PET/CT-Directed Biopsy in Hodgkin-Variant Richter Transformation: An Imaging-Pathology Correlation Series

PET/CT Maps the Target; Histopathology Establishes the Diagnosis

Truman Koh[1], Farrukh T. Awan[1]

[1]University of Texas Southwestern Medical Center, Dallas, Department of Internal Medicine, TX, USA

Introduction

- Hodgkin-variant Richter transformation (RT) is an uncommon complication of chronic lymphocytic leukemia/small lymphocytic lymphoma (CLL/SLL), and diagnosis may be challenging when Hodgkin/Reed-Sternberg (HRS) cells coexist with background CLL/SLL[(1-3)]
- PET/CT can identify suspicious lesions but cannot distinguish transformation reliably without tissue confirmation[(1,4)]
- **Objective:** To characterize PET/CT–biopsy concordance and practical biopsy-selection patterns in patients with biopsy-confirmed Hodgkin-variant RT

Methods

- IRB-approved retrospective imaging-pathology correlation study of adults with biopsy-confirmed Hodgkin-variant RT evaluated at UT Southwestern from 2017–2025
- The PET/CT immediately preceding diagnostic biopsy was reviewed for disease distribution, lesion SUVmax, and accessibility and correlated with the biopsy site and procedure
- Histopathology, immunohistochemistry, EBV/EBER status, and background CLL/SLL
- Analyses were descriptive and were not designed to establish an optimal SUV cutoff

