What Nuclear Medicine Physicians Need to Know About Normal Variant Left Renal Vein and IVC Anatomy and Their Implications For IVC Filter Placement

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Normal variant left renal vein and IVC anatomy is best evaluated with contrast enhanced CT and MRA exams. While oncology whole body PET/CT is performed without the routine use of iodinated contrast, it is our experience that these variants can still be readily identified. We feel it is particularly important to report these variants given oncology patients are at increased risk for developing DVT with possible placement of IVC filter required in particular because these variants are often occult in pre-filter placement IVC venograms. If IVC filters are placed without knowledge of variant anatomy, DVT from lower extremities can bypass the filter and still reach the lungs. Therefore, it is important for nuclear medicine physicians to be aware of these variants and incorporate these findings into their PET/CT reports.

Patients undergoing IVC filter placement typically have a catheter placed via the right femoral vein into the IVC. An IVC venogram is then performed with the catheter tip at the T12/L1 level in order to allow visualization of the normal right and left renal vein ostia. The IVC filter is then placed just below the level of the ostia. However, renal vein and IVC variant anatomy, including circumaortic renal veins, supernumerary left renal veins, and duplicate IVC may not be appreciated. Lack of knowledge to the presence of these variants leaves the patient prone to sub-optimally placed filters with conduits available for lower extremity DVT to reach the lungs.

Problems in accurately determining left renal vein variants may arise in the setting of retroperitoneal adenopathy, large aortic aneurysms, little intra-abdominal fat, motion, or pediatric patients. Also, the 3rd and 4th portions of the duodenum may be confused for an anterior left renal vein.

Normal variant anatomy:
- Circumferential left renal vein
- Supernumerary anterior left renal veins
- Double IVC
- Left renal vein anterior to aorta

Variant anatomy:
- Adenopathy interfering with accurate determination
- Large abdominal aortic aneurysm interfering with accurate determination
- Retroaortic portions of the duodenum may be confused for an anterior left renal vein.

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