Synchronous locally advanced rectal and prostate cancer: Dual tracer imaging with ^{18}F-FDG-PET/CT and ^{68}Ga-PMSA PET/CT

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Abstract

Synchronous rectal and prostate malignancies are uncommon. Early diagnosis, accurate staging, and characterization of tumours are essential for selecting patient-tailored therapy. The origin of metastatic disease in synchronous cases presents a challenge for conventional imaging modalities but advances in molecular imaging have addressed this limitation. We report the case of a 72-year-old male with synchronous prostate and rectal cancer. Adoption of a dual PET/CT approach is essential for accurate staging and patient management. The combined molecular imaging approach significantly influenced staging and enabled individualized multidisciplinary management tailored to the biological behaviour and extent of each primary tumour.

Keywords: ^{68}Ga-PSMA PET/CT; ^{18}F-FDG-PET/CT; synchronous tumours; prostate cancer
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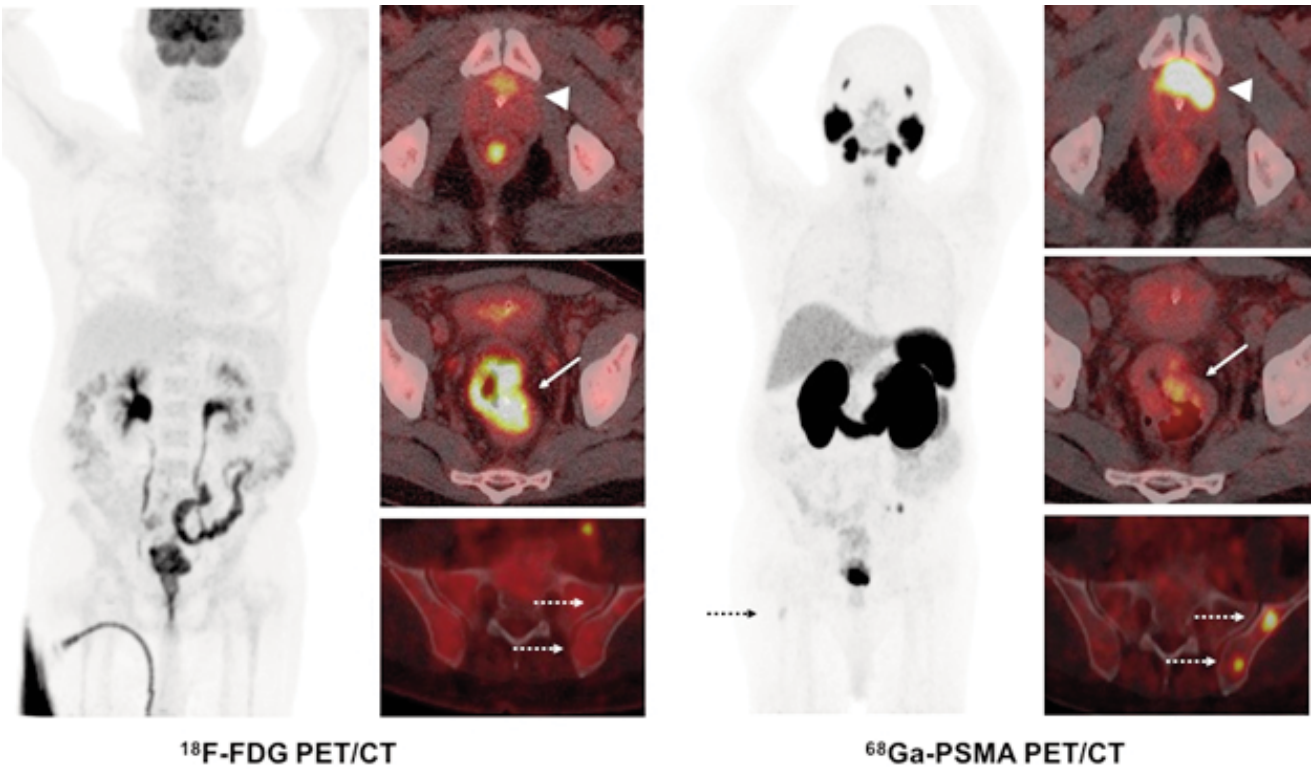

Figure: ^{18}F-FDG PET/CT demonstrated an intensely FDG-avid primary rectal tumor (solid arrow) with suspicious mesorectal lymph nodes. Additionally, mild heterogeneous FDG uptake was noted within an enlarged prostate gland (arrowhead) with high PSA level of 43ng/mL, raising suspicion for a synchronous prostatic malignancy. Subsequent ^{68}Ga-PSMA PET/CT revealed intense ^{68}Ga-PSMA PSMA uptake in the prostate (arrowhead) consistent with primary prostate carcinoma, along with PSMA-avid (FDG non-avid) osseous lesions in the left iliac bone and upper shaft of the right femur (dotted arrow), compatible with skeletal metastases of prostatic origin.

A 72-year-old male presented with bleeding per rectum. Subsequent colonoscopy with a biopsy revealed upper mid rectum lesion extending up to rectosigmoid junction with moderately differentiated, rectal adenocarcinoma. ^{18}F-FDG PET/CT confirmed a primary FDG avid rectal tumour with suspicious mesorectal nodes along with evidence of

heterogeneous ^{18}F-FDG activity within an enlarged prostate. Consequently, ^{68}Ga-PSMA PET revealed prostate primary cancer and ^{68}Ga-PSMA avid bone lesions in the left iliac bone and in the upper shaft of right femur, likely due to bone metastases of prostate origin (Figure). A serum prostate-specific antigen (PSA) is 43ng/mL and prostate biopsy positive for adenocarcinoma with Gleason score of 4+3.

Synchronous diagnosis of rectal and prostate cancer is uncommon but presents significant diagnostic and therapeutic challenges, particularly when both malignancies are locally advanced.[1] Accurate characterization of disease extent is essential to differentiate metastatic spread from dual primary tumours and to optimize treatment planning. Management requires a multidisciplinary approach involving colorectal surgeons, urologists, radiation oncologists, and nuclear medicine specialists.[2]

Dual-tracer molecular imaging with ^{18}F-FDG PET/CT and ^{68}Ga-PSMA PET/CT provided critical complementary diagnostic information in a patient with synchronous rectal and prostate malignancies. ^{18}F-FDG PET/CT better characterized the metabolically active locally advanced rectal tumour and regional nodal disease, while ^{68}Ga-PSMA PET/CT more accurately defined the extent of prostate cancer and upstaged the disease by demonstrating PSMA-avid bone metastases not identified on ^{18}F-FDG imaging.[3,4] This distinction significantly influenced management decisions and allowed individualized treatment planning. The prostate cancer was managed conservatively with androgen deprivation therapy followed by radiotherapy to the prostate and metastatic bone lesions, whereas the rectal cancer underwent neoadjuvant chemotherapy followed by definitive surgical resection. This case highlights the important complementary role of dual-tracer imaging with ^{18}F-FDG PET/CT and ^{68}Ga-PSMA PET/CT in accurately characterizing synchronous rectal and prostate malignancies and detecting occult metastatic disease. The combined molecular imaging approach significantly influenced staging and enabled individualized multidisciplinary management tailored to the biological behaviour and extent of each primary tumour.

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