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Distinguishing Pseudoprogression From Progression in High-Grade Gliomas:

A Brief Review of Current Clinical Practice and Demonstration of the Potential Value of ^{18}F -FDG PET

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Abstract

We report a case in which ^{18}F -FDG PET was able to discriminate pseudoprogression from progression observed on contrast-enhanced (CE) MRI (CE-MRI). A 56-year-old male patient with anaplastic oligodendroglioma demonstrated markedly increased tumor enhancement on CE-MRI 1 month after completing radiation therapy (RT), suggesting radiological progression. However, the patient was clinically improved and therefore received an early-therapy response assessment PET to assess for pseudoprogression. PET showed low tumor uptake indicating stable disease. Follow-up CE-MRI at 3 and 4 months post-RT confirmed stable disease. This case emphasizes the value of ^{18}F -FDG PET when pseudoprogression is clinically suspected.

Keywords

pseudoprogression; anaplastic oligodendroglioma; ^{18}F -FDG; PET; therapy response assessment

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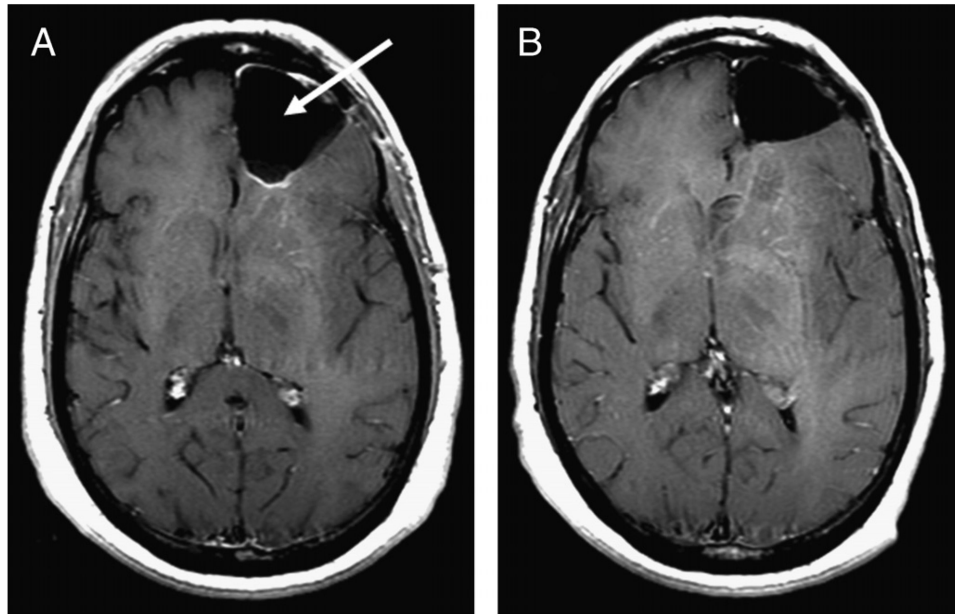


Figure 1.

A 56-year-old male patient with left-frontal anaplastic oligodendroglioma underwent tumor resection (arrow), followed by a gadolinium-diethylenetriaminepentaacetic acid (Gd-DTPA) CE-MRI scan (A). After completing 9 cycles of temozolomide chemotherapy (75 mg/m^2), the patient was clinically in remission and a follow-up CE-MRI showed stable disease (B).

