

Unusual association of diseases/symptoms

Detection of previous brain infarct on PET/CT study of a Hodgkin lymphoma patient

Zehra Pinar Koç,¹ Kemal Unal,² Tansel Ansal Balci,¹ Emin Tamer Elkiran³¹Department of Nuclear Medicine, Firat University Hospital, Elazig, Turkey;²Division of Nuclear Medicine, Training Hospital, Elazig, Turkey;³Department of Internal Medicine, Oncology Division, Firat University Hospital, Elazig, Turkey**Correspondence to** Dr Zehra Pinar Koç, zehrapinar koc@gmail.com**Summary**

Positron emission tomography/CT examination was performed to 62-year-old male patient with diagnosis of Hodgkin lymphoma for treatment response which revealed complete response. During re-evaluation process of this patient in our department, asymmetrical brain metabolism defect of right thalamus and hypometabolism of right parietal lobe was observed. This finding was confirmed with additional CT imaging as a subacute infarct tissue.

BACKGROUND

Brain has high glucose consumption and brain metabolism alterations can reflect to positron emission tomography (PET)/CT images as metabolism defects. This case-report is an example of incidentally found brain metabolism alteration due to a prior cerebrovascular event.

CASE PRESENTATION

62-year-old male patient was diagnosed as Hodgkin lymphoma and received two cycles of adriamycin, bleomycin, vinblastine and dacarbazine treatments.

Physical examination of patient was normal.

INVESTIGATIONS

Patient was referred to PET/CT examination for treatment response evaluation and his images were re-evaluated in our clinic. In re-evaluation process besides complete remission of lymphoma (figure 1), asymmetric ametabolism of right thalamus (figure 2A) and hypometabolism of parietal lobe was visualised (figure 2B). When we questioned patient, he told about a cerebrovascular accident over 4 months ago. Further CT examination revealed infarct of same territory with hypometabolism area and subacute infarct of middle cerebral arterial territory.

DIFFERENTIAL DIAGNOSIS

Brain is usually not included in field of view for oncologic PET/CT studies. However, there are several cases that can benefit from information derived from brain images of PET/CT. Brain in the field can reveal unexpected brain metastasis especially, several cancer types and additionally give secondary information like the case we present.

Our patient experienced a cerebrovascular accident 4 months ago. His neurological status was stable and further neurological problem was not expected. PET/CT images show asymmetrical hypometabolism of nucleuses, thalamus and cortical tissue which was confirmed with CT imaging that, there was infarct and adjacent subacute infarct tissue. This finding allowed us to further investigate the brain infarct.

Brain imaging with PET/CT has clinical applications like brain tumours, epileptic focus determining and dementias.¹ Stroke is also another field of PET/CT imaging. CT and MR are well established methods in field of ischaemic conditions of brain PET/CT introduced to this area with perfect reflection of metabolic changes of ischemic brain tissue. PET found to be superior to morphologic imaging method for both earlier demonstration of anomalies and defining larger impaired territory of brain.¹ PET additionally can give prognostic information.²

OUTCOME AND FOLLOW-UP

The information obtained from PET/CT caused further investigation and defining of subacute infarct tissue and changed neurological management of patient.

DISCUSSION

Although metabolic changes during ischaemic process after cerebrovascular accident of brain are well established, PET imaging in this field is new and need future studies. Experimental studies show that hypometabolism finding can be an early presentation of brain infarct and an experimental study concluded that, early hypometabolism is not necessarily a predictor of infarction.³ In a rat model of Fu *et al* local glucose metabolism alteration after cerebral ischaemia was evaluated and concluded that small animal F-18 FDG/micro PET studies can guide cerebral ischaemic changes in rat models.⁴ Liu and Mountz demonstrated a case with focal hypometabolism area consistent with infarct or tumour.⁵ Stroke related changes in local glucose metabolism have been evaluated by Mountz *et al* and relationship of these changes with therapeutic strategies was also analysed.⁶

Penumbra which is defined as morphologically normal tissue with functional impairment can be identified by means of PET.⁷ Regional cerebral blood flow is another marker which shows the impairment of cerebral tissue from ischaemia and this parameter is also defined with PET studies.⁹ PET imaging with ¹⁵O also can be used as a

