Letter to the Editor

^{18}F-FDG PET/CT for the detection of extensive bone relapse in acute lymphoblastic leukemia with TCF3-PBX1 fusion after hematopoietic stem cell transplantation

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Submitted Jan 07, 2022. Accepted for publication Apr 02, 2022.
doi: 10.21037/qims-22-19
View this article at: https://dx.doi.org/10.21037/qims-22-19

Introduction

Early detection of extramedullary relapse (EMR) following allogeneic hematopoietic stem cell transplantation (allo-HSCT) is an unresolved clinical challenge for patients with acute lymphoblastic leukemia (ALL) due to the variety of potential relapse sites. Here, we report a case in which ^{18}F-FDG PET/CT aided in the detection of extensive bone relapse in ALL with TCF3-PBX1 fusion following allo-HSCT.

Case presentation

A 20-year-old man was referred to the Department of Orthopedics at The First Affiliated Hospital of Xi'an Jiaotong University, with swelling and pain in the left ankle after spraining it without trauma 2 weeks previously. X-ray of the left ankle joint at a local hospital showed normal patterns, whereas magnetic resonance imaging (MRI) from the same hospital showed intra-articular effusion. The patient had a prior history of acute pre-B cell lymphoblastic leukemia with t(1;19)(q23;p13)/TCF3-PBX1. He had undergone matched unrelated allo-HSCT 2 years previously, and there was no radiographic or histologic evidence of additional occult leukemia before allo-HSCT. The immunosuppression was discontinued 6 months after transplantation without chronic graft versus host disease. During the 2-year follow-up, flow cytometric detection of measurable residual disease of the bone marrow and real-time polymerase chain reaction (PCR) detection of the TCF3-PBX1 fusion gene remained consistently negative with full donor chimerism.

Additional laboratory findings showed a normal white blood cell count, with 58.2% lymphocytes. The patient's hemoglobin and platelet levels were normal, as were his liver and renal functions. The erythrocyte sedimentation rate was 90 mm/h, and there was no lactate dehydrogenase elevation. A bone marrow smear showed no blast cells. One day after bone marrow puncture, ^{18}F-FDG PET/CT showed many bones with a mass nuclide dense focus (*Figure 1*). PET/CT-guided bone biopsy in the left distal tibia revealed infiltration of acute leukemia cells expressing TdT, CD19, PAX5, CD99, and CD10 (*Figure 2*). Real-time PCR was positive for the TCF3-PBX1 fusion gene in the bone marrow 2 weeks after the development of swelling and pain in the left ankle. The measurable residual disease of the bone marrow detected by flow cytometry was still negative with full donor chimerism. All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee(s) and with the Helsinki Declaration (as revised in 2013). Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the editorial office of this journal.

Discussion

EMR after allo-HSCT is an unresolved clinical challenge for patients with ALL. EMR of ALL primarily involves

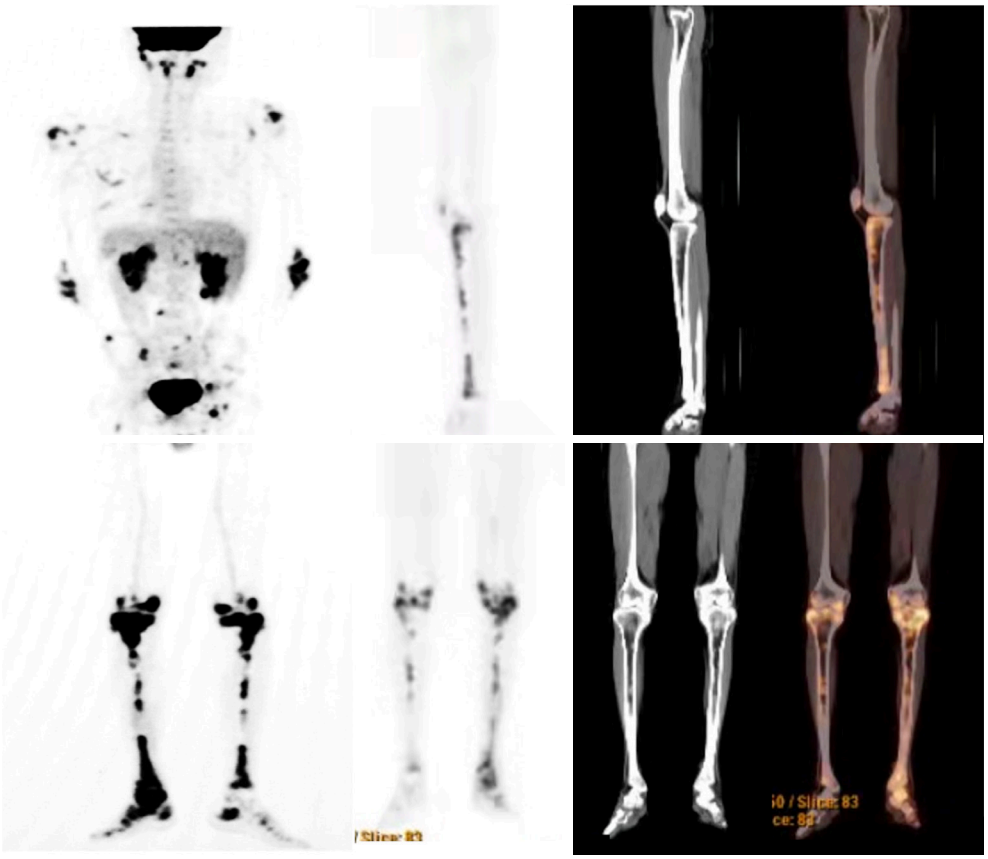

Figure 1 ^{18}F-FDG PET/CT showing many bones with a mass nuclide dense focus.

