

Preoperative FDG PET/CT in Adrenocortical Cancer Depicts Massive Venous Tumor Invasion

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Abstract: A 79-year-old woman presented with abdominal pain. Ultrasound revealed an intra-abdominal mass in the left renal region. Comprehensive endocrine workup was unremarkable. The patient was referred for further diagnostic workup. FDG PET/CT revealed a hypermetabolic mass in the left adrenal region. In addition, pathologically increased tracer uptake of 2 renal veins (the upper vein crossing in front of the aorta the lower one crossing behind the aorta) and the inferior vena cava raised the concern for malignant venous infiltration. Adrenalectomy, nephrectomy, and thrombectomy were carefully planned and performed. Adrenocortical carcinoma with tumor thrombus and caval extension was proven by histopathology.

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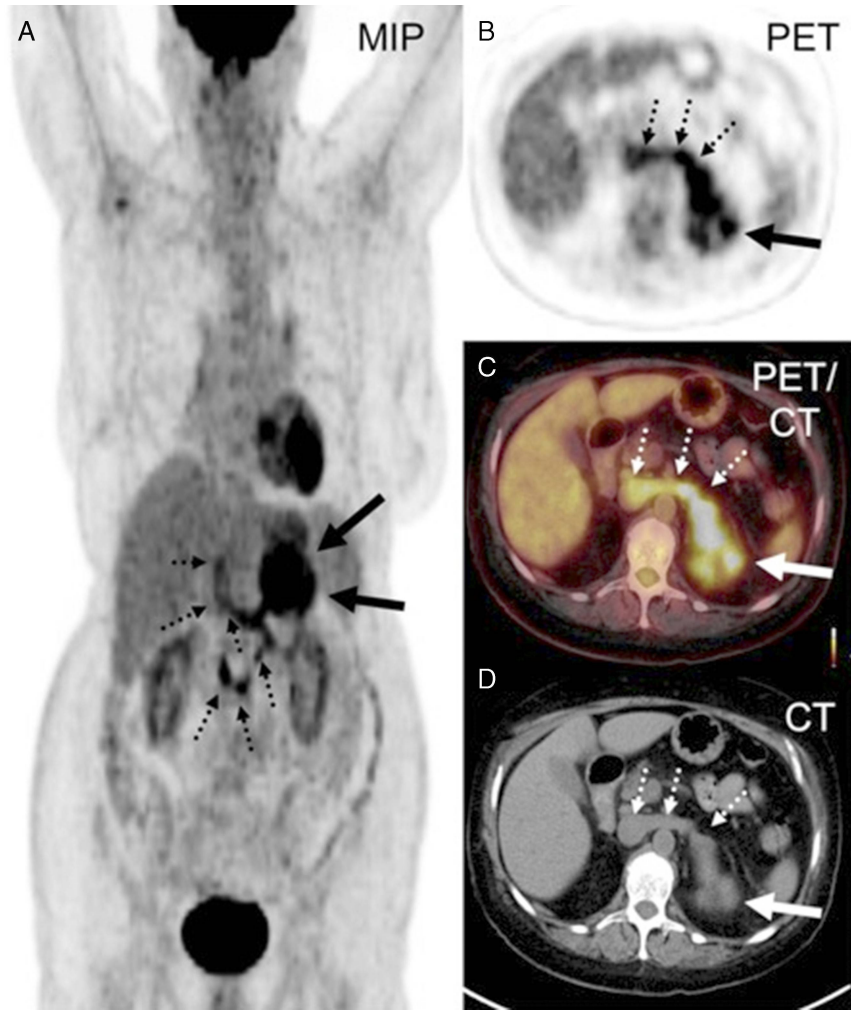


FIGURE 1. ^{18}F -FDG PET/CT. A 79-year-old woman presented with abdominal pain. Ultrasound revealed an unclear intra-abdominal mass in the left renal region; blood tests showed acute kidney injury. Comprehensive endocrine workup was unremarkable. Consequently, the patient was referred for further diagnostic workup using combined functional and anatomical imaging. Because of renal insufficiency, CT was performed without IV contrast. Imaging reveals a mass in the left adrenal region with highly increased FDG uptake consistent with malignancy (A–D, arrows). Interestingly, the patient has the variant of 2 separate venae renales with the upper vein crossing in front of the aorta and the lower one crossing behind the aorta before entering the inferior vena cava (IVC). PET/CT indicates pathologically increased tracer uptake of both renal veins and IVC (A–D, arrowheads), highly consistent with malignant venous infiltration.

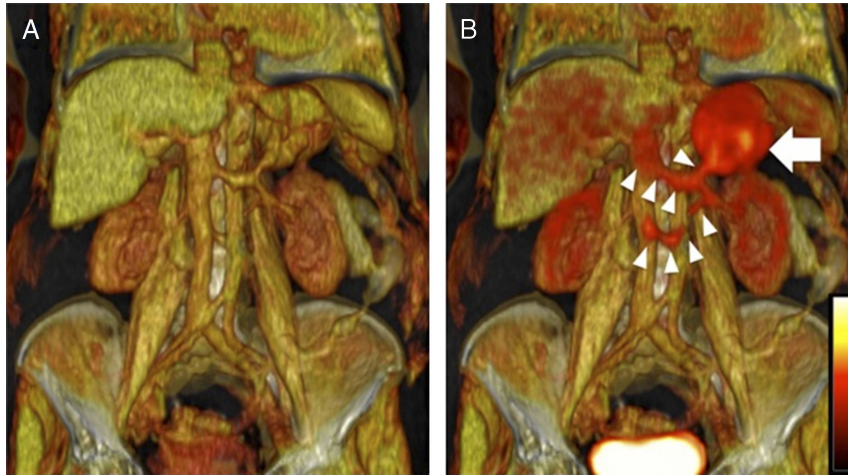


FIGURE 2. The abdominal volume-rendered 3-dimensional anatomical CT image (A) fused with functional imaging with FDG PET (B) provides better spatial orientation than conventional cross-sectional tomography. The fused image reveals increased glucose metabolism corresponding to the adrenal mass (arrow). In addition, abnormal hypermetabolic lesions spreading from the adrenal tumor via 2 separate renal veins (variant of 2 separate venae renales with the upper vein crossing in front of the aorta and the lower one crossing behind the aorta before entering the inferior vena cava) into the IVC are depicted (arrowheads). This finding is highly consistent with venous tumor invasion. Venous invasion is a very frequent finding in adrenocortical carcinoma (up to 80% of cases) and has been shown to be strongly associated with inferior clinical outcome.^{1,2} Despite not being a contraindication to surgery by itself, tumor thrombus demands complex adjunct procedures, such as veno-veno bypass or even cardiopulmonary bypass to facilitate resection.³⁻⁵ Because surgeons with adequate experience achieve relatively low perioperative mortality and long disease-free survival in some cases, tumor invasion should not deter from surgical treatment in experienced centers.⁶⁻⁸ Therefore, careful presurgical workup of patients with assessment of venous infiltration is of utmost importance. Many prior reports have described the ability of PET/CT to detect tumor invasion of the blood vessels.⁹⁻¹² In our patient, depiction of IVC thrombus resulted in optimized surgical planning. Furthermore, preoperative whole-body FDG PET/CT was crucial for patient management by excluding distant metastases.