Case Report

Postoperative distal ureteric and bladder cuff recurrence in a Grade I renal transitional cell carcinoma diagnosed and restaged by fluorodeoxyglucose positron emission tomography-computed tomography

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ABSTRACT

A 56-year-old male having Grade I transitional cell carcinoma (TCC) of left kidney, postleft nephrectomy and upper 1/3rd ureterectomy presented with painless hematuria. Restaging fluorodeoxyglucose (FDG) positron emission tomography/computed tomography (PET/CT) revealed abnormal linear FDG uptake in the lower 2/3rd of the left ureter and in the bladder adjacent to the left vesicoureteric junction, no locoregional adenopathy nor distant metastases (Figures 1 and 2- left column). Patient underwent left lower ureterectomy with partial cystectomy. Postoperative histopathology was TCC. Instillation of Bacillus Calmette-Guérin injection in the bladder was done postoperatively. A follow-up FDG PET/CT scan performed 3 months postoperatively was revealed no abnormal focal FDG uptake in the whole body revealing disease free status. FDG PET was helpful in diagnosing tumor recurrence in the distal remnant ureter. This case attempts to highlight the role of FDG PET/CT in follow-up, residual and recurrence evaluation.

Keywords: Fluorodeoxyglucose, nephroureterectomy, positron emission tomography/computed tomography, renal transitional cell carcinoma

INTRODUCTION

Upper urinary tract transitional cell carcinoma (TCC) accounts for up to 10% of cases of neoplasm of the upper urinary tract.[1] Radical nephroureterectomy with excision of a cuff of the bladder wall is established as the standard treatment for TCC of the upper urinary tract in the presence of a normal contralateral kidney.[2] Whole-body fluorodeoxyglucose positron emission tomography/computed tomography (FDGPET/CT) (with postdiuretic delayed imaging) should replace CT of the abdomen in the restaging protocol for recurrent invasive bladder cancers. Application of this technique may be extended to evaluation of patients with upper urinary tract cancers and other pelvic malignancies such as uterine, ovarian and colorectal cancers.[3] PET has an established role in oncologic imaging and plays an important role in the initial staging, assessment of response to therapy, restaging and detection of recurrence in many types of cancers.[4] FDG PET/CT has high specificity and high positive predictive value in renal cancer and could be useful in restaging patients with renal cancer.[5] In case of TCC of kidney post left nephrectomy and left upper two-third ureterectomy, we highlight the role of FDG PET/CT in restaging by diagnosing recurrence in the lower 2/3rd of ureter and in the bladder adjacent to vesicoureteric junction (VUJ) with no loco-regional nodal involvement or distant metastases. We also highlight the role of FDG PET/CT in follow-up and residual disease evaluation.

Access this article online

Quick Response Code:

Website: www.ijnm.in

DOI: 10.4103/0972-3919.142640

CASE REPORT

A 56-year-old male, had initially presented with painless hematuria for about a month. CT scan of the abdomen revealed bulky left kidney with a mildly enhancing soft tissue lesion seen

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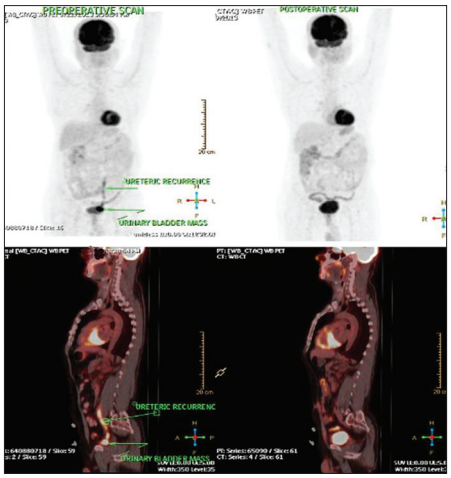

Figure 1: Left column: Preoperative scans-left upper row shows positron emission tomography (PET) maximum intensity projection and left lower row fused PET/noncontrast computed tomography (CT) in sagittal view showing an abnormal linear ^{18}F-fluorodeoxyglucose (FDG)-uptake in the remnant left lower third of ureter and in the bladder at left vesicoureteric junction. Right column: Postoperative scans-right upper row shows PET maximum intensity projection and Right lower row fused PET/noncontrast CT in sagittal view showing no abnormal ^{18}F-FDG-uptake anywhere in the body

