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IS POSITRON EMISSION TOMOGRAPHY/MAGNETIC RESONANCE IMAGING A RELIABLE TOOL FOR DETECTING VASCULAR ACTIVITY IN TREATED CHILDHOOD-ONSET TAKAYASU'S ARTERITIS? A MULTICENTER STUDY

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BACKGROUND

Disease activity assessment in childhood-onset Takayasu's arteritis (c-TA) is a challenge in clinical practice. There are no reliable biomarkers for this purpose and a better imaging surveillance is of paramount importance.

The aim of this study is to assess whether 18F-fluorodeoxyglucose-positron emission tomography/magnetic resonance imaging (18F-FDG-PET/MRI) can contribute to detect vessel wall inflammation in patients with c-TA under immunosuppressive therapy.

MATERIAL AND METHODS

Three-center cross-sectional study was conducted to analyze 18F-FDG-PET/MRI scans in c-TA patients. The same imaging tests were performed in oncologic patients, who served as control group. Clinical and laboratory characteristics were also analyzed.

RESULTS

Seventeen c-TA patients (65% females) between the ages of 6 and 21 years, mean disease duration of 9.4 years, were recruited. Only one patient presented clinical disease activity, and six (35.6%) had increased erythrocyte sedimentation rate (ESR) and/or C-reactive protein (CRP) levels. The most frequent magnetic resonance angiography (MRA) findings were stenosis and thickening, observed in 82.4 and 75% of patients, respectively; 88.2% of patients had 18F-FDG uptake higher than the liver at least in one arterial segment (Figure 1). The total qualitative assessment of vascular 18F-FDG uptake across the arterial segments was 21.8 ± 3.3 . Median standardized uptake value (SUVmax) was 3.22 (2.76–3.69) and mean metabolic inflammatory volume (MIV) was $1990 \text{ cm}^3 \pm 1077$. Patients with c-TA presented significantly higher SUVmax than oncologic patients ($p < 0.001$). There was a positive correlation between SUVmax and CRP levels ($\text{Rho} = 0.528$; $p = 0.029$) and between SUVmax and MIV ($\text{Rho} = 0.615$; $p = 0.009$).

CONCLUSION

This was the first study in c-TA using a state-of-the-art imaging modality that revealed a strong vascular FDG uptake even in patients in clinical and laboratory inactive disease. We suppose that this finding may represent a silent activity in the vessel wall; however, we cannot exclude the possibility of arterial remodeling in these cases. Importantly, a negative imaging scan may support the immunosuppression withdrawal in daily clinical practice.

FUNDING

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Figure 1. PET/MRI in a 17-year-old girl with childhood-onset Takayasu arteritis (c-TA).

¹⁸F-FDG PET/MRI imaging performed after gadolinium contrast of thoracic aorta (ascending, arch and descending) in coronal planes A: Maximum Intensity Projection (MIP) for Magnetic Resonance Angiography (MRA); B: MIP for ¹⁸F-fluorodeoxyglucose-Positron emission tomography (¹⁸F-FDG-PET) and C: Fusion Positron emission tomography/magnetic resonance imaging (PET/MRI); D: Sagittal ¹⁸F-FDG-PET image; E: Axial ¹⁸F-FDG-PET image, F: Fused PET/MRI image. The images show moderate focal, parietal and concentric uptake of ¹⁸F-FDG at the proximal third level of the ascending part of the thoracic aorta most evident in C and D. This imaging study was considered to be positive (Takayasu arteritis indicating active inflammation).

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Figure 1