ELSEVIER

Blood 142 (2023) 4419–4421

The 65th ASH Annual Meeting Abstracts

POSTER ABSTRACTS

623.MANTLE CELL, FOLLICULAR, AND OTHER INDOLENT B CELL LYMPHOMAS: CLINICAL AND EPIDEMIOLOGICAL

Beyond MIPI: Harnessing Machine Learning and Histological Subtype for Enhanced MCL Prognostication of Survival

Adrian Mosquera Orgueira[1], *Alba Carbita*[2], *Victor Navarro Garces*[3], *Pau Abrisqueta, MD PhD*[4], *Rodrigo Alonso Salcedo Pereda*[5], *Carlos Aliste Santos*[6], *Marta Canelo Vilaseca, MD*[7], *Marina Gomez Rosa, MD*[8], *Alberto Lopez Garcia, MD*[9], *Tomas Garcia, MDPhD*[10], *Fatima De la Cruz, MD*[11], *Juan-Manuel Sancho, MD PhD*[12], *Eduardo Rios Herranz, MD*[8], *Raul Cordoba, MDPhD*[13], *Angel Serna, MD*[14], *Gloria Iacoboni, MD*[15], *Moraima Jiménez, MD*[16], *Cecilia Carpio*[17], *Cristina Garcia*[16], *Josep Castellvi, MD*[18], *Francesc Bosch, MD PhD*[19], *Ana Marin Niebla, MDPhD*[16]

[1] University Hospital of Santiago de Compostela, Department of Hematology, IDIS, SANTIAGO DE COMPOSTELA, Spain
[2] Vall d'Hebron Institute of Oncology (VHIO), University Hospital Vall d'Hebron, Hematology Department, Barcelona, Spain
[3] Oncology Data Science (ODysSey) Group, Vall d'Hebron Institute of Oncology (VHIO), Barcelona, Spain
[4] Experimental Hematology, Vall d'Hebron Institute of Oncology (VHIO), Barcelona, Spain
[5] University Hospital of Santiago de Compostela, Deparment of Hematology, IDIS, Santiago de Compostela, Spain
[6] University Hospital of Santiago De Compostela, SANTIAGO DE COMPOSTELA, ESP
[7] Hematology Department, University Hospital Germans Trias i Pujol, Badalona, Spain
[8] Hematology Department, University Hospital Ntra. Sra de Valme, Seville, Spain
[9] Hematology Department, University Hospital Fundación Jiménez Díaz, Madrid, Spain
[10] Hematology Department, University Hospital Arnau de Vilanova, Lleida, Spain
[11] Hematology Department, University Hospital Virgen del Rocío, Seville, Spain
[12] Hematology Department, ICO Badalona, Germans Trias i Pujol University Hospital. Universitat Autònoma de Barcelona. Josep Carreras Leukemia Research Institute, Barcelona, Spain
[13] Head of Lymphoma Unit, Department of Hematology, Fundacion Jimenez Diaz University Hospital, Health Research Institute IIS-FJD, Madrid, Spain
[14] Hematology Department,, Vall d'Hebron Institute of Oncology (VHIO), University Hospital Vall d'Hebron, Barcelona, Spain
[15] Hospital Universitari Vall d'Hebron-Universitat Autónoma de Barcelona, SEATTLE, WA
[16] Hematology Department, Vall d'Hebron Institute of Oncology (VHIO), University Hospital Vall d'Hebron, Barcelona, Spain
[17] University Hospital Vall d'Hebron, Barcelona, Spain
[18] Department of Pathology, Vall d'Hebron University Hospital, Barcelona, Spain
[19] Department of Hematology, Vall d'Hebron Institute of Oncology (VHIO), Hospital Universitari Vall d'Hebron, Barcelona, Spain

Introduction

Mantle cell lymphoma (MCL) presents challenges due to its aggressive nature and dismal treatment outcomes. The Mantle Cell Lymphoma International Prognostic Index (MIPI) score is valuable for risk stratification, but it may not fully capture the complexity of MCL biology. To address this, we explored innovative data-driven methods based on machine learning to augment the MIPI score. By integrating clinical and histological data with advanced algorithms, this study aimed to enhance risk assessment in MCL. Improved prognostication of survival could facilitate the design of risk-tailored therapeutic approaches, directing more aggressive treatments to high-risk patients, ultimately leading to personalized and precise management.

