Nucl Med Mol Imaging
Vol. 43, No. 2, Apr 2009

Invited Interesting Image

Maximum Intensity Projection 영상에서 미미한 결손으로 나타난 직장의 ^{18}F-FDG 결합성 샘암종: 1예 보고

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^{18}F-FDG-Avid Adenocarcinoma of the Rectum Presenting as a Subtle Filling Defect on Maximum Intensity Projection Image: Report of a Case

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Introduction

^{18}F-FDG avid polypoid or tumefacient carcinomas of the gastrointestinal (GI) tract including the rectum are characteristically featured on PET-CT as an intraluminal tumor surrounded by completely or partially cleared background.[1)] However, the carcinomas of intramural or sessile variant may not so easily be detected especially when tumors are obliterated by feces or mucus retained in the host bowel loop. Recently, we observed a case of cauliflower-like adenocarcinoma of the rectum that was diagnosed by noting a subtle, flat filling defect created against the background of "black" feces-mucus filled rectum. To our knowledge such a "filling defect" produced by sessile tumor has not previously been reported as a useful diagnostic sign of GI tract carcinoma on PET-CT.

Case Report

A 69-year-old male was admitted to our hospital because of chronic hematochezia. Routine laboratory tests were within normal limits except for moderate anemia (Hgb=10.5 mg/dl). Double-contrast barium enema revealed a flat filling defect in the posterior wall of the mid-rectum (Fig. 1A) and subsequent colonofiberscopy disclosed a cauliflower-like mucosal tumor with an irregular area of small ulcerations in the tumor center (Fig. 1B). The tumor measured 3.5 x 3.5 cm in area and histological diagnosis was moderately differentiated adenocarcinoma (Fig. 1C). For tumor staging PET-CT was performed.

Contrary to our anticipation this macroscopically well-established tumor could not be recognized at the first look of PET images including the maximum intensity projection (MIP) because the tumor-bearing rectum was diffusely filled with feces and mucus which were "blackened" due to ^{18}F-FDG (Fig. 2A). However, by gyrating MIP image a focal "filling defect" was found on near-lateral projection (Fig. 2B). Analysis using magnified view revealed the presence of segmental mural thickening with increased ^{18}F-FDG uptake that was calculated as 7.4max (Figs. 2C and D). The tumor was completely extirpated by operation (Fig. 1D). There was focal lymphangitic spread but regional lymph nodes were free. The tumor staging was $T_2N_0M_0$. Post-operative course was uneventful and patient was discharged home.

Discussion

If tumor is not too small in size and colon is well prepared ^{18}F-FDG avid carcinomas of the rectum are not