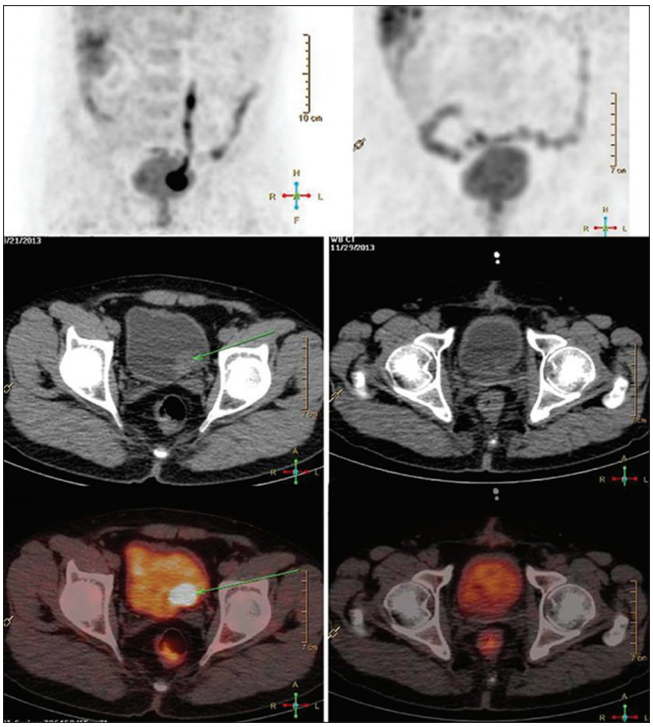

Figure 2: Left column: Preoperative scans-left upper row shows abdomino-pelvic region positron emission tomography (PET) maximum intensity projection showing an abnormal focal fluorine-18-fluorodeoxyglucose (^{18}F-FDG)-uptake in the remnant left lower third of ureter and in the bladder at left VUJ, left middle row non contrast computed tomography (CT) transaxial view showing bladder mass at left VUJ, left lower row fused PET/non contrast CT in transaxial view showing abnormal focal ^{18}F-FDG-uptake in the bladder mass at left VUJ. Right column: Postoperative scans-right upper row shows abdomino-pelvic region PET maximum intensity projection showing no abnormal focal FDG uptake, middle row non contrast CT transaxial view showing no abnormal growth in the bladder and right lower row fused PET/non contrast CT in transaxial view showing no abnormal ^{18}F-FDG-uptake in the bladder

in the upper-mid calyces of left kidney with extension into parenchyma of upper half of the kidney. There was no evidence of loco regional lymphadenopathy or renal vein thrombosis. The patient underwent left radical nephrectomy with left upper two-third ureterectomy. The histopathology report revealed it to be TCC Grade I of the kidney with uninvolved perinephric fat, hilar region and ureteric margin. Patient had an uneventful postoperative status. Eleven months postsurgery patient had an episode of painless hematuria. Ultrasonography abdomen and pelvis revealed soft tissue mass in the left VUJ of the urinary bladder; however, the postoperative remnant distal third left ureter was unremarkable. Patient was referred for FDG PET/CT scan for the evaluation of disease status and restaging. The FDG PET/CT scan showed abnormal increased linear FDG uptake in the remnant distal third left ureter and in the soft tissue mass projecting through the left VUJ into the urinary bladder (Figures 1 and 2- left column). Patient underwent left distal third ureterectomy with excision of urinary bladder cuff. The histopathology report showed evidence of tumor infiltrate of TCC in the left ureter and focal area of TCC Grade IV in partial cystectomy specimen with distal margin of partial cystectomy uninvolved. Weekly Bacillus Calmette-Guérin (BCG) instillation through a ureteric catheter was done for 6 consecutive weeks. The follow-up 3 months postsurgery FDG PET/CT scan (Figures 1 and 2- right column) was unremarkable and revealed no abnormal focal FDG uptake in the whole body.