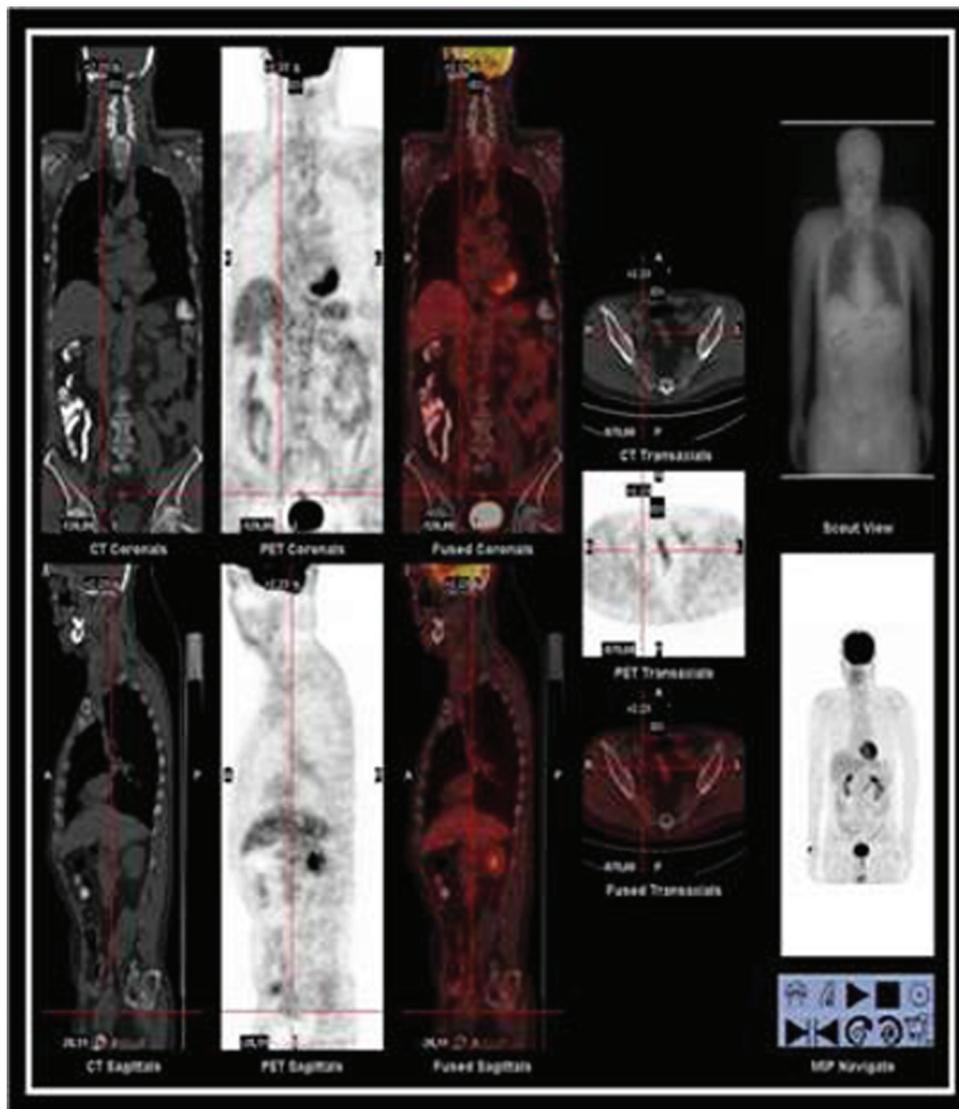


Figure 1 Whole body coronal, sagittal, transaxial PET, CT and fusion images and maximum intensity projection images.

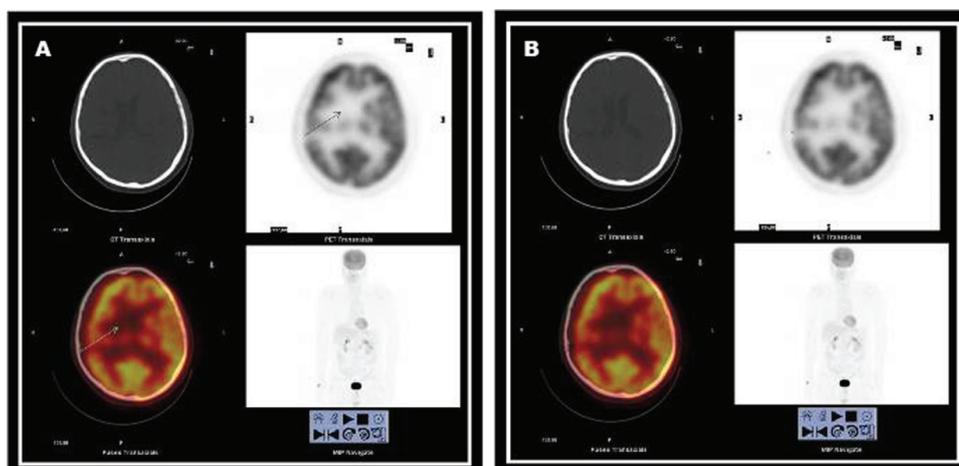


Figure 2 (A,B) Transaxial PET, CT and fusion images and maximum intensity projection images from brain.

