International Journal of Medical Science and Health Research

Vol. 4, No. 04; 2020

ISSN: 2581-3366

18F-FDG PET/CT as a Diagnostic Target for a Subset of Patients with Giant Cell Arteritis

Vanesa Alende[1]; JA Diaz Peromingo[2]; Bernardo Sopeña[2]; Arturo Gonzalez-Quintela[2]

[1] MedicinaInterna, Hospital do Salnés
[2] Medicina Interna, Complexo Hospitalario Universitario de Santiago de Compostela

Corresponding Author:
Mrs. Vanesa Alende
Hospital Comarcal do Salnés
Vilagarcia de Arousa

Abstract

Background: Some patients with LV-GCA does not have cranial symptoms and the TAB is negative. Patients with isolated ESR increase could be erroneously considered as a relapse and put on steroid treatment. In these cases, PET/CT can be useful.

Methods: two groups of patients were prospectively studied: Group-1: Patients with clinical suspicion of GCA with a negative TAB. Group 2: patients with ESR persistently elevated.

Results: Group 1 (n= 18): The main complaint was: constitutional symptoms in 72%. TAB was performed and negative in 9 patient. PET showed vascular uptake suggestive of LV-GCA in 89%. Group-2 (n=4): all patients had ESR> 100 mm/h, three of them were asymptomatic. The PET/TC was negative for relapse in 3 patients and positive for PMR in the other case.

Conclusions: The judicious use of PET/CT was useful in the diagnosis and management of selected cases of LV-GCA and to avoid unnecessary steroid treatment.

Keywords: PET; giant cell arteritis; corticosteroids; relapse

Introduction

Giant cell arteritis (GCA) is a systemic vasculitis that affects people of middle age and older. GCA frequently involves large and medium-sized arteries[1]. Even if the cranial arteries are commonly involved, the larger vessels (the aorta and its major branches) can also be affected[2]. Some patients with LV-GCA do not have cranial symptoms of giant cell arteritis (C-GCA) and the temporal artery biopsy (TAB) is negative for arteritis. These patients often have a delay in diagnosis and undergo inappropriate treatment. Furthermore, patients with biopsy-proven C-GCA and isolated erythrocyte sedimentation rate (ESR) increase could be erroneously considered to indicate a relapse and put on steroid treatment. In these 2 groups of patients, where clinical decisions are difficult, Fluorine-18 fluorodeoxyglucose positron emission/computed tomography (18-FDG PET/CT) may be useful[3][4][5][6].

The objective of this study is to analyze if the realization of a PET/CT with 18F-FDG can be

Vol. 4, No. 04; 2020

ISSN: 2581-3366

helpful for the diagnosis of difficult cases of LVGCA and to evaluate relapses in patients with diagnosed C-GCA with rised markers of inflammation.

Methods

We performed a prospective study from January 2012 in the Hospital of Santiago de Compostela. The patients were separated, upon acceptance, into two groups: Group 1 included patients with a clinical suspicion of C-GCA but with a negative TAB and/or patients with an inflammatory general syndrome of unknown origin who did not meet the criteria for C-GCA; and Group 2 included patients with biopsy-proven C-GCA and persistently elevated ESR where relapse was considered. In these two groups, once the diagnostic work-up had ended, an 18F-FDG PET/CT was performed.

By reviewing their medical history, we collected clinical and analytical characteristics, diagnostic tests, treatment and the response to the treatment.

Group definitions

Group 1 included patients with the following characteristics: patients with a suspicion of GCA based upon medical anamnesis, physical examination and laboratory features in whom temporal artery biopsy was negative for the diagnosis. Also, patients with fever of unknown origin and a suspicion of inflammatory syndrome who did not meet criteria for GCA, using the classification criteria formulated by the American College of Rheumatology (ACR), were included.

Group 2 includes patients who had a positive temporal artery biopsy for C-GCA and persistently elevated ESR and where relapsed was considered. We followed these patients for a mean period of 16.5 months.

