

F18 FDG PET/CT and Urinary Bladder/Urothelial Carcinoma: Diagnostic Performance and Impact on Clinical Management

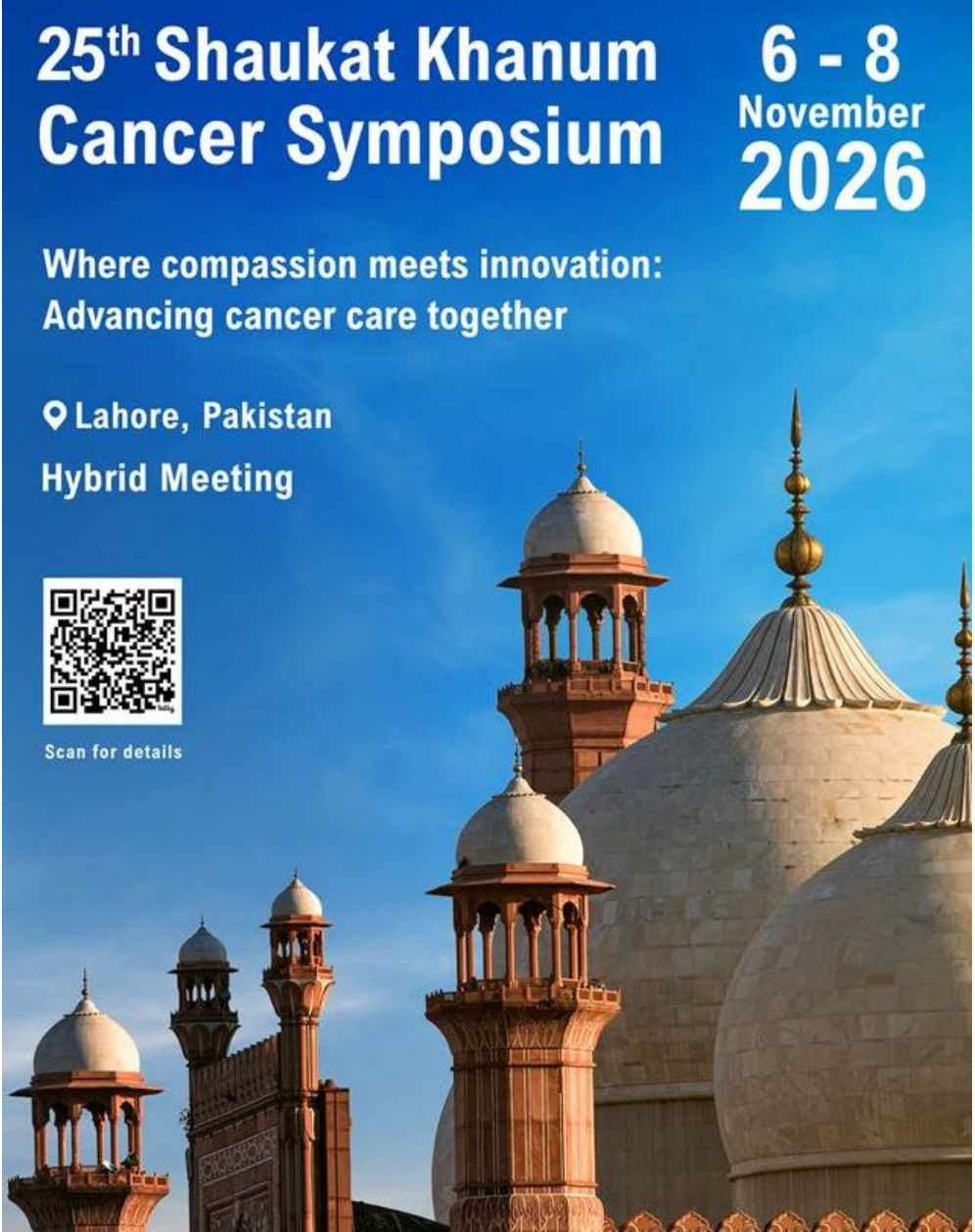
An Institutional Review

Zeeshan Sikandar¹, Sana Munir Gill², Hajira Ilyas¹, Humayun Bashir³, Syed Abdul Mannan Hamdani², Khurram Mir²

