Arteries And Grafts On Fire: Value and Limitations Of 18F-FDG PET CT in Diagnosing Arteritis and Graft Infections

Hisham Rashid
Consultant Vascular Surgeon
King's College Hospital, London, UK
Veith Symposium, New York, 2015

Disclosure

- I do not have any potential conflict of interest

Prosthetic Graft Infection

- Rare (1-6%) challenging diagnostic and therapeutic complication
- Diagnosis: CTA, MRI and white cell isotope scan

Few weeks later!

The obvious disaster!

Fluoro-deoxyglucose (18F-FDG)

- The uptake of 18F-FDG (tissue uptake of glucose) in high metabolic activity in inflammation and infection
- Not suitable in patients with blood glucose >180 mg/dL (10 mmol/L)
18F-FDG PET CT Interpretation

- Maximum standardized uptake value (SUVmax)
- Tissue to background ratio (TBR)
- Visual grading scale (VGS)
- FDG uptake (focal or homogenous)

"FDG PET-CT in the detection of aortic endograft infection"
S Dua et al, Bio-Imaging Unit, Tata Memorial Hospital, India

Should White Blood Cell Scan be Replaced by 18F-FDG PET-CT in the Diagnosis of Prosthetic Vascular Graft Infection?

- 17 patients suspected vascular-graft infection
- 14 patients with positive PET-CT underwent redo-surgery
- Microbiological confirmation in 12 /14 patients

CONCLUSION:
• Long-term follow-up confirmed that 18F-FDG-PET/CT is an excellent diagnostic modality for suspected vascular graft infection
• Sensitivity of 100% and specificity of 71.4%
Karaca et al, Q J Nucl Med Mol Imaging, 2014

Case Presentation

- 65 year old man
- Left aorto-femoral bypass 2001 for claudication
- Acute left leg ischemia 2014
- Emergency graft thrombectomy and above knee fem-popliteal e-PTFE bypass
- Complicated by left supra-inguinal incision faecal fistula
"¹⁸F-FDG PET/CT for Therapy Control in Vascular Graft Infections: A First Feasibility Study"

- 25 infected prosthetic grafts
- Antibiotic treatment followed up by PET/CT scans
- Antibiotic therapy adjusted based on PET/CT response

CONCLUSION:
(¹⁸)F-FDG PET/CT represents a useful tool in therapy monitoring of infected grafts


"Diagnostic performance of ¹⁸F-FDG-PET/CT in vascular graft infections"

- 27 patients with aortic graft infection
- Microbiological culture, obtained after open biopsy or graft explantation
- 1 patient diagnosed as false positive, 6 patients were correctly classified as true negative, and no patients were rated false negative

CONCLUSIONS:
High diagnostic accuracy of FDG-PET/CT in the detection of aortic graft infection

Sah, et al. EJVES, 2015

"Differential FDG-PET Uptake Patterns in Uninfected and Infected Central Prosthetic Vascular Grafts"

- 27 infected Vs 32 uninfected graft
- PET results analyzed using:
  - Maximum systemic uptake value (SUVmax)
  - Tissue to background ratio (TBR)
  - Visual grading scale (VGS)
  - Focality of FDG uptake

CONCLUSION:
The patterns of FDG uptake for uninfected grafts largely overlap with those of infected grafts. This questions the value of these individual FDG-PET-CT parameters in identifying infected grafts

Berger et al, EJVES, 2015

Vasculitis case presentation
"The Role of 18F Fluorodeoxyglucose Positron Emission Tomography Scanning in the Diagnosis and Management of Systemic Vasculitis"

- FDG-PET has acceptable sensitivity and specificity for the early diagnosis in non-cranial GCA, cranial GCA with negative biopsy, assessment of immediate response to treatment, predicting prognosis
- Limited value in serial follow-up and prediction of relapses
- In Takayasu, can be useful for early diagnosis and probably for serial assessment of disease activity
- FDG-PET has a limited role in medium and small vessel vasculitis

Danve A and O’Dell. Int Rheum Dis, 2015

"Management of large-vessel vasculitis with FDG-PET: a systematic literature review and meta-analysis"

- Diagnosis of large-vessel inflammation in giant cell arteritis, and the performance to evaluate the disease inflammatory activity in Takayasu arteritis
- 21 studies (413 patients, 299 controls)
- Sensitivity (90%) and specificity (98%) for the diagnosis of large-vessel inflammation in GCA Vs 87% and 73% in Takayasu

Soussan et al. Medicine (Baltimore), 2015

Conclusions

- 18-FDG PET-CT a promising modality in diagnosis/follow-up of patients with infected prosthetic grafts and arteritis
- Accurate parameters for analysis
- Clinical and biochemical correlation is essential
- Limited role in small-medium size vessel vasculitis
- Limited use in diabetics with elevated blood sugar
- More prospective large series studies required