An 18F-FDG PET/CT was performed in both groups of patients to search for vasculitic affectation. We determined the large-vessel involvement by vascular areas and also if PET/CT was performed after treatment.

We defined C-GCA as giant cell arteritis affecting the epicranial arteries and LV-GCA as the cases where extracranial artery involvement was proven.

A descriptive analysis was performed, by calculating qualitative variable rates and the mean and standard deviation of quantitative variables in both groups to determine the usefulness of the mentioned technique in the diagnosis and management of LV-GCA.

Statistical analysis was performed using SPSS v.22.0 (SPSS Inc., Chicago, IL, USA).

Results

From January 2012, a total of 22 patients were studied. Seventy-seven percent (n=17) were women with a mean age of 72 years (range: 50-85 years). There were 18 patients in the Group 1. Their main complaint was: constitutional symptoms in 13 (72%), fever of unknown origin in 7 of (39%), optic neuritis in one and relapsing polymyalgia rheumatica (PMR) in another. Symptoms of upper or lower extremity claudication were present in 8 (44%) and 1 patient (6%) respectively, and severe abdominal pain was reported in 4 patients (22%). No patient had a

Vol. 4, No. 04; 2020

ISSN: 2581-3366

stroke. In the 4 patients who had temporal artery abnormalities, the biopsy was negative. Regarding the analytical characteristics, anaemia was documented in 10 patients (55%) and ESR >50 mm/h in 18 (mean 96; range: 52-140 mm/h). A temporal artery biopsy was performed in 9 patients and was negative in all cases. The study with 18F-FDG PET/CT showed vascular uptake suggestive of LV-GCA without temporal enhancement in 16/18 cases (89%). The described case of optic neuritis was caused by Bartonella. The patient previously diagnosed with PMR showed vascular enhancement and this information led to a change in the treatment. In the 4 patients with abdominal pain, intense uptake of the abdominal aorta was seen.

There were 4 patients in Group 2, all of which had ESR >100 mm/h. One patient had symptoms of PMR and the other 3 were asymptomatic. However, 2 patients were on intermittent treatment with steroids. The 18F-FDG PET/CT was negative for arteritis in 3 patients, which were followed without treatment during a mean of 16.5 months. In the other case, the 18F-FDG PET/CT images were typical of PMR (without signs of LV-GCA) and had a good response to low dose of steroids.

Discussion

GCA is a systemic vasculitis that affects people of middle age and older. It is the most frequent vasculitis in adult people, with an estimated incidence in Spain of 11 cases per 100,000 inhabitants per year[1]. The histological presentation is characterised by the granulomatous involvement of blood vessels, with a predilection for the aorta and extracranial branches of the carotid artery[2]. Recently, the authors demonstrated that patients with C-GCA and LV-GCA have different patterns of clinical presentation[2][7]. The prevalence of LV-GCA is not well defined.

LVV is a frequent cause of inflammation of unknown origin (IUO) in elderly patients with no specific symptoms[1]. In such cases, imaging examinations can be useful for an accurate diagnosis[8][9][10]. FDG uptake may occur in various inflammatory cells by activating macrophages[11] and granulation tissue in the presence of some cytokine stimulation. Previous studies have shown the usefulness and clinical application of FDG-PET/CT in patients with inflammatory diseases[12][5]. In fact, in the case of LVV, FDG-PET/CT can be useful for early diagnosis, to evaluate treatment response and to identify vascular complications[13][3]. Patients with LVV due to GCA less commonly have positive temporal artery biopsies and often have a longer duration of symptoms before diagnosis[14]. In these cases, FDG-PET/TAC can be useful for an early diagnosis and, consequently, early treatment.