¹Shaukat Khanum Memorial Cancer Hospital and Research Centre, Peshawar

²Shaukat Khanum Memorial Cancer Hospital and Research Centre, Lahore

³Kent & Canterbury Hospital, Canterbury, UK



OBJECTIVE

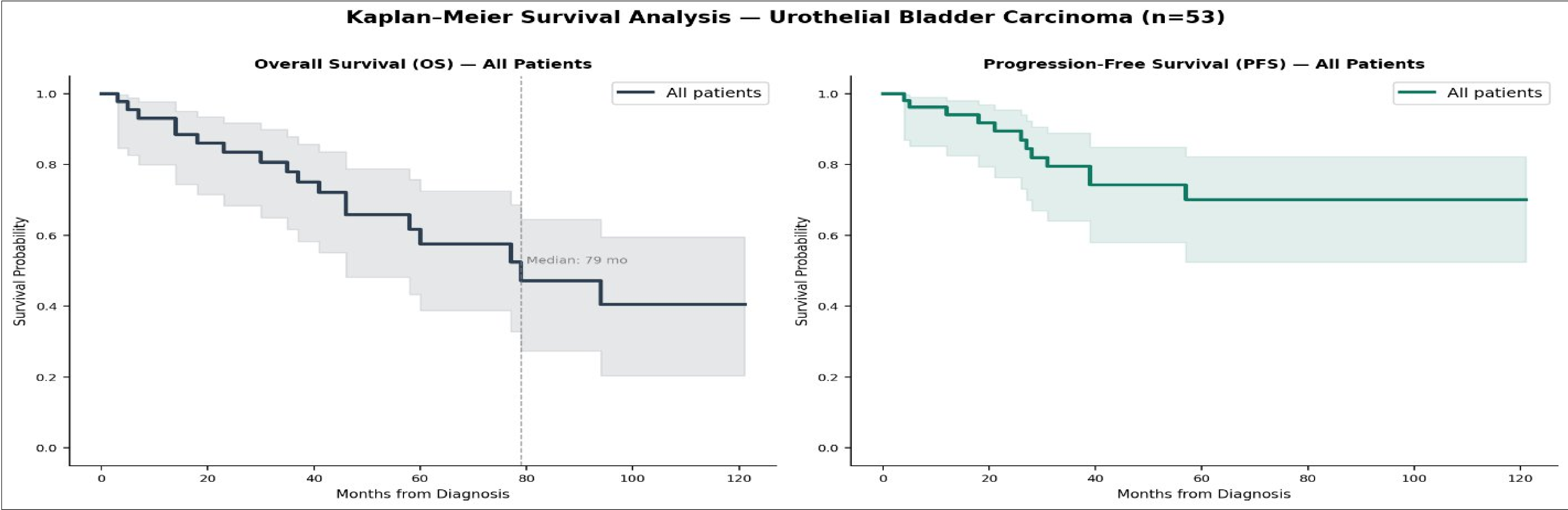
Bladder cancer is the most common urothelial carcinoma, while upper urinary tract urothelial carcinomas account for only 5–10% of cases. Accurate staging and restaging are essential for appropriate treatment selection. This study aims to evaluate the added value of [18F]FDG PET/CT in detecting occult nodal and distant metastases and assess its impact on clinical management and treatment decisions in bladder urothelial carcinoma.