• **Received**: 2009. 4. 16. • **Revised**: 2009. 4. 20.
• **Accepted**: 2009. 4. 26.
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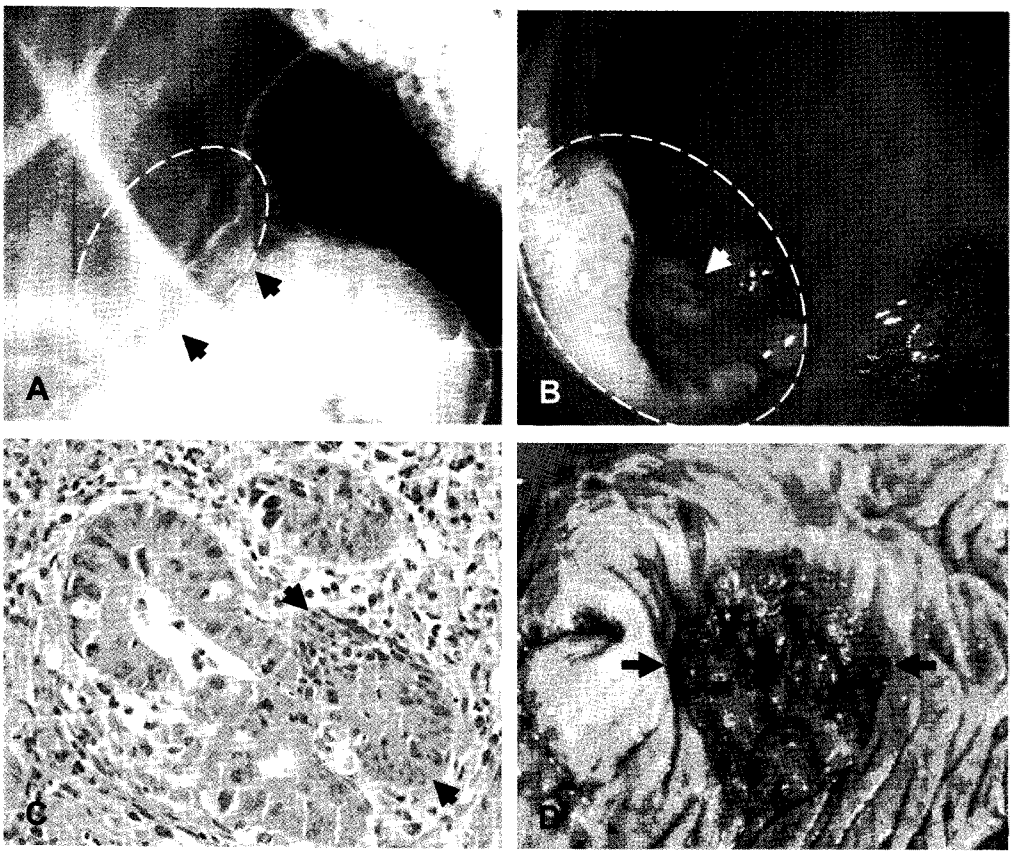

Figure 1. A. Lateral view of double-contrasted rectum shows a saddle-like filling defect produced by a sessile mucosal tumor (circle and arrows). B. Colonoscopy shows a 3.5 x 3.5 cm cauliflower-like tumor (circle) with central ulceration (arrow). C. High-power photomicrograph shows moderately differentiated adenocarcinoma with a mitosis (between arrows). HE stain (X400). D. Extirpated surgical specimen shows irregular cauliflower-like carcinoma with central necrosis and small ulcers (arrow).

