Abstract: 193

Assessment of osteoblastic activity with 18F-sodium fluoride PET in aortic bioprosthesis structural valve dysfunction: first results of a monocentric observational pilot study.

Authors:
A Pallardy¹, C Lelarge², T Eugene¹, B Jamet¹, C Cueff², JM Serfaty³, T Letourneur², N Piriou¹, ¹University Hospital of Nantes, Nuclear Medicine - Nantes - France, ²University Hospital of Nantes, Cardiology / Institut du thorax - Nantes - France, ³University Hospital of Nantes, Radiology - Nantes - France,

Topic(s):
Positron Emission Tomography (PET)

Citation:

INTRODUCTION

Structural valve degeneration of bioprostheses (SVD) is the most common and life threatening complication in patients undergoing aortic valve replacement. A calcification process is frequently involved in SVD but its pathophysiology remains unclear.

In native valves, an active metabolic phenomenon of calcification has been shown to contribute to native aortic valve disease, rather than a passive deposit of calcium. We hypothesized that the same physiopathology could be involved in SVD.

To explore the mechanism of calcification of in SVD, inflammation and macrophage activity was determined by 18F-fluorodeoxyglucose (18F-FDG) Positron Emission Tomography (PET) and ongoing mineral deposition was evaluated by 18F-sodium fluoride (18F-NaF) PET.

MATERIAL AND METHODS:

Between January 2017 and March 2018, patients with echocardiography-confirmed SVD (mean gradient = 20 mmHg, maximum velocity = 3m / sc, area = 1.2 cm², and / or aortic insufficiency =2 / 4) were proposed to participate to the study.

Patients underwent 18F-NaF PET/CT (125 MBq), 18F-FDG PET/CT and thoracic CT to evaluate bioprosthesis calcified plaque burden. Radiotracer uptake on bioprostheses was analyzed both qualitatively and quantitatively by measuring the blood-pool-corrected standardized uptake value (target-to-background ratio (TBR)).

Echocardiographic parameters, bioprosthesis calcium scoring (AU), and pattern of 18F-NaF and 18F-FDG activity on bioprostheses were describe. For quantitative description, median 18F-NaF TBR was chosen as a cutoff to establish two groups of patients.

RESULTS:

The first 21 included patients having both a 18F-NaF and a 18F-FDG PET scan were analyzed. Median age was 76.5 years, 4 patients (19%) had intraprosthetic regurgitation, 4 (19%) a stenosis and 13 (61.9%) had both (mixed type).

Calcium score was higher in patients with significant 18F-NaF visual uptake (n=12, 57.1%) versus patients with no 18F-NaF uptake (mean 1065 ± 505 vs 462 ± 320, p 0.015). No significant periprosthetic FDG uptake was found on visual analysis.
The median 18F-NaF TBR (3.49, [2.33- 5.04]) was significantly higher than those of 18F-FDG (1.34, [1.20 - 1.47]).

The patients with 18F-NaF TBR greater than the median value had a higher calcium score (mean 1059 ± 550 vs 566 ± 363, p = 0.05), and showed a tendency to have more severe stenosis (mean gradient 45.5 ± 16.8 mmHg vs 37.2 mmHg ± 18.4, p 0.29 and indexed area 0.394 cm² / m² ± 0.123 vs 0.6 cm² / m² ± 0.132).

The picture shows an example of a patient with SVD : CT (A) established localizations of calcium deposits; 18F-NaF PET/CT (B) show intense uptake adjacent to calcifications; 18F-FDG PET/CT (C) show no uptake.

CONCLUSION:

These preliminary results pave the way to new perspectives on the assessment of severity of aortic SVD pathology through 18F-NaF PET quantification of ongoing mineral burden.