Analysis of $^{18}$F-fluorodeoxyglucose positron emission tomography findings in patients with pituitary lesions

Hannah Seok, Eun Young Lee, Eun Yeong Choe, Woo In Yang, Joo Young Kim, Dong Yeob Shin, Ho Jin Cho, Tae Sung Kim, Mi Jin Yun, Jong Doo Lee, Eun Jig Lee, Sung-Kil Lim, and Yumie Rhee

Background/Aims: Although magnetic resonance imaging (MRI) is a good visual modality for the evaluation of pituitary lesions, it has limited value in the diagnosis of mixed nodules and some cystic lesions. We evaluated the usefulness of $^{18}$F-fluorodeoxyglucose positron emission tomography (FDG PET) for patients with pituitary lesions.

Methods: $^{18}$F-FDG PET and MRI were performed simultaneously in 32 consecutive patients with pituitary lesions. The relationships between FDG uptake patterns in PET and MRI findings were analyzed.

Results: Of 24 patients with pituitary adenomas, 19 (79.2%) showed increased uptake of $^{18}$F-FDG in the pituitary gland on PET scans. All patients with pituitary macroadenomas showed increased $^{18}$F-FDG uptake on PET scans. Meanwhile, only five (50%) of the 10 patients with pituitary microadenomas showed positive PET scans. Interestingly, of two patients with no abnormal MRI findings, one showed increased $^{18}$F-FDG uptake on PET. For positive $^{18}$F-FDG uptake, maximum standardized uptake values (SUV$_{max}$) $>$ 2.4 had 94.7% sensitivity and 100% specificity. In addition, SUV$_{max}$ increased in proportion to the size of pituitary adenomas. Most cystic lesions did not show $^{18}$F-FDG uptake on PET scans.

Conclusions: About 80% of pituitary adenomas showed positivity on PET scans, and SUV$_{max}$ was related to the size of the adenomas. PET may be used as an ancillary tool for detection and differentiation of pituitary lesions.

Keywords: Pituitary; Positron-emission tomography; Magnetic resonance imaging
changes or hemorrhage, by MRI is sometimes problematic [4].

Positron emission tomography (PET) with $^{18}$F-fluorodeoxyglucose ($^{18}$F-FDG) is a valuable method for the diagnosis and staging of malignancies as well as monitoring their therapeutic effectiveness. PET is also helpful for some diagnoses that are difficult to obtain with MRI. However, PET has not been frequently used for the diagnosis of pituitary tumors. There are limited data on the diagnostic value of PET for pituitary tumors.

In this regard, we experienced one interesting case involving Rathke’s cleft cysts (RCC) (case 27). A 59-year-old woman was referred to the hospital due to symptoms of panhypopituitarism and visual disturbances. Because brain MRI revealed a focal enhanced mass extending over the pituitary gland, optic chiasm, and bilateral optic tracts (Fig. 1A), she was first diagnosed with optic glioma. Her symptoms spontaneously improved, and she was observed for 3 months. A subsequent MRI showed improvement in the lesions surrounding the optic tract, whereas a cystic lesion in the pituitary fossa had expanded. A PET scan was performed, and it showed no uptake of $^{18}$F-FDG in the pituitary fossa (Fig. 1B). This suggested that it was more likely to be a cystic lesion such as RCC. She underwent trans-sphenoidal surgery for confirmation and was finally diagnosed with RCC.

Thus, we investigated the usefulness of $^{18}$F-FDG PET for the diagnosis and evaluation of various pituitary lesions.

**METHODS**

**Patients**

From January 2005 to August 2010, we performed PET and MRI simultaneously in 46 consecutive patients who had been investigated for pituitary lesions according to presenting symptoms, signs, laboratory data, or other imaging studies. We excluded other brain

![Figure 1. Magnetic resonance imaging (MRI) findings and $^{18}$F-fluorodeoxyglucose positron emission tomography (FDG PET) imaging in a 58-year-old woman with Rathke’s cleft cyst (case 27). (A) T1-weighted MRI with gadolinium contrast. Coronal (upper panel) and axial (lower panel) views demonstrate an enhanced mass (white arrows) covering the pituitary gland and optic tracts. (B) Sagittal view of the brain on PET imaging showed no abnormal $^{18}$F-FDG uptake in the sella turcica (black arrow).](http://dx.doi.org/10.3904/kjim.2013.28.1.81)