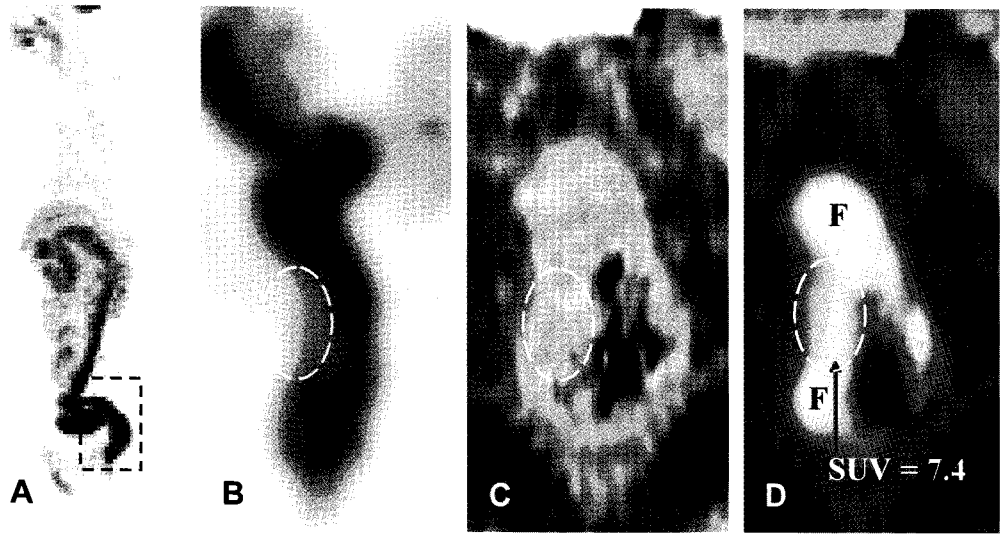

Figure 2. A. Lateral maximum intensity projection image of torso shows no filling defect in the mid-rectum that is diffusely filled with feces and mucus (frame). B. Near-lateral magnified view shows shallow filling defect (circle) in the right posterolateral aspect. C. Magnified CT scan shows segmental thickening of the rectal wall (circle). D. PET scan shows moderately increased ^{18F}-FDG uptake (SUV = 7.4 max) (circle). F denotes feces.

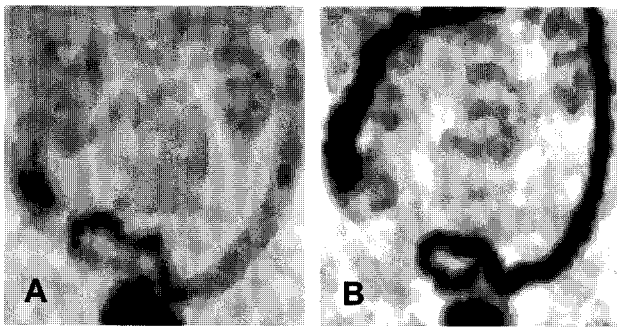

Figure 3. A. Initial torso MIP image shows mild to moderate blackening of the entire colon with mucus and feces. B. Post cleansing-enema MIP image shows worsened blackening.

difficult to diagnose on PET-CT as they present as an intraluminal mass surrounded by a clear background.[1] However, the carcinomas of intramural or sessile variant are not so easy to detect especially when they are flat and obliterated by feces or mucus in the host bowel loop as in the present case. On single barium contrast image of GI tract such a tumor is characteristically shown as a filling defect in the host bowel[2] or barium coated tumor on double contrast image.[3] Our case, cauliflower-like in appearance and fairly large in area, was diagnosed by a subtle, flat filling defect that was produced against the background of feces-mucus filled rectum. Tumor's standard uptake value was calculated as 7.4max but the tumor appeared non FDG-avid to naked eyes because of optical illusion caused by "black" background.

It is a common occurrence on PET/CT that the rectum and sigmoid colon are loaded fragmentarily or diffusely with feces or mucus, easily obscuring both intramural and intraluminal tumors which are of considerable size as in the present case. To make the situation difficult such disturbing foreign materials cannot often be passed as desired by time allowance (delayed scan) or even forced defecation. As shown in figures 3A and B cleansing enema may treacherously worsen the situation presumably due to that the volume of enema water instilled is large enough to distend and stimulate colonic mucosa and muscles to intensely accumulate ^{18}F-FDG.[4]

A useful yet simple maneuver to solve the problem is slow rotary observation of MIP image with a high index of suspicion so that subtle filling defect is let to stand out with advantage in profile (Fig. 2B). The lesion thus detected is to be subjected to meticulous morphological analysis and FDG uptake quantification using magnified images (Fig. 2C and D). The stiffness of the involved rectal or colonic wall is another important sign of neoplastic change. It is to be underscored that a tumor defect is seldom detected with certainty on en face view even if the tumor is of considerable dimension.

References

1. Eisenberg RL. Single filling defects in the colon. In: Eisenberg RL editor *Gastroenterology: A pattern approach.* Philadelphia: JB Lippincott; 1983. p. 681-710.
2. Kitapci MT, Coleman RE. Colorectal cancer. In: Oehr P, Biersack H.-J, Coleman RE. eds. *PET and PET-CT in oncology.* Heidelberg: Springer-Verlag 2004, p. 213-26.
3. Kreel L, Beale T. Colon filling defect. ***Postgrad Med J*** 1993;69: 627-8.
4. Unpublished personal data.