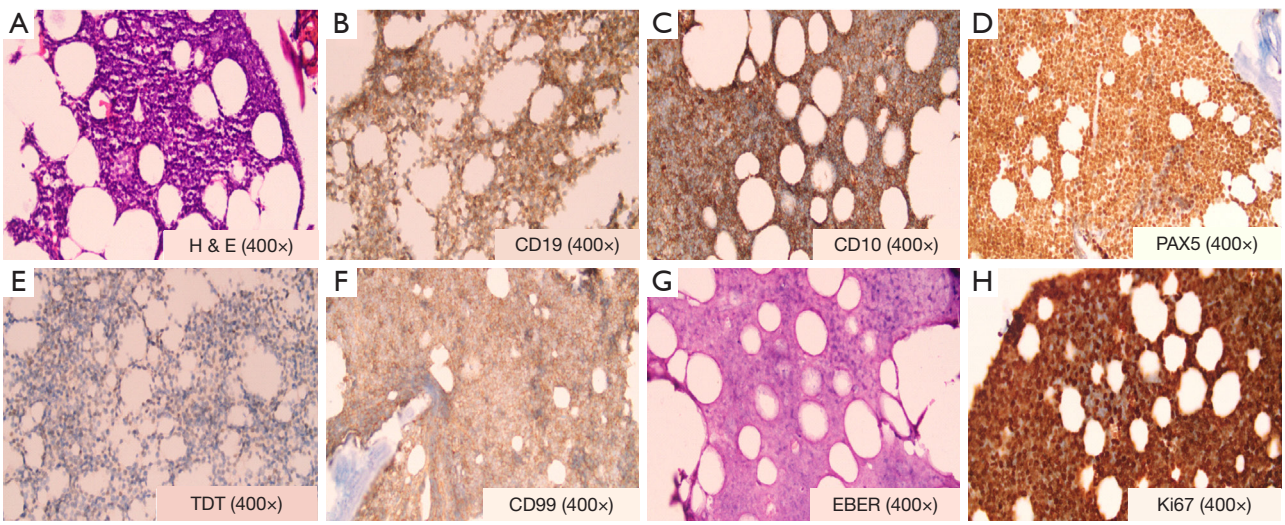

Figure 2 Pathological analysis of biopsy samples from the left distal tibia, showing results of (A) hematoxylin and eosin (H&E) staining and (B-H) immunohistochemical staining for CD19, CD10, PAX5, TdT, CD99, Epstein–Barr virus-encoded RNA (EBER), and Ki67.

the central nervous system and testis but occasionally occurs in the breast, urogenital tract, bone, skin, and other sites (1). Establishing an early diagnosis of EMR remains challenging because of the considerable diversity in relapse sites. Bone involvement has been reported to be more common in patients with TCF3-PBX1-positive B-cell acute lymphoblastic leukemia (B-ALL) than in other patients with B-ALL (2-4). However, TCF3-PBX1 detection is not commonly used to monitor patients for EMR as part of the routine follow-up after HSCT (5). In the present case, the findings of uninvolved bone marrow on the aspirate and full chimerism are explained by the fact that the marrow was that of the normal donor, while the leukemia had relapsed in the host bones. Our case demonstrates that PET/CT can be used to detect "hidden" disease in TCF3-PBX1-positive B-ALL, facilitating earlier treatment of patients with this disease.

Conclusions

This case report highlights the use of ^{18}F-FDG PET/CT for monitoring and guiding the biopsy for EMR of ALL with TCF3-PBX1 fusion following HSCT.

Acknowledgments

Funding: This study was supported by the Key Research and Development Program of Shaanxi Province (Nos. 2020SF-174 and 2022SF-13).

Footnote

Conflicts of Interest: All authors have completed the ICMJE uniform disclosure form (available at https://qims.amegroups.com/article/view/10.21037/qims-22-19/coif). The authors have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee(s) and with the Helsinki Declaration (as revised in 2013). Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the editorial office of this journal.

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Cite this article as: Wang X, Niu F, Ren J, He P. ^{18}F-FDG PET/CT for the detection of extensive bone relapse in acute lymphoblastic leukemia with TCF3-PBX1 fusion after hematopoietic stem cell transplantation. Quant Imaging Med Surg 2022;12(7):4002-4004. doi: 10.21037/qims-22-19

