban areas, compared to only 16.13% in urban centers. Most patients (70.97%) presented with lymph node involvement as the initial biopsy site, while 29.03% had extra-nodal tissue involvement. Immunophenotyping revealed typical ALCL patterns with universal CD30 positivity, while T-cell markers showed variable expression: CD3 positive in 16.13%, CD4 positive in 16.13%, CD5 positive in 9.68%, and CD8 positive in 6.45% of cases. B-cell markers (CD10, CD20, CD21) and follicular helper T-cell markers (BCL-6, PD-1, CXCL13, ICOS, SAP) were uniformly negative, consistent with the expected immunophenotype [10]**.** Hematological parameters at diagnosis showed mean values within normal ranges: WBC count 7.95 ± 4.03 × 10⁹/L, hemoglobin 121.79 ± 21.06 g/L, and platelet count 326.21 ± 160.54 × 10⁹/L. A more comprehensive look at the CBC differential is found below (**Figure 2 & 3)**

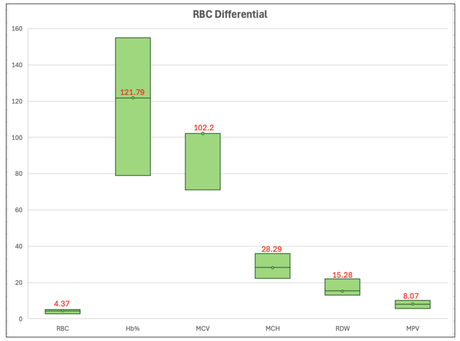

Figure 2

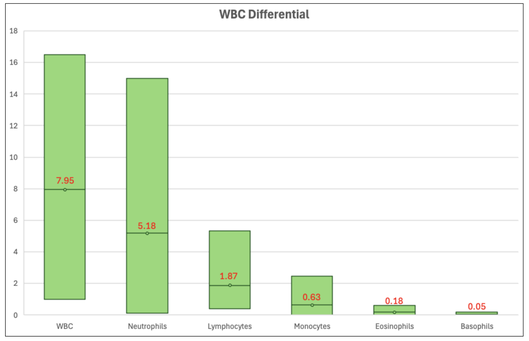

Figure 3

The mean Charlson Comorbidity Index was 3.10 ± 2.33, with diabetes mellitus being the most common comorbidity (16.6% of patients). Treatment analysis revealed that 71.0% of patients received intensive chemotherapy regimens. The most common regimen was CHOEP (CHOP plus etoposide) in 27.3% of cases, followed by standard CHOP in 18.2% of cases. Other intensive regimens were employed in 54.5% of patients. **(Figure 4).** Bone marrow transplantation was performed in 16.13% of patients (80% autologous, 20% allogeneic)**.** At the time of analysis, 58.06% of patients remained alive while 41.94% had died, with a mean prognosis score of 1.33 ± 1.11. **(Figure 5)**

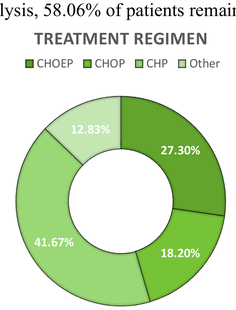

Figure 4

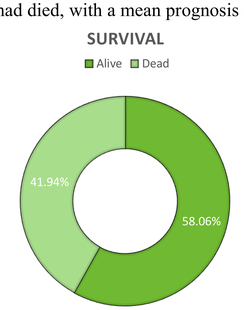

Figure 5

CONCLUSIONS

This Saskatchewan population-based study reveals several notable findings that contribute to our understanding of ALCL epidemiology and outcomes. The unusually high proportion of ALK-positive cases (64.52%) compared to typical adult cohorts suggests potential regional variations in ALCL biology or referral patterns [11]. The striking rural predominance (83.87%) represents a unique geographic finding that warrants further investigation into potential environmental, genetic, or healthcare access factors.

The mortality rate of 41.94% falls between expected outcomes for ALK-positive (typically 10-30% mortality) and ALK-negative (50-65% mortality) ALCL, consistent with the mixed population studied [12,13]. Treatment patterns reflected standard-of-care approaches with CHOP-based regimens, though the study period likely preceded widespread adoption of brentuximab vedotin, which has shown significant survival benefits in recent clinical trials. The ECHELON-2 study demonstrated superior 5-year progression-free survival (61.0% vs 48.0%) and overall survival (79.1% vs 71.5%) with brentuximab vedotin plus CHP compared to CHOP in previously untreated systemic ALCL [14].

These findings highlight the importance of population-based studies in understanding real-world ALCL outcomes and suggest that geographic and demographic factors may influence disease presentation and outcomes. The rural predominance observed in Saskatchewan patients represents a novel finding that requires validation in larger cohorts and investigation of underlying contributing factors. Future research should focus on implementing current treatment advances, including brentuximab vedotin-containing regimens, and investigating the unique epidemiological patterns observed in this Canadian prairie population.

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