USE OF POSITRON EMISSION TOMOGRAPHY FOR THE DIAGNOSIS OF IMMUNE CHECKPOINT INHIBITOR MYOCARDITIS

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Background Myocarditis from immune checkpoint inhibitor (ICI) therapy has a reported mortality of 25 to 50%. The gold standard for myocarditis diagnosis is endomyocardial biopsy (EMB). The feasibility and diagnostic accuracy of fluorodeoxyglucose positron emission tomography (FDG PET) computed tomography (CT) has not been extensively evaluated compared to EMB in ICI myocarditis.

Methods This was a prospective observational study conducted at MD Anderson Cancer Center between March 2021 and May 2022. Patients were eligible if age ≥ 18 years, ICI was administered in single or combination therapy, and there was clinical or diagnostic suspicion of myocarditis. All patients had an EMB with at least 4 samples of the right ventricular septal wall. Prior to imaging with FDG PET CT, patients followed a 72-hour low carbohydrate, high fat diet. Sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) of FDG PET CT were calculated.

Results There were 10 patients enrolled with FDG PET CT performed. The demographics were 68.9 years (median), 70% male, 70% Caucasian and 30% Hispanic. The most common malignancies were genitourinary (30%), melanoma (30%), lung (20%), liver (10%), and papillary thyroid (10%). The ICI use was 40% programmed cell death 1 (PD-1) inhibitor, 30% programmed cell death ligand 1 (PD-L1) inhibitor, and 30% combination PD-1 and cytotoxic T-lymphocyte-associated protein 4 (CTLA-4) inhibition. The sensitivity of FDG PET CT was 75%, specificity 67%, PPV 60%, and NPV 80% (table 1). The time from admission to imaging with FDG PET CT was median 11 days. The time from admission to EMB was median 1 day. Reasons for delay in FDG PET CT included plasmapheresis being administered with glucose infusion (50%), inability to adhere to dietary protocol (20%), and clinical instability (20%) for imaging. One of the three patients EMB and FDG PET CT positive for ICI myocarditis had imaging uptake in the septal wall. Two patients FDG PET CT positive and EMB negative had imaging uptake in the lateral left ventricular wall and apex. Two of the FDG PET CT noted skeletal muscle FDG avidity and these patients had concomitant myositis.

Conclusions The feasibility of performing FDG PET CT is limited due to the use of plasmapheresis and the dietary protocol necessary for imaging. There is reasonable sensitivity and specificity for FDG PET CT in ICI myocarditis. There may be a role for identification of concomitant immune related adverse events also with the diagnosis of myositis.

Trial Registration NCT05062395

REFERENCE

Consent Written informed consent was obtained from the patients prior to enrollment in the study. A copy of the written consent is available for review by the Editor of this journal.

Table 1

| EMB     | Positive | FDG PET CT
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<tbody>
<tr>
<td>Positive</td>
<td>3</td>
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<tr>
<td>Negative</td>
<td>2</td>
<td>4</td>
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