If we focus on the spectrum of clinical manifestations, the main complaint was constitutional symptoms in 13 (72%) following by a fever of unknown origin in 7 (39%), which were similar to the characteristics found by other authors[14]. In this regard, it has been estimated that up to one-quarter of elderly (>65 years) patients presenting with a fever of unknown origin (FUO) have an underlying GCA as the cause of their complaint, often with LV-GCA[15]. Furthermore, this shows that LV-GCA and C-GCA have different clinical spectra. Symptoms of upper or lower extremity claudication were present in 8 (44%). In this sense, the study shows that patients with

Vol. 4, No. 04; 2020

ISSN: 2581-3366

LV-GCA often have clinical symptoms and/or signs of vascular insufficiency.

With regard to analytical parameters, all patients had an ESR value greater than 50 mm/h (mean 96; range: 52-140 mm/h). It is well known that in GCA, acute phase reactants are increased[14][16]. Thus, ESR and CRP measurements are typically elevated with an ESR above 50[17].

Similar to other studies, we found a subset of patients with negative temporal artery biopsy and suspicion of GCA[15]. Furthermore, fever of unknown origin was documented in 39% of patients. The 18F-FDG PET/CT showed vascular uptake in 89% of cases by the affectation of the large-vessel in GCA. In this regard, our study illustrates the usefulness of this technique for the diagnosis of GCA with negative TAB, as described previously by other authors[14][8][18]. This can be explained as GCA has a predilection for the aorta and its main branches in some cases, instead of typical manifestations. These findings confirmed that FDG-PET is an effective technique for detecting LV-GCA in patients with negative TAB and those that are presented as fever of unknown origin[19]. Thus, we suggested that this imaging technique is useful in patients with a suspicion of GCA and negative TAB or patients with atypical and systemic manifestations.

In our study, we found that FDG-PET is a good method for the subset of patients who have permanently increased acute phase reactants, to determine whether it is necessary or not to improve the treatment. All patients had an ESR greater than 100 mm/h. The FDG-PET was negative for arteritis in 3 patients (75%) who were followed without treatment for a mean of 16.5 months. In the other case, the PET/CT images were typical of PMR (without signs of LV-GCA) and had a good response to low doses of steroids. Other authors investigated the role of FDG-PET in following the treatment response[3][6][8]. This showed the usefulness of PET in some unclear cases.

Furthermore, the judicious use of FDG-PET or PET-TAC can be useful in the diagnosis and management of selected cases of GCA and to avoid unnecessary steroid treatments in patients without vasculitis or relapse.

Conclusion

FDG-PET or PET-TAC has demonstrated its usefulness in the diagnosis and management of selected cases of GCA (specifically LV-GCA) and to avoid unnecessary steroid treatments in patients without vasculitis or relapse. In conclusion, our results confirmed that 18F-FDG PET/CT was a useful technique to identify patients with LVV and evaluate the extent and intensity of vascular involvement.

List of abbreviations:

TAB: temporal artery biopsy

GCA: Giant cell arteritis

LV-GCA: large vesel-Giant cell arteritis

C-GCA: cranial - Giant cell arteritis

ESR: Erythrocyte Sedimentation Rate

CRP: C reactive protein

18-FDG PET/CT: Fluorine-18 fluorodeoxyglucose positron emission/computed tomography

IUO: inflammation of unknown origin

FUO: fever of unknown origin

References

1. Romero JMC. Arteritis de células gigantes. 2002; **19**: 257–62.

2. Gonzalez-Gay M a, Barros S, Lopez-Diaz MJ, Garcia-Porrua C, Sanchez-Andrade A, Llorca J. Giant cell arteritis: disease patterns of clinical presentation in a series of 240 patients. *Medicine (Baltimore)* 2005; **84**: 269–76.

3. Bruschi M, De Leonardis F, Govoni M, *et al.*[18FDG-PET and large vessel vasculitis: preliminary data on 25 patients]. *Reumatismo***60**: 212–6.

4. Papathanasiou ND, Du Y, Menezes LJ, *et al.* 18F-Fludeoxyglucose PET/CT in the evaluation of large-vessel vasculitis: Diagnostic performance and correlation with clinical and laboratory parameters. *Br J Radiol* 2012; **85**.