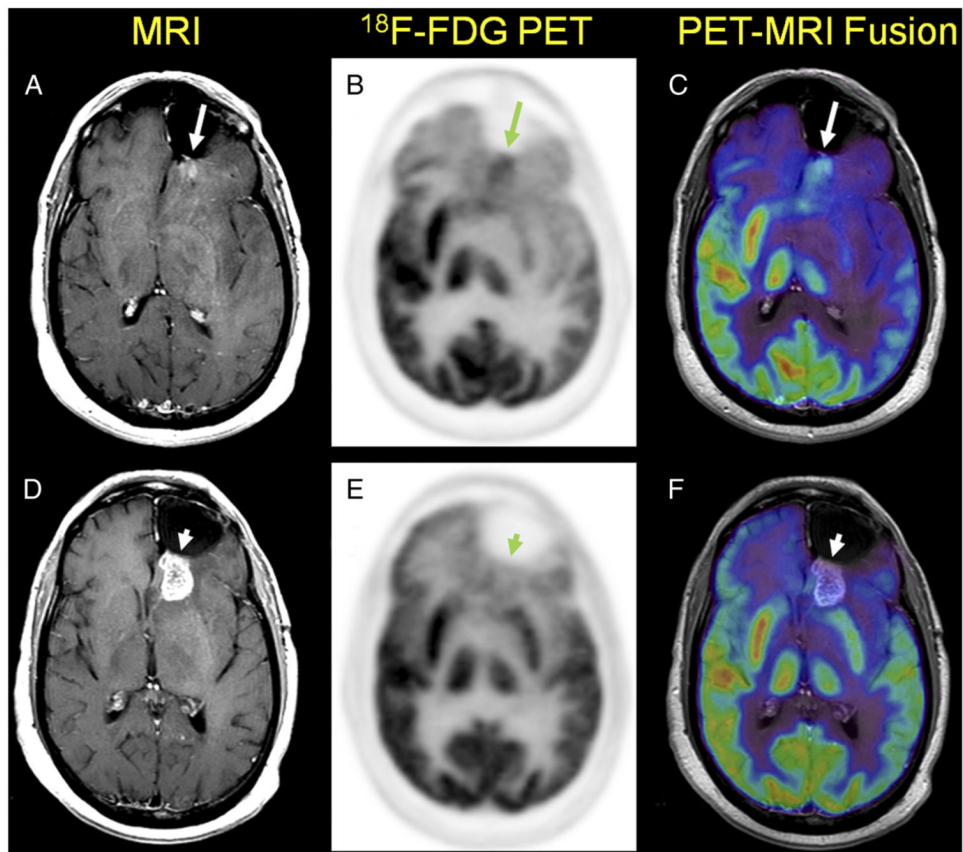


Figure 2.

After completing 3 additional cycles of temozolomide chemotherapy (12 cycles total), the patient presented with a new peripheral region of CE (arrow) on CE-MRI (A) posterior to the resection site suggesting radiologic progression of disease.¹⁻³ ^{18}F -FDG PET showed a region of increased tracer uptake (B) anatomically correlating with the observed CE region on MRI (C). Therefore, the patient underwent RT to a total dose of 60 Gy in 2-Gy fractions. One month after completing RT, CE-MRI (D) showed increased enhancement posterior to the prior resection cavity in the left frontal lobe (arrowhead). However, the patient was clinically improved, and therefore an early-therapy response assessment ^{18}F -FDG PET scan was obtained with the intent of differentiating the clinical possibilities of true progression and pseudoprogression⁴⁻⁶ On PET (E), no abnormal areas of increased ^{18}F -FDG uptake in the region of MRI contrast enhancement were identified (F), thus additional therapy was deemed not indicated; the patient was monitored on follow-up CE-MRI scans.

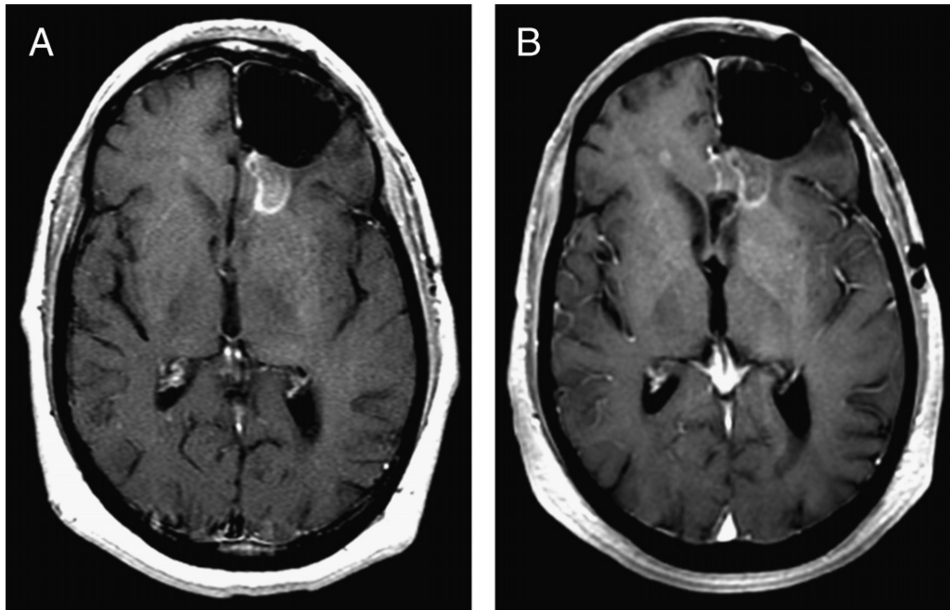


Figure 3.

Follow-up CE-MRI scans obtained at 3 months (A) and 4 months (B) after completion of therapy and the negative ^{18}F -FDG scan. Compared with the CE-MRI obtained at 1 month after RT, the intensity and size of the CE region is observed to decrease and stabilize, and the patient remained in remission. The potential for pseudoprogression limits the use of CE-MRI for early-therapy response assessment in high-grade brain tumors.^{7,8} Current recommendations aimed at reducing the risk of misdiagnosis due to pseudoprogression include delaying diagnosis of progression for 12 weeks after completion of RT in regions showing CE on MRI,^{2,9} a significant shortcoming in the management of high-grade gliomas.^{10,11} Currently, ^{18}F -FDG PET is not a standard-of-care method for evaluating therapeutic response in high-grade gliomas. However, as emphasized by this case, ^{18}F -FDG PET may allow for timely discrimination of pseudoprogression from true progression.