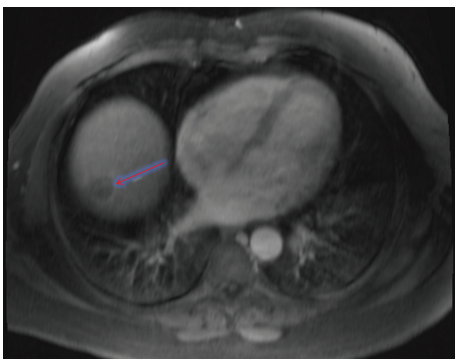
Needle guidance with coaxial needle tracker

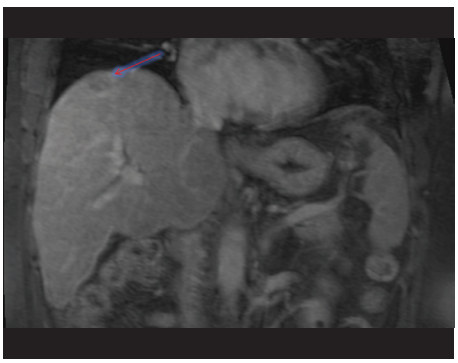
Philips EPIQ image fusion and navigation case study

Patient history

A 66-year-old patient presented with hepatitis C and hepatocellular carcinoma (HCC). MRI demonstrated a 2.5 cm lesion in Segment 7 at the liver dome. The lesion demonstrated arterial enhancement with portal venous washout on imaging, consistent with HCC.



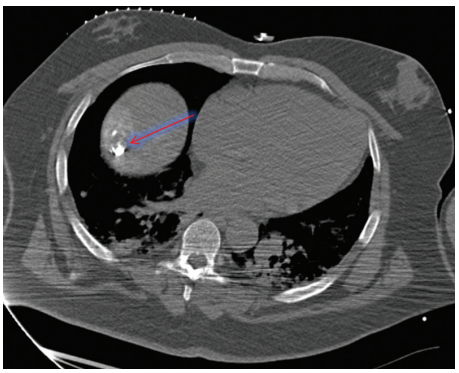
MRI – portal venous delay with EOVIST



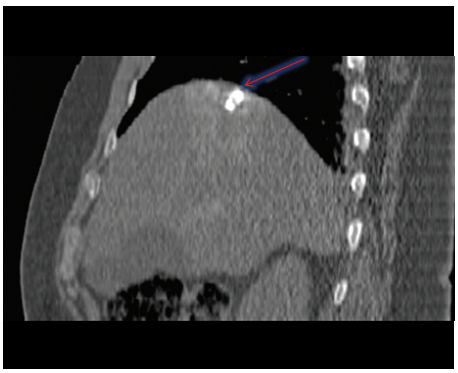
MRI – coronal 20-minute delay

This patient was not suitable for resection; therefore, the plan of care was combined chemo-embolization and microwave ablation (MWA) for curative intent.

A great technical challenge was encountered in accessing this lesion, as it resided in the dome. Efforts were made to avoid damage to the diaphragm, as well as to avoid the lung. Philips image fusion and navigation on EPIQ demonstrated its clinical utility for planning the needle approach – ultimately resulting in a change in the access site.



Pre-procedural axial CT



Pre-procedural sagittal CT

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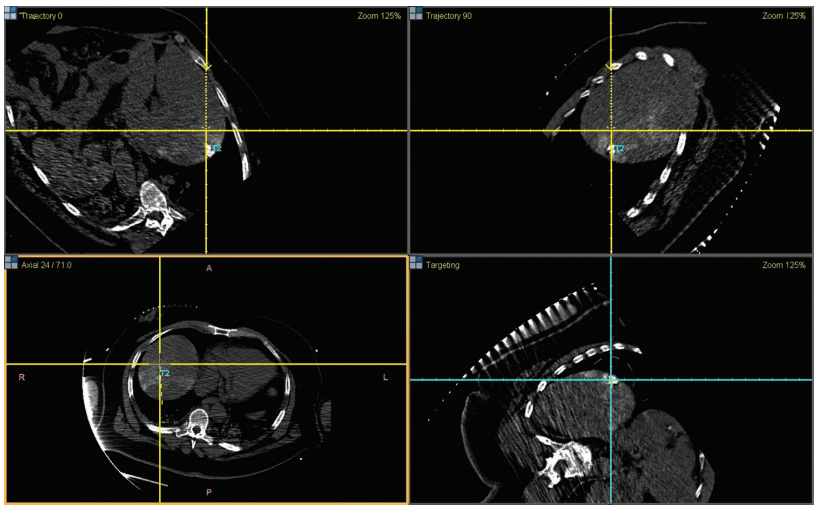
The image fusion and navigation planning tools enable dynamic distance measurements from proposed entry sites to the target lesion, as well as a visual flythrough of the planned needle path to ensure critical structures are spared.

On initial assessment, the intended approach was to access the lesion subxyphoid.

Dynamic measurement tools on image fusion and navigation software demonstrated the microwave probe would be short of 4 cm. As a result, the decision was made to access the lesions intercostal. A pre-procedural CT scan was then acquired axially with the Philips reusable patient trackers which were placed on or near the area of interest on the patient.

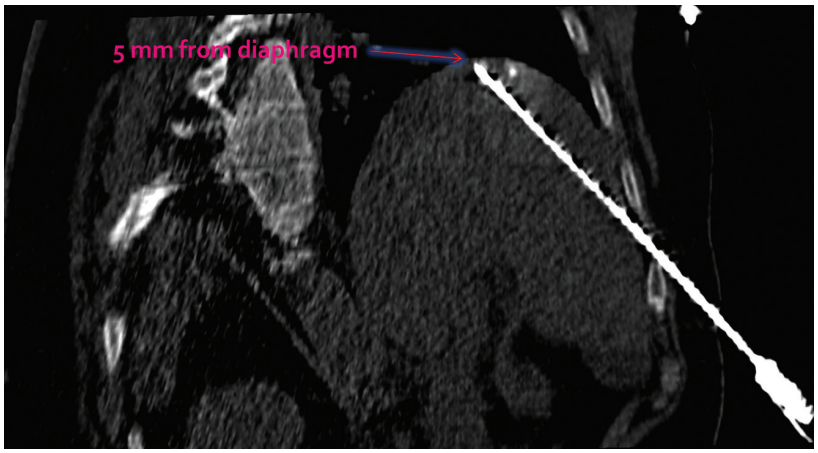
These images were pushed from the CT scanner to the EPIQ system for image registration. This process spatially maps coordinates from the pre-procedural CT scan to the patient.

A 16Gx11cm coaxial needle tracker (CNT) was used for needle-tip tracking when introducing the Microwave probe to the treatment site. Since the length of the microwave probe exceeded that of the tracked stylet, a needle offset was applied to the image fusion and navigation software to account for the difference. As demonstrated on the image, the proximal arrowhead demonstrated the position of the introducer needle tip; the distal arrowhead demonstrated the site where the microwave probe will land once introduced into the Philips CNT cannula. Virtual tracking of the needle tip in real time enabled the physician to make adjustments to the trajectory with confidence in lesion access.



On final confirmatory scan, a distance of 5 mm was measured from the probe tip to the diaphragm. This was precise in terms of probe placement, as the microwave ablation probe ablates 5 mm from the tip of the probe.

No damage to surrounding structures was demonstrated upon completion.



Confirmatory scan after placement of MWA through CNT

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