DISCUSSION

Upper urinary tract TCC are defined as tumors located anywhere on the urothelial lining between the renal calyces and VUJ of the distal ureter. They are less common than TCC that originate in the bladder, though the true incidence is difficult to identify due to epidemiological data often merging with tumors of the renal pelvis with renal cell carcinoma statistics. Furthermore, there is considerable geographic variability, with the highest reported incidence occurring in Balkan countries, associated with a degenerative interstitial nephropathy.[6] Staging and grading of upper tract TCC is similar to that of bladder cancer, though due to the relative thinness of the ureter's muscle layer, ureteric tumors are more likely to be invasive at presentation.[7] Upper tract TCC most commonly presents either with macroscopic or microscopic hematuria, or is discovered during follow-up imaging of patients with bladder TCC.[8] Upper urinary tract TCC accounts for 10% of renal cell cancers.[1] TCC of the intrarenal collecting system accounts for approximately 7% of primary renal tumors.[9] Radical nephroureterectomy with excision of a cuff of the bladder wall is established as the standard treatment for TCC of the upper urinary tract in the presence of a normal contralateral kidney.[2] In our patient of the left renal TCC the initial surgery performed was radical nephrectomy with upper two-third ureterectomy, the lower third of left ureter and bladder cuff was not resected. Bladder tumor recurrence following nephroureterectomy for TCC of the upper urinary tract has been observed in 30-40% of

patients.[10] In all cases, it is vital to confirm the diagnosis prior to ablative surgery.[11] Excretory urography and retrograde pyelography have been the conventional diagnostic tools used for this purpose with a CT scan reserved for further regional/nodal staging.[11] There are conflicting reports in the literature concerning the diagnostic and staging value of CT as well as reports of its limitations in accurately staging the lower stages (Ta-T2).[12] In our patient, preoperative CT scan was performed for staging and there were no loco regional nodes. Bone scan was performed to confirm any skeletal metastases. In our patient, FDG PET/CT revealed abnormal linear FDG uptake in the in the remnant lower third ureter and in the urinary bladder adjacent to the VUJ revealing recurrence in the remnant ureter and bladder. FDG-PET might be useful in detecting perivesical tumor growth or distant metastasis in patients with advanced bladder cancer, and for the early detection of recurrent cancer following therapy, although a major remaining pitfall is the intense FDG accumulation due to excretion in the urine.[13] Detection of recurrent disease in cases of invasive bladder cancer can be significantly improved by using FDG-PET/CT, with delayed imaging following forced diuresis and oral hydration. Composite PET/CT is superior to CT alone for the restaging of invasive bladder cancers.[3] PET/CT is useful for detection of metastatic disease, but the ability to detect primary bladder wall lesions remains to be elucidated further. To overcome the problem with urinary excretion of ^{18}F-FDG, new PET tracers like choline, methionine and acetate are being tested.[14]

Our patient underwent left distal third ureterectomy with excision of urinary bladder cuff-partial cystectomy. The histopathology report showed evidence of tumor infiltrate of TCC in the left ureter and focal area of TCC Grade IV in partial cystectomy specimen with distal margin of partial cystectomy uninvolved. The histopathological findings correlated with the FDG scan findings and thus, indicated the role of FDG PET/CT in upper urinary tract TCC recurrence. The aim of instilling chemo-or immunotherapeutic agents such as mitomycin C, thiotepa and BCG, post resection to reduce tumor recurrence. Our patient was given intravesical BCG injections with no complications. The 3 months postsurgery follow-up ^{18}F FDG PET-CT scan revealed disease free status.

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How to cite this article: Sonavane S, Rani D, Asopa R, Upadhye T, Pawar D. Postoperative distal ureteric and bladder cuff recurrence in a Grade I renal transitional cell carcinoma diagnosed and restaged by fluorodeoxyglucose positron emission tomography-computed tomography. Indian J Nucl Med 2014;29:264-6.

Source of Support: Nil. **Conflict of Interest:** None declared.