METHODS

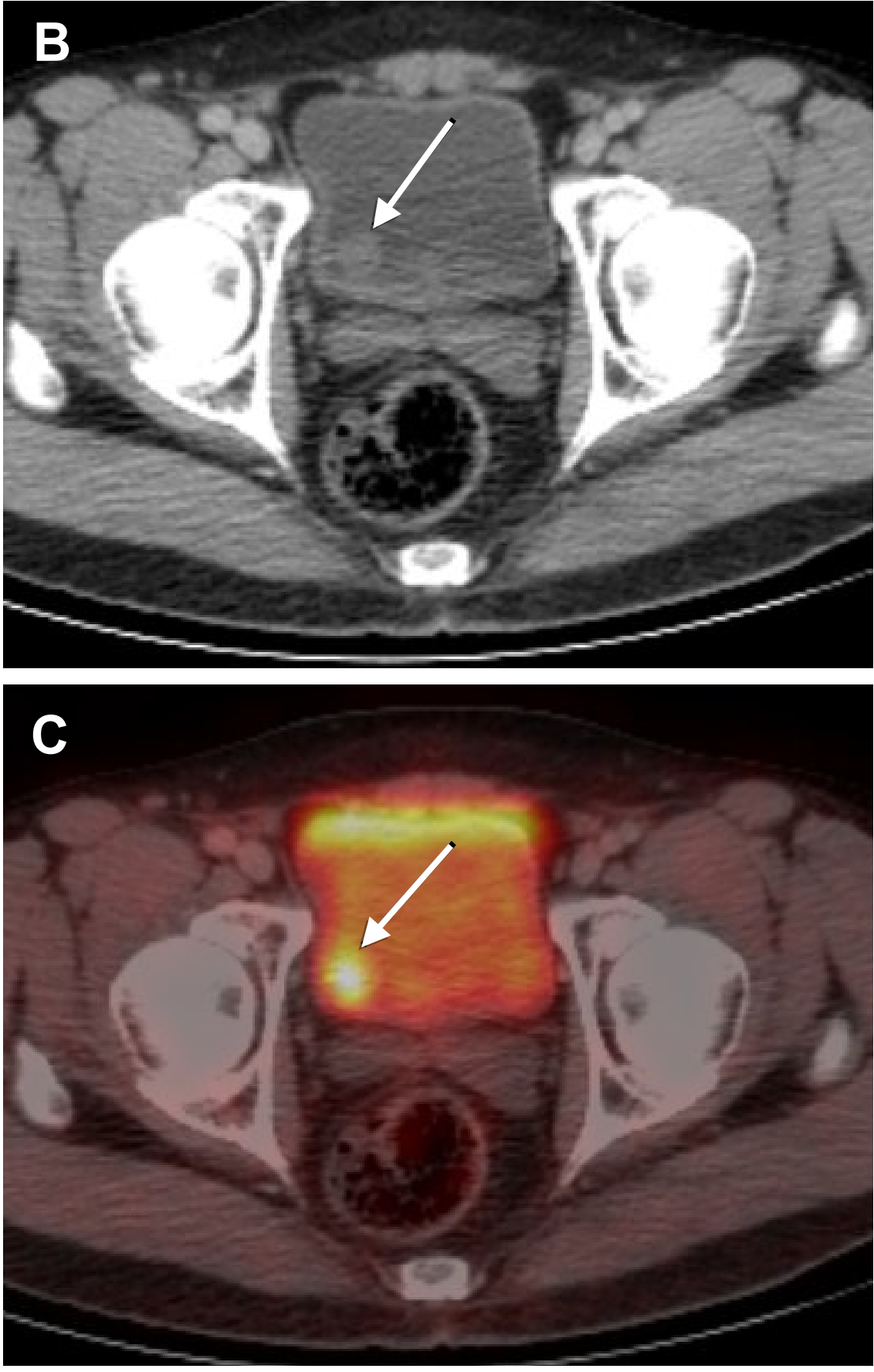
- Study design:** Retrospective study of 53 histopathologically confirmed urothelial carcinoma patients who underwent [18F]FDG PET/CT between February 2011 and February 2026; IRB approved.
- Patient and clinical data:** Demographics, tumor histopathology/grade and location, treatment, conventional imaging, and follow-up outcomes were retrieved from the hospital information system. Comparative CT/MRI was available within 2–3 months of PET/CT.
- Statistical analysis and outcomes:** Categorical variables were compared using *Chi-square/Fisher’s exact tests*, and continuous variables using the *Mann–Whitney U test or Student’s t-test*, as appropriate. *Kaplan–Meier analysis with log-rank testing* was used for PFS and OS. Management changes following PET/CT were assessed from clinical records/MDT decisions.

RESULTS

- Patient profile:** 53 patients (86.7% male), mean age 60.8 years; 94.4% had high-grade urothelial carcinoma, with 50.9% muscle invasive bladder cancer (MIBC) and 49.1% non muscle invasive bladder cancer (NMIBC). Bladder was the primary site in 71.7%, while 15.1% had upper urinary tract (UUT) involvement.
- PET/CT findings:** PET/CT was performed for initial staging in 15% and restaging in 85% of patients, demonstrating metabolically active disease in 56.6%. Compared with conventional imaging, PET/CT upstaged 17% and down staged 3.7% of patients.
- Impact on management:** PET/CT findings led to a change in clinical management in 6 (11.3%) patients. Five patients were shifted to palliative systemic therapy, while one patient with a solitary FDG-avid lymph node underwent potentially curative surgical resection.
- Survival outcomes:** Of the 30 patients with FDG-avid disease, 14 (46.6%) died during follow-up; these patients had FDG-avid nodal or distant metastatic disease. Four deaths occurred among PET-negative patients. The median overall survival was 94 months (95% CI: 58.0–not reached), with an estimated 3-year PFS of 79% and 5-year OS of 62.1%.