Methods

The following patient-level variables were retrieved: age, gender, Ann-Arbor stage (I-II vs III-IV), Bulky disease, extranodal disease, histopathological variant (classic vs pleomorphic/blastoid lymphoma), and Ki67+ cells. The MIPI score was used to categorize patients into low, intermediate, and high-risk groups. Employing random survival forests, we developed a novel risk score by integrating clinical and histological data. Missing variables were imputed using a random forests algorithm. Harrel's concordance indexes (c-indexes) were used to evaluate model's accuracy.

Results

We assembled a real-world database of 231 MCL patients from 6 Spanish tertiary hospitals (Jan 2000-Dec 2021), and another cohort for validation from another Spanish tertiary hospital (N=44). Median age at diagnosis was 64 years in both cohorts. Median follow-up was 6.28 y and 8.67 y in the training and test sets, and median overall survival (OS) was 11.48 y and 5.61 y. According to the MIPI score, 44% and 38% of patients were of high risk in the training and validation sets; 26% and 39% were of intermediate risk, and 30% & 23% were of low risk. The c-index of the MIPI groups for the prediction of OS was 0.716 and 0.684 in the training and validation sets, respectively. Then, a random survival forest algorithm was used to derive a new risk score in the training set. The first model contained all the available variables mentioned previously. This 8-variable model achieved a cross-validated c-index of 0.764 in the training set. A variable reduction technique was implemented to remove those variables that provided less independent prognostic value. A simplified model was developed, which contained the following variables by order of importance: histological subtype, MIPI-derived groups, age at diagnosis and Ann-Arbor stage. This model outperformed the conventional MIPI grouping strategy, achieving c-indexes of 0.764 and 0.775 in the training and validation sets, respectively (**Figure 1**).

Conclusion

This study showcases the potential of a novel machine learning model in MCL prognostication beyond the traditional MIPI score, utilizing easily accessible clinical information. The inclusion of histological subtype, MIPI score, age at diagnosis, and Ann-Arbor stage as robust independent prognostic factors improves risk prediction accuracy. Future research may further refine the model and explore additional variables to continue optimizing prognostication and treatment strategies for MCL patients.

Disclosures Mosquera Orgueira: *AstraZeneca:* Consultancy; *Janssen:* Consultancy. **Abrisqueta:** *Abbvie:* Consultancy, Honoraria, Speakers Bureau; *Janssen:* Consultancy, Honoraria, Speakers Bureau; *Beigene:* Consultancy; *Incyte:* Honoraria, Speakers Bureau; *Astrazeneca:* Consultancy, Honoraria, Speakers Bureau; *Roche:* Consultancy, Honoraria, Speakers Bureau; *BMS:* Consultancy, Honoraria, Speakers Bureau. **Cordoba:** *European Hematology Association (EHA), Spanish Society Hematology (SEHH):* Membership on an entity's Board of Directors or advisory committees; *F. Hoffmann-La Roche Ltd, Takeda, Abbvie, Janssen, AstraZeneca, Lilly, BeiGene, BMS, Genmab, Incyte, Gilead:* Speakers Bureau; *F. Hoffmann-La Roche Ltd, Takeda, Abbvie, Janssen, AstraZeneca, Lilly, BeiGene, BMS, Genmab, Incyte, Gilead:* Consultancy; *Fundacion Jimenez Diaz University Hospital:* Current Employment. **Iacoboni:** *Janssen:* Honoraria; *MSD:* Honoraria; *Novartis:* Consultancy, Honoraria; *AstraZeneca:* Honoraria; *Gilead Sciences:* Consultancy, Honoraria; *Miltenyi:* Consultancy, Honoraria; *Autolus:* Consultancy; *Abbvie:* Honoraria; *Celgene/Bristol-Myers Squibb:* Consultancy, Honoraria. **Carpio:** *Regeneron Pharmaceuticals, Inc.:* Consultancy, Honoraria, Membership on an entity's Board of Directors or advisory committees; *Takeda:* Consultancy, Honoraria, Membership on an entity's Board of Directors or advisory committees; *Novartis:* Honoraria; *Gilead:* Honoraria; *BMS:* Consultancy. **Bosch:** *Roche:* Honoraria; *BeiGene:* Consultancy; *Lilly:* Consultancy; *Mundipharma:* Consultancy, Honoraria; *Gilead:* Consultancy, Honoraria; *Janssen:* Consultancy, Honoraria; *AbbVie:* Consultancy, Honoraria; *Novartis:* Consultancy, Honoraria; *Takeda:* Consultancy, Honoraria; *AstraZeneca:* Consultancy, Honoraria; *Karyospharm:* Other; *Celgene:* Consultancy, Honoraria; *Roche:* Consultancy, Honoraria. **Marin Niebla:** *AstraZeneca:* Consultancy; *Roche:* Consultancy; *Janssen:* Consultancy, Honoraria; *Takeda:* Consultancy, Honoraria; *Kiowa Kirin:* Consultancy; *Kite:* Consultancy, Honoraria; *Lilly:* Consultancy, Honoraria.