5. Fuchs M, Briel M, Daikeler T, *et al.* The impact of 18F-FDG PET on the management of patients with suspected large vessel vasculitis. *Eur J Nucl Med Mol Imaging* 2012; **39**: 344–53.

6. Walter M a., Melzer R a., Schindler C, Müller-Brand J, Tyndall A, Nitzsche EU. The value of [18F]FDG-PET in the diagnosis of large-vessel vasculitis and the assessment of activity and extent of disease. *Eur J Nucl Med Mol Imaging* 2005; **32**: 674–81.

7. Muratore F, Pazzola G, Pipitone N, Boiardi L, Salvarani C. Review Large-vessel involvement in giant cell arteritis and polymyalgia rheumatica. 1972.

8. Treglia G, Mattoli MV, Leccisotti L, Ferraccioli G, Giordano A. Usefulness of whole-body fluorine-18-fluorodeoxyglucose positron emission tomography in patients with large-vessel vasculitis: A systematic review. *Clin Rheumatol* 2011; **30**: 1265–75.

9. Belhocine T, Blockmans D, Hustinx R, Vandevivere J, Mortelmans L. Imaging of large vessel vasculitis with 18FDG PET: Illusion or reality? A critical review of the literature data. *Eur J Nucl Med Mol Imaging* 2003; **30**: 1305–13.

10. Meller J, Strutz F, Siefker U, *et al.* Early diagnosis and follow-up of aortitis with [(18)F]FDG PET and MRI. *Eur J Nucl Med Mol Imaging* 2003; **30**: 730–6.

11. Yamashita H, Kubota K, Takahashi Y, *et al.* Whole-body fluorodeoxyglucose positron emission tomography/ computed tomography in patients with active polymyalgia rheumatica: Evidence for distinctive bursitis and large-vessel vasculitis. *Mod Rheumatol* 2012; **22**: 705–11.

12. Bleeker-Rovers CP, Bredie SJH, van der Meer JWM, Corstens FHM, Oyen WJG. F-18-fluorodeoxyglucose positron emission tomography in diagnosis and follow-up of patients with different types of vasculitis. *Neth J Med* 2003; **61**: 323–9.

13. Blockmans D, De Ceuninck L, Vanderschueren S, Knockaert D, Mortelmans L, Bobbaers H. Repetitive 18-fluorodeoxyglucose positron emission tomography in isolated polymyalgia rheumatica: A prospective study in 35 patients. *Rheumatology* 2007; **46**: 672–7.

14. Muratore F, Kermani T a., Crowson CS, *et al.* Large-vessel giant cell arteritis: a cohort study. *Rheumatology* 2014; **54**: 463–70.

15. Calamia KT, Hunder GG. Giant cell arteritis (temporal arteritis) presenting as fever of undetermined origin. *Arthritis Rheum* 1981; **24**: 1414–8.

16. El-Dairi M a., Chang L, Proia AD, Cummings TJ, Stinnett SS, Bhatti MT. Diagnostic Algorithm for Patients With Suspected Giant Cell Arteritis. *J Neuro-Ophthalmology* 2015: 1.

17. Winkler A, True D. Giant Cell Arteritis: 2018 Review. *Mo Med***115**: 468–70.

18. Besson FL, Parienti J-J, Bienvenu B, *et al.* Diagnostic performance of (18)F-fluorodeoxyglucose positron emission tomography in giant cell arteritis: a systematic review and meta-analysis. *Eur J Nucl Med Mol Imaging* 2011; **38**: 1764–72.

19. Lensen K-JDF, Voskuyl a E, van der Laken CJ, *et al.* 18F-Fluorodeoxyglucose Positron Emission Tomography in Elderly Patients with an Elevated Erythrocyte Sedimentation Rate of Unknown Origin. *PLoS One* 2013; **8**: e58917.

Vol. 4, No. 04; 2020

ISSN: 2581-3366

Figure 1. A 72 year old woman with LVV. FDG uptake on PET appears to reflect active inflammation in the subclavian and the arteries.