marker to show haemodynamic changes by means of oxygen extraction fraction.¹⁰

PET imaging is a promising tool for patients with cerebrovascular accident. This case, that we presented, is an example of this indication. This is the first case as far as we know with incidentally found brain infarct tissue in a PET/CT study. Prospective studies can be employed in this area.

Learning points

- ▶ PET imaging can be helpful in identification of infarct tissue after cerebrovascular accident.
- ▶ Including brain in field of view of PET/CT examination can benefit in some patients.

Competing interests None.

Patient consent Obtained.

REFERENCES

1. **Jolles PR**, Chapman PR, Alavi A. PET, CT, and MRI in the evaluation of neuropsychiatric disorders: current applications. *J Nucl Med* 1989;**30**:1589–606.
2. **Kushner M**, Reivich M, Fieschi C, *et al*. Metabolic and clinical correlates of acute ischemic infarction. *Neurology* 1987;**37**:1103–10.
3. **Martín A**, Rojas S, Pareto D, *et al*. Depressed glucose consumption at reperfusion following brain ischemia does not correlate with mitochondrial dysfunction and development of infarction: an *in vivo* positron emission tomography study. *Curr Neurovasc Res* 2009;**6**:82–8.
4. **Fu YK**, Chang CJ, Chen KY, *et al*. Imaging of regional metabolic activity by (18)F-FDG/PET in rats with transient cerebral ischemia. *Appl Radiat Isot* 2009;**67**:1743–7.
5. **Liu HG**, Mountz JM. F-18 FDG brain positron emission tomography and TI-201 early and delayed SPECT in distinguishing atypical cerebral tumor from cerebral infarction. *Clin Nucl Med* 2003;**28**:241–2.
6. **Mountz JM**, Liu HG, Deutsch G. Neuroimaging in cerebrovascular disorders: measurement of cerebral physiology after stroke and assessment of stroke recovery. *Semin Nucl Med* 2003;**33**:56–76.
7. **Astrup J**, Siesjö BK, Symon L. Thresholds in cerebral ischemia - the ischemic penumbra. *Stroke* 1981;**12**:723–5.
8. **Baron JC**, Bousser MG, Comar D, *et al*. Noninvasive tomographic study of cerebral blood flow and oxygen metabolism in vivo. Potentials, limitations, and clinical applications in cerebral ischemic disorders. *Eur Neurol* 1981;**20**:273–84.
9. **Heiss WD**, Sobesky J. Comparison of PET and DW/PW-MRI in acute ischemic stroke. *Keio J Med* 2008;**57**:125–31.
10. **Tanaka M**, Shimosegawa E, Kajimoto K, *et al*. Chronic middle cerebral artery occlusion: a hemodynamic and metabolic study with positron-emission tomography. *AJNR Am J Neuroradiol* 2008;**29**:1841–6.

This pdf has been created automatically from the final edited text and images.

Copyright 2011 BMJ Publishing Group. All rights reserved. For permission to reuse any of this content visit <http://group.bmj.com/group/rights-licensing/permissions>.

BMJ Case Report Fellows may re-use this article for personal use and teaching without any further permission.

Please cite this article as follows (you will need to access the article online to obtain the date of publication).

Koç ZP, Unal K, Balci TA, Elkiran ET. Detection of previous brain infarct on PET/CT study of a Hodgkin lymphoma patient. *BMJ Case Reports* 2011; 10.1136/bcr.06.2011.4402, date of publication

Become a Fellow of BMJ Case Reports today and you can:

- ▶ Submit as many cases as you like
- ▶ Enjoy fast sympathetic peer review and rapid publication of accepted articles
- ▶ Access all the published articles
- ▶ Re-use any of the published material for personal use and teaching without further permission

For information on Institutional Fellowships contact consortiasales@bmjgroup.com

Visit casereports.bmj.com for more articles like this and to become a Fellow