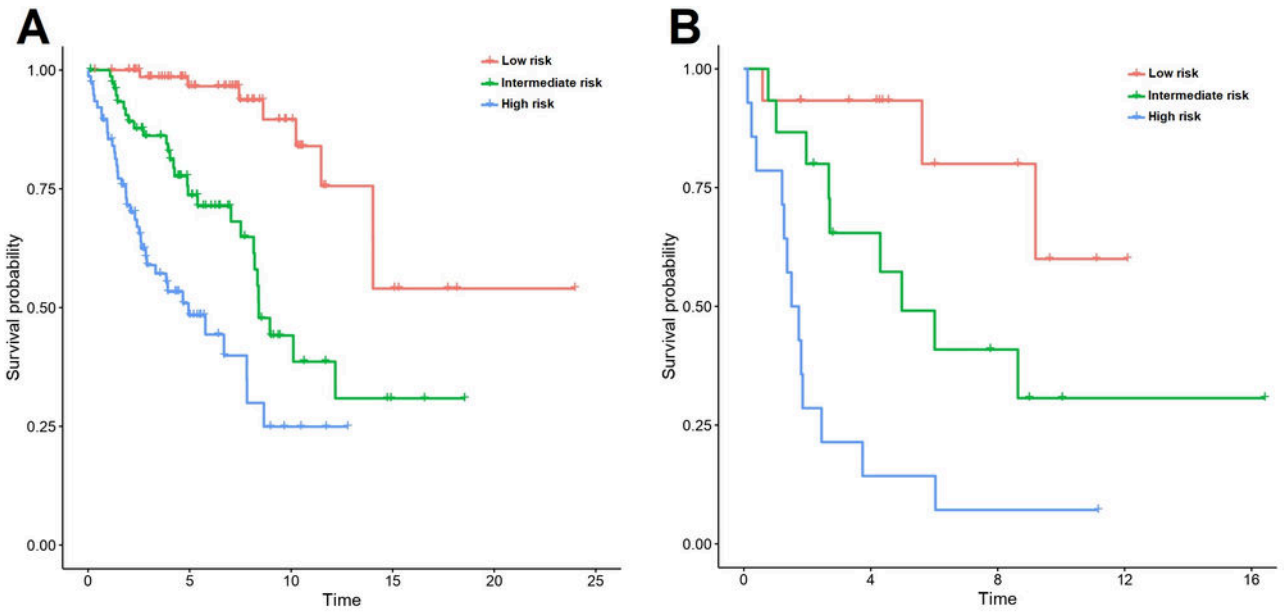

Figure 1. Kaplan-Meier plots representing the overall survival of patients in the training (A) and validation (B) cohorts. Patients were stratified into 3 equal subgroups according to the proposed machine learning risk score.

Figure 1

https://doi.org/10.1182/blood-2023-179174