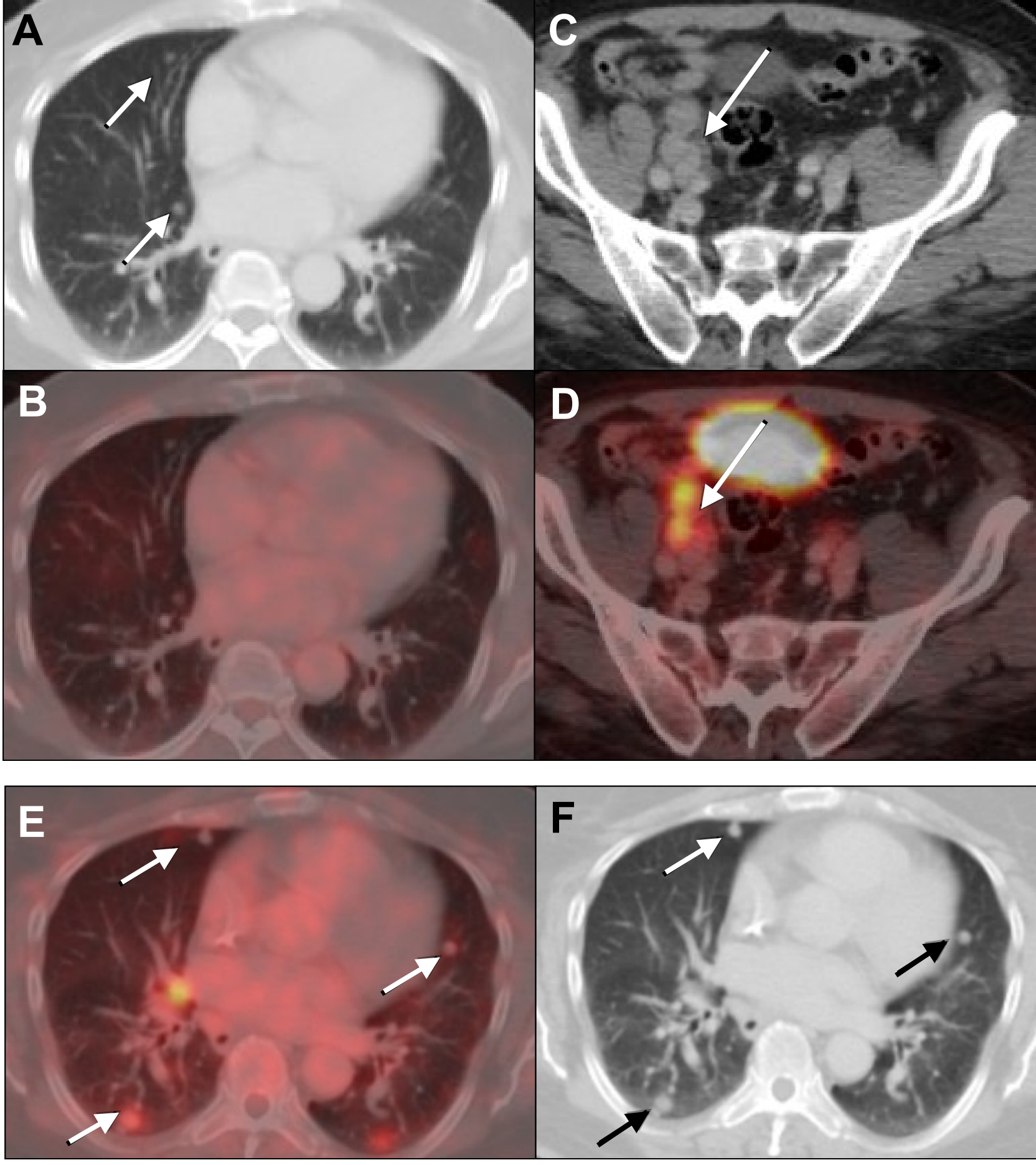


CASES



Case 1: 45 year old male with moderately differentiated adenocarcinoma caecum/ascending colon. Status post extended right hemicolectomy and gastrojejunostomy, Roux En-Y anastomosis outside. [18F]FDG PET/CT was acquired prior to chemotherapy. In addition to the post surgical changes there was avid soft tissue in the right wall of urinary bladder measuring 1.6 cm, SUV 10.9; A (MIP in sagittal view, black arrow), CT and fused PET/CT axial (B,C white arrows) . Cystoscopy and transurethral resection of bladder wall was done. Histopathology revealed high grade urothelial cancer.

Case 2: 58 years old male, known case of carcinoma urinary bladder. Status post treatment four years ago. [18F]FDG PET/CT was acquired to assess nodules seen on surveillance CT scan. On PET-CT there were multiple tiny soft tissue nodules in both lungs with variable avidity; SUV 2.2 (CT and fused PET/CT axial images; A,B arrows). Also, avid nodes in the right pelvic side wall measuring 2.0 cm, SUV 7.5 (CT and fused PET/CT axial images; C,D arrows). He was started on cisplatin and gemcitabine. Restaging scan 6 months later showed disease progression with interval increase in size and number of avid pulmonary nodules, SUV 2.5 along with avid right hilar node; SUV 4.9 (CT and fused PET/CT axial images; E,F arrows)



CONCLUSION

[18F]FDG PET/CT provides incremental value over conventional imaging in the staging and restaging of urothelial carcinoma by improving disease assessment and influencing treatment decisions. Detection of occult nodal and distant metastases may help avoid unnecessary radical surgery and its associated morbidity. FDG-positive metastatic disease was also associated with poorer survival, supporting the prognostic role of PET/CT in treatment planning and risk stratification.

