Figure 13.3 Visualization of the esophageal probe location on CARTO. A PA view of a left atrial endocardial map, with visualization of a quadripolar (Josephson, Abbott) mapping catheter attached to the esophageal temperature probe within the esophageal lumen. Note that the quad catheter is typically attached at a fixed offset from the tip of the temperature probe to prevent the possibility of RF/heat transfer to the quad electrodes (see text). In this example, the esophageal temperature probe (and esophagus) are located adjacent to the right inferior pulmonary vein.

Ablation

The ablation and high-density mapping catheters are advanced via the steerable and fixed curve long sheaths, respectively, to the LA via ICE (**Figure 13.4**). A dense (typically >2000 points) EAM is created of the LA, identifying all the PVs, the LAA, and the mitral valve (MV) annulus. RF energy is then delivered to create a continuous WACA lesion set around each pair of ipsilateral PVs. Specific catheter movements may be accomplished through direct catheter steering mechanisms or with augmentation with the long steerable sheath. Most sheaths currently are not directly visualized in the mapping system; thus, catheter curve, direction, and extension within the LA must be visualized through ICE. Utilizing a sheath that can be visualized within the mapping system (Vizigo, Biosense Webster) can facilitate this process (**Figure 13.5**). As mentioned, the authors typically utilize a hybrid drag approach with continuous RF delivery, maintaining the catheter at each ablation location for a prescribed time based on a combination of variables including power, anatomic location, catheter stability, impedance decrease, and electrogram amplitude diminishment.

At the time of this writing, the evolution of several novel RF delivery strategies is ongoing, with the potential for these various techniques to be incorporated into standard AF RF ablation in the future. Real-time measures of RF energy delivery that may predict lesion formation include ablation index (AI), which incorporates contact force, power, and time of RF,[6] force-time integral (FTI), which simply integrates contact force over time,[7] may have benefit. Delivery of short duration (4–5 seconds), high power (50W) lesions in order to shorten lesion formation time and minimize lesion depth is also gaining acceptance.[5] Automated algorithms to mark RF ablation sites have also been developed.[16] It is quite likely that such approaches can be easily incorporated into a reduced/zero fluoroscopy workflow.

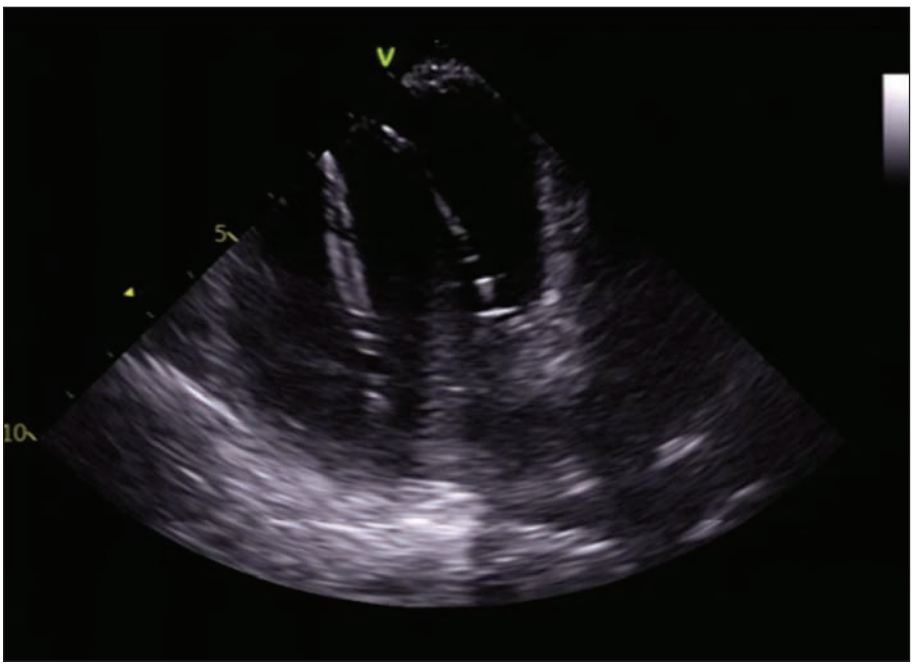

Figure 13.4 ICE visualization of PentaRay and SmartTouch introduced in LA. An ICE image of the left atrium demonstrates both a PentaRay and ablation catheter in the left atrium, directed towards the LSPV and posterior wall, respectively. Please see **Video 13.2** for additional information.