Clinical vignette

Nuclear Medicine Review 2022, 25, 1: 68–69
DOI: 10.5603/NMR.a2022.0014

ISSN 1506–9680, e-ISSN 1644–4345

VIA MEDICA

Rare osteoarticular complications on [^{18}F]FDG-PET/CT — following intravesical BCG immunotherapy for bladder cancer

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[Received 1 IX 2021; Accepted 30 XI 2021]

Abstract

This case illustrates rare osteoarticular complications of Bacillus Calmette-Guérin (BCG) immunotherapy in a 55-year-old male with high-risk non-muscle-invasive bladder cancer (NMIBC). The patient was referred for ^{18}F-fluorodeoxyglucose ([^{18}F]FDG) positron emission tomography/computed tomography (PET/CT) to rule out bone metastases suspected on prior post-gadolinium magnetic resonance imaging (MRI). Although metastases were excluded, nearly symmetrical uptakes were detected in the costovertebral and costotransverse joints. Medical history revealed that the patient had been receiving intravesical instillations of BCG, the first-line therapy for high-risk NMIBC. The patient was diagnosed with reactive arthritis (ReA), a rare autoimmune complication of BCG, that was successfully treated with a nonsteroidal anti-inflammatory drug (NSAID).

KEY words: oncology treatment; NMIBC therapy; BCG side effects; reactive arthritis; metastasis

Nucl Med Rev 2022; 25, 1: 68–69

A 55-year-old male with high-risk non-muscle invasive (superficial) bladder cancer (NMIBC), associated with a greater risk for progression, was referred for [^{18}F]FDG-PET/CT after post-gadolinium MRI raised suspicion for bone metastases. A review of the [^{18}F]FDG-PET/CT imaging excluded bone (and other) metastases. However, remarkable, almost symmetrical uptakes were noted in the costovertebral and costotransverse joints. The fused volume-rendered coronal view showed multifocal enhancement along the thoracic spine (Fig. 1A). The transaxial fused volume rendering technique VRT (Fig. 1B) and the correlated initial T1W FS post-gadolinium MRI (Fig. 1C) showed intense uptakes in the right costovertebral (yellow arrow) and left costotransverse (red arrow) joints at T5, that were not characteristic of metastases.

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These imaging findings clinically correlated with the patient's history of spinal pain in the thoracic region at night for over a year. Medical history further revealed that the patient had been receiving intravesical instillations of Bacillus Calmette-Guérin (BCG), the first-line therapy for high-risk (CIS/Tis, high grade/G3, T1, or low-grade with multiple, recurrent, Ta tumors measuring > 3 cm) NMIBC, that contains a live strain of *Mycobacterium Bovis* in an attenuated (weakened) state. Yet, it can result in local complications through contamination of urine or systematic complications from dissemination in the bloodstream.

Review of the [^{18}F]FDG-PET/CT findings and correlated clinical history in this patient led to the suspicion of inflammation due to reactive arthritis (ReA), a rare autoimmune complication of BCG that is commonly associated with HLA-B27. The diagnosis was clinically confirmed, and the patient was successfully treated with NSAID (Ibuprofen).

This is the first case to provide visual evidence of ReA following BCG therapy on [^{18}F]FDG-PET/CT. This case highlights the rare autoimmune side effects of BCG (and other immunotherapy) that necessitate a thorough consideration of the clinical history and initial tumor stage to avoid potential upstaging and unnecessary treatment.

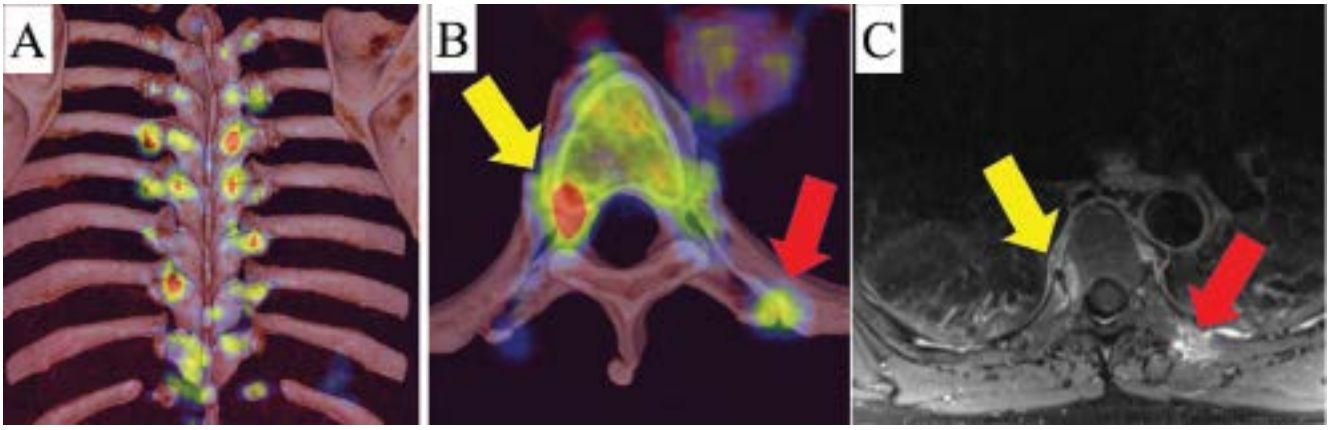

Figure 1. Coronal volume rendering technique (VRT) of the fused ^{18}F-fluorodeoxyglucose ([^{18}F]FDG) positron emission tomography/computed tomography ([^{18}F]FDG-PET/CT) images of the patient demonstrated multifocal enhancement along the thoracic spine (A). The volume-rendered transaxial view of the fused [^{18}F]FDG-PET/CT at the level of the T5 vertebra showed intense uptakes in the right costovertebral (yellow arrow) and left costotransverse (red arrow) joints (B). These findings correlated with the initial T1-weighted fat saturation (FS) post-gadolinium magnetic resonance imaging (MRI) (C)

Funding

The authors did not receive any specific funding for this work.

Ethical approval

The submitted work does not contain any studies with human participants performed by any of the authors.

Informed consent

Informed consent was obtained from the individual patient for the data and images included in this report.

Conflict of interest

All three authors declare that they have no conflict of interest that is directly or indirectly related to the work submitted for publication.