

Incidental Diagnosis of Prostate Cancer by ^{18}F -FDG PET-CT Imaging in a Patient During Post-operative Evaluation for Cecal Cancer

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ABSTRACT

Incidental high fluorine-18 FDG (fluorodeoxyglucose) uptake in well-differentiated prostate cancer is rare. We reported the case of a 75-year-old man who underwent a whole-body FDG PET-CT (positron emission tomography with computed tomography) scan for post-operative evaluation of caecal cancer and demonstrated no evidence of recurrence. However, a focal hypermetabolic lesion was detected in the right lateral lobe of the prostate. The patient's prostatic biopsy from the right lobe revealed well-differentiated adenocarcinoma with a Gleason score of six and a raised serum PSA level. Incidental, focally intense FDG uptake in the prostate gland should be considered for further investigations to confirm the presence of prostate cancer.

Keywords: ^{18}F -FDG PET-CT, Second primary malignancy, adenocarcinoma of prostate.

Bangladesh J. Nucl. Med. Vol. 26 No. 1 January 2023

Doi: <https://doi.org/10.3329/bjnm.v26i1.64666>

INTRODUCTION

The Globocon (Global Cancer Observatory) estimates that the number of new cases of prostate cancer was about 2441 and the number of deaths was about 1289 in Bangladesh in the year 2020 (1). Close to 28% of men may get an incidental diagnosis of this malignancy, with a median age of 66 years at diagnosis (2, 3). There are aggressive and indolent varieties of prostate cancer, where the indolent type can remain silent for a very long time and evolve over many years with aging without generating any symptoms or death (4).

Positron emission tomography with computed tomography (PET-CT) utilizing fluorine-18 fluorodeoxyglucose (^{18}F -FDG) as a tracer has become a promising imaging technique for the identification of many cancers (5). Prior research has demonstrated that although incidental hypermetabolic lesions in the prostate gland are

infrequently detected on ^{18}F -FDG PET-CT imaging, a substantial number of them are connected to cancer (6). The most prevalent histological type of prostate cancer is adenocarcinoma, which might manifest as incidental localized FDG uptake (7).

The reported case of incidental focal hypermetabolic uptake in the prostate during ^{18}F -FDG PET-CT scanning for post-operative evaluation of caecal cancer revealed that the patient is suffering from prostate cancer.

CASE REPORT

A 75-year-old man visited the PET-CT division of NINMAS on March, 2021, for post-operative evaluation of caecal cancer by ^{18}F -FDG PET-CT. The patient was treated with a right hemicolectomy along with an ileocolostomy for caecal cancer. A histopathological study revealed moderately differentiated (grade II) adenocarcinoma of the cecum. ^{18}F -FDG PET-CT demonstrated no metabolic evidence of local recurrence or residual mass at the site of operation. But an intense hypermetabolic focal lesion (SUVmax: 12.6, size 21x15x20 mm) at the right lateral lobe of the prostate along with prostatic enlargement was reported. We recommended a prostate biopsy with clinicopathological correlation. Later, the clinician recommended an MRI of the prostate as well as a serum PSA level. Serum PSA was found at 7.32 ng/ml. The MRI report mentioned an enlarged prostate with a volume of 41 mL and clinically significant cancer likely to be present at the right lobe's peripheral zone at the basal and mid regions of the prostate with no extracapsular extension. The MRI resulted in a PI-RADS score of 4, indicating that the tumor was most likely malignant. Prostatic needle biopsy specimens were taken from the apical, middle, and basal

regions of both the right and left lobes. Specimens from the left side revealed benign prostatic tissue, but those from the right lobe revealed adenocarcinoma in all three regions (combined modified Gleason score: 3+3=6/10), Gleason grade group 1.