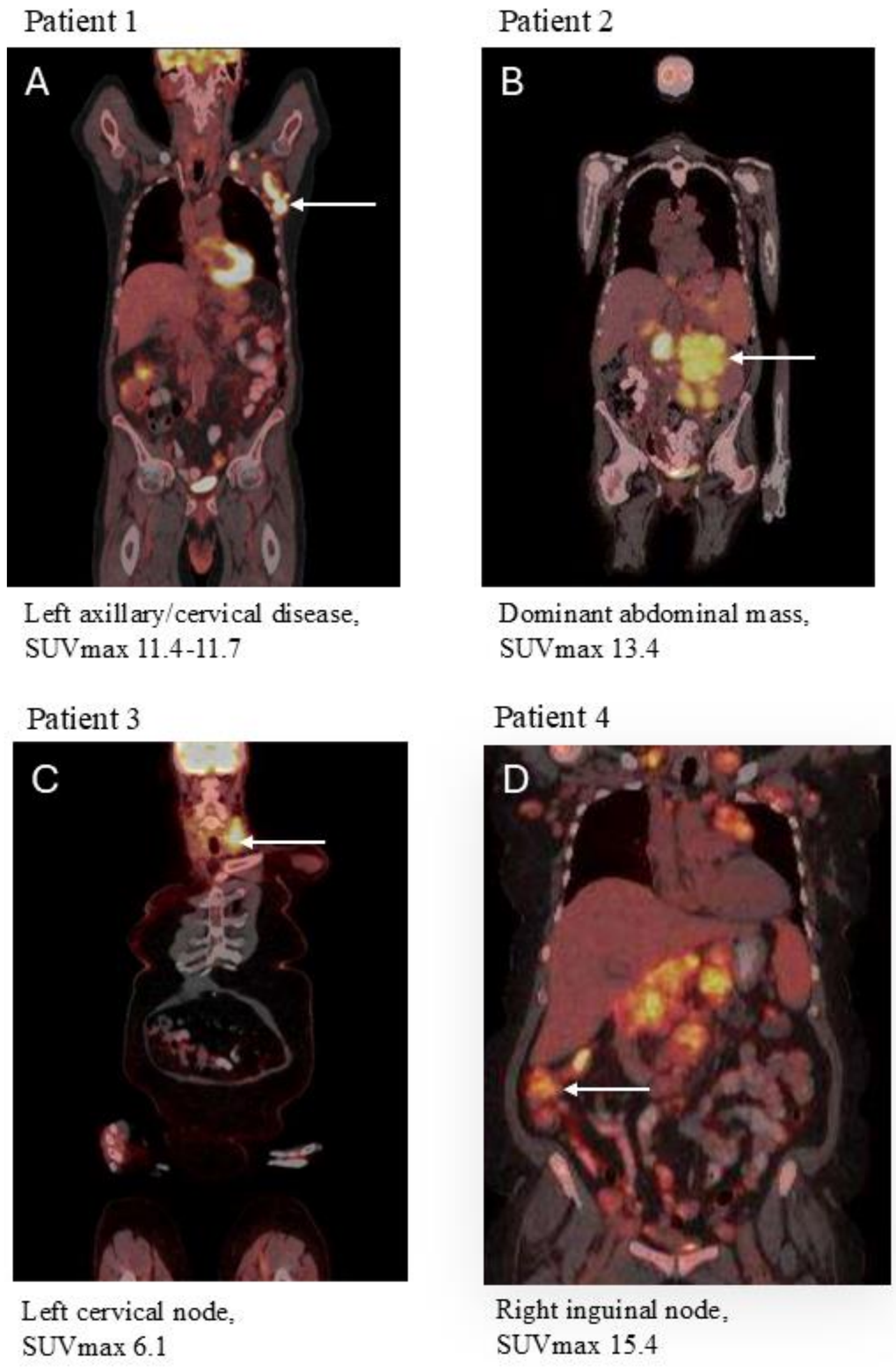
Results

- Six patients were identified; four had evaluable pre-biopsy PET/CT. Median age was 70 years (range, 68–77), and two patients were female
- Diagnostic tissue included one excisional lymph node biopsy and three ultrasound-guided 18-gauge core biopsies
- All four biopsies were anatomically concordant with suspicious PET/CT findings
- Four biopsy-selection patterns were observed: persistent high-avidity disease after therapy; a dominant high-avidity mass distinct from lower-avidity CLL/SLL; an accessible moderate-SUV lesion; and an accessible high-SUV lesion among multifocal disease (Figure 1)
- Biopsied-lesion SUVmax ranged from 6.1–15.4 (median, 12.4).
- EBV/EBER was positive in all four cases, and background CLL/SLL was present in three diagnostic specimens. Representative type 1 morphology and immunophenotype are shown in Figure 2

Conclusion

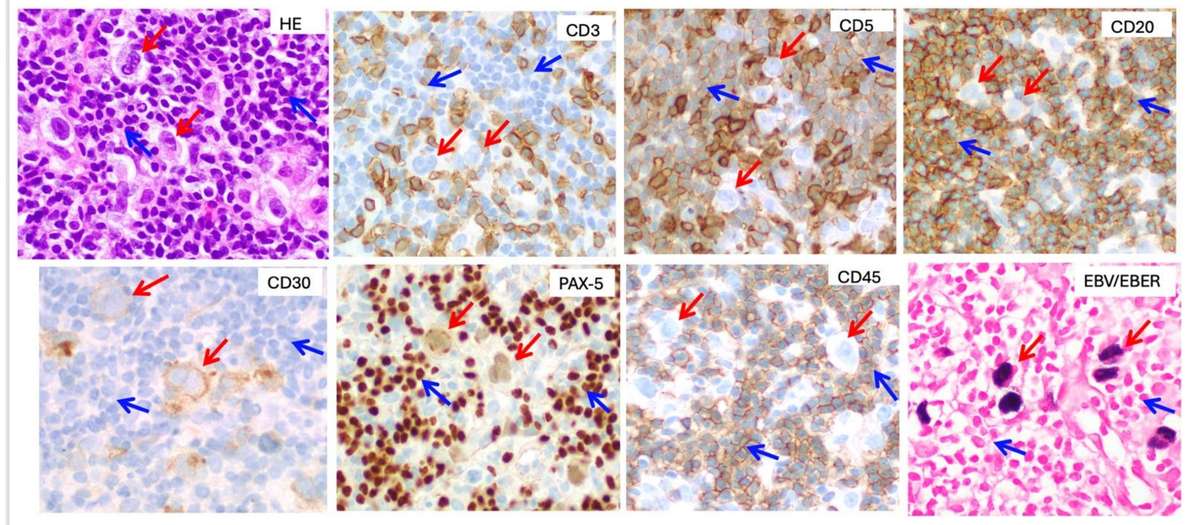
- PET/CT should be used as a biopsy-selection map, not as a diagnostic substitute[(1,4)]
- Target selection should integrate metabolic activity, lesion discordance, accessibility, and tissue adequacy; the highest-SUV lesion is not always the most appropriate target[(1,4)]
- Histopathology with immunophenotyping and EBV/EBER assessment remains the diagnostic endpoint; image-guided core biopsy provided adequate tissue in three cases[(1–3)]
- This small descriptive series does not establish an optimal SUV cutoff

Figure 1. PET/CT-Directed Biopsy Targets



Representative pre-biopsy FDG PET/CT images. White arrows identify FDG-avid lesions selected for, or anatomically concordant with, diagnostic biopsy. PET/CT supported biopsy-site selection; histopathology established the diagnosis. FDG, fluorodeoxyglucose; SUVmax, maximum standardized uptake value.

Figure 2. Representative Type 1 Hodgkin-Variant RT



Red arrows indicate HRS-like cells; blue arrows indicate background CLL/SLL cells. HRS-like cells demonstrate CD30 positivity, weak PAX5 expression, and EBV/EBER positivity.

References

1. Kittai AS, et al. International consensus statement on diagnosis, evaluation, and research of Richter transformation: the ERIC recommendations. Blood. 2025;146:291–303.
2. King RL, et al. Chronic lymphocytic leukemia with Reed-Sternberg-like cells versus classic Hodgkin lymphoma transformation of CLL: does this distinction matter? Blood Cancer J. 2022;12:18.
3. Xiao W, et al. Hodgkin lymphoma variant of Richter transformation: morphology, Epstein-Barr virus status, clonality, and survival analysis. Hum Pathol. 2016;55:108–116.
4. Albano D, et al. The diagnostic performance of FDG PET/CT in identifying Richter transformation: an updated systematic review and meta-analysis. Cancers (Basel). 2024;16(9).

Ackknowledgements

We thank Weina Chen, MD, PhD, Department of Pathology at UT Southwestern Medical Center, for providing the representative histopathology and immunophenotypic images used in Figure 2.