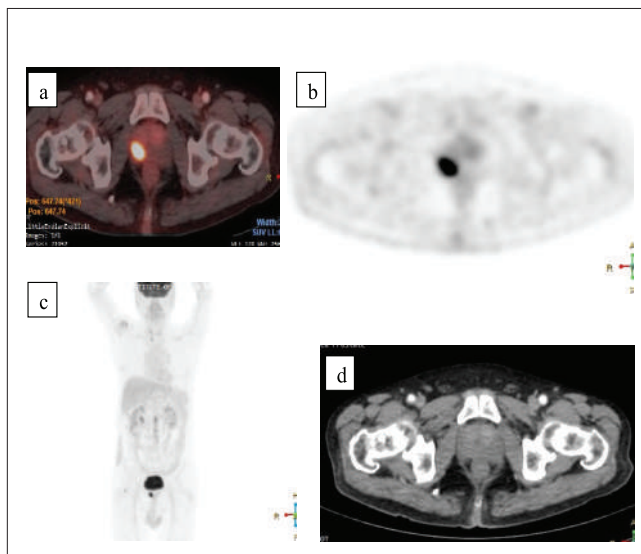


Figure: a) Transaxial fused PET-CT image b) Transaxial PET image c) Minimal Intensity Projection (MIP) – images showing a intense hypermetabolic lesion in right lateral lobe of prostate and d) Transaxial CT image showing no demonstrable lesion in prostate except enlargement in size.

DISCUSSION

Colorectal cancers are common in developed countries but rare in developing countries. Up to 35% of colonic cancers may be cecal tumors in developed countries. When diagnosed at an early stage of the disease, it is curable (8). In the postoperative follow-up of colorectal cancer, PET-CT imaging has developed into an effective and accurate non-invasive examination tool that provides a whole-body overview at one examination (9).

A study has shown that 20% of individuals who are survivors of carcinoma will develop a new primary cancer, and 30% of cancer survivors older than 60 will get more than one new malignancy (10). ^{18}F -FDG PET-CT plays a significant role in the assessment of unrecognized primary malignancies and in identifying second primary malignancies. A 13-year study of 76,168 patients with second primary malignancy found that the risk of developing prostate cancer as a secondary primary malignancy in patients with colorectal cancer is very low, with a reported incidence of 9.13 percent (11).

The diagnosis and staging of urological malignancies such as prostate cancer, bladder cancer, and renal cell cancer by ^{18}F -FDG PET are not fully supported. The urine excretion of the radiotracer and the low metabolic activity of prostate cancer place restrictions on the identification of the cancer during the FDG PET scan. Increased FDG uptake can also be seen in benign prostatic diseases. There have been reports of focal or diffuse FDG uptake in prostatitis or benign prostatic hyperplasia. However, FDG PET was found to have a sensitivity of 4.0% for tissue-confirmed prostate cancer in a study by Liu et al. (12). In one survey, it was discovered that patients with hypermetabolism in the prostate had a 58% PPV for occult prostate cancer (2).

A needle biopsy sample is used to confirm the presence of prostate cancer histologically. PSA and digital rectal examinations are useful screening tests in clinical practice (13). The sensitivity of cancer diagnosis in the hypermetabolic area of uptake in individuals with increased PSA is estimated to be between 50 and 75% (14). The PSA level in our reported instance was 7.32 ng/mL, which is greater than the amount considered to be normal and is consistent with our reported case.

It is generally known that prostate cancer frequently develops at the gland's periphery (15). A peripheral region in the right lobe of the prostate gland showed focal FDG uptake in our index case's prostate. Following an MRI, the same area showed evidence of malignancy, which was confirmed by a prostatic biopsy.

Patients with a high Gleason score do need intensive treatment, and regions of FDG uptake may include high-grade prostate cancer, especially if SUVmax is >6 (16, 17). This information is supported by our reported case, which has a SUVmax value >12 and a Gleason score of 6. Gleason grade, clinical stage, and serum PSA levels all directly correlate with increased FDG uptake in prostate cancer (18).

The limitation of this report is that this patient had never before undergone a prostate cancer screening, though a previous CT scan of his abdomen following a diagnosis of caecal carcinoma revealed enlargement of the prostate. One study stated that the chance of cancer in a specific patient with hypermetabolism in the prostate gland was evaluated based on a number of factors.

One of the factors among them is poorly differentiating cancer, which accumulates FDG (2). However, our patient was diagnosed with adenocarcinoma that was well differentiated; therefore, that is not the situation with our indexed patient.

CONCLUSION

An incidental hypermetabolic lesion in the prostate during ^{18}F -FDG PET-CT scan is rare, but these lesions are frequently found to harbor occult malignancy. Further diagnostic investigations are therefore necessary for these lesions, particularly if the hypermetabolic lesions are situated peripherally and patients have an elevated serum PSA level. Greater SUVmax values may also be due to malignancy within the prostate gland and should be taken into account while reporting PET-CT results.

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