

Redirecting the care path with enhanced detection of vascularity and avascularity to redefine small parts imaging

eL18-4 PureWave linear array transducer

Category

Small parts, abdominal, renal transplant

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Overview

The Philips eL18-4 PureWave linear array transducer is proving useful not only in traditional small parts imaging, but also in abdominal imaging, including renal transplant assessment. Advances in ultrasound are allowing for increased

confidence in subtle findings. If we can increase our confidence in the subtle diagnosis at the time of scanning, we can triage the subsequent investigation pathway appropriately and prevent delayed diagnoses.

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The Philips eL18-4 PureWave linear array transducer is our first high-performance transducer featuring ultra-broadband PureWave crystal technology with multi-row array configuration, allowing for fine-elevation focusing capability.

Small parts

Testicular vascularity

Disease processes with active inflammation demonstrate a difference in vascularity between the normal and abnormal sides. MicroFlow Imaging (MFI) and the Trapezoid mode maintain a high-resolution detailed image through a complete field of view with up to 7 cm penetration, enhancing diagnostic confidence, as these testicular scans indicate (**Figures 1-4**).

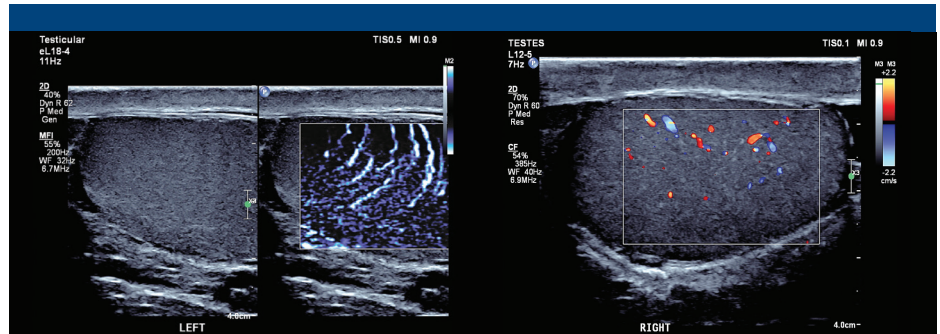


Figure 1 MFI images (left) clearly depict, in textbook-like anatomical detail, tortuous venous drainage through the testes, adding to information from color Doppler images on the right.

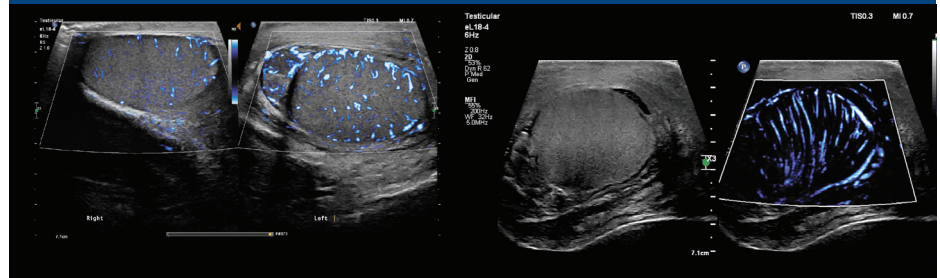


Figure 2 The Trapezoid mode maintains highly detailed resolution throughout the full extended field of view.

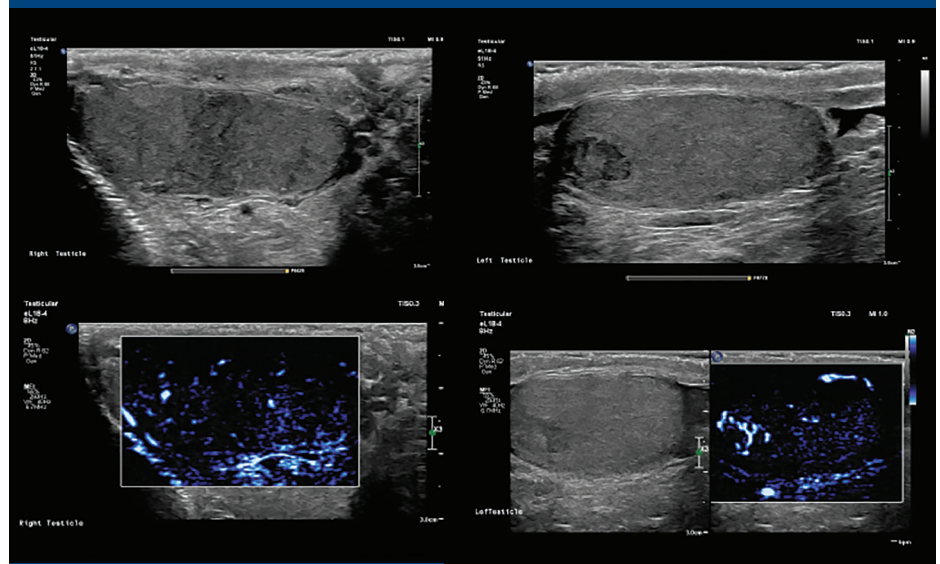


Figure 3 A comparison of MFI on the normal and abnormal sides clearly shows chaotic vascularity in a testicular tumor, with a level of detail usually available only with contrast ultrasound.

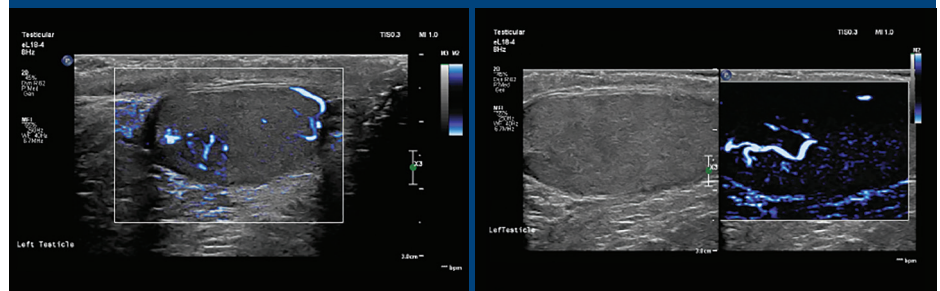


Figure 4 A blended view of MFI shows the lesion with increased vascularity in the same area. The image on the right demonstrates normal B-mode appearance, while MFI reveals a large vessel feeding into the lesion, indicating a surgical lesion that requires resection.

Abdominal

The boundaries of what has been considered linear imaging are blurring because the high penetration capability of the eL18-4 is proving useful for abdominal scans as well. **(Figure 5)**

Liver

A 2D-image with the curved transducer showed a suspected lesion in the liver in this patient with deranged liver function tests (LFTs), and the patient was subsequently recalled for a contrast ultrasound. Scanning with the linear eL18-4 transducer showed extensive liver nodules not previously detected, but highly suspicious for metastases, indicating the need for CT staging rather than additional ultrasound investigation **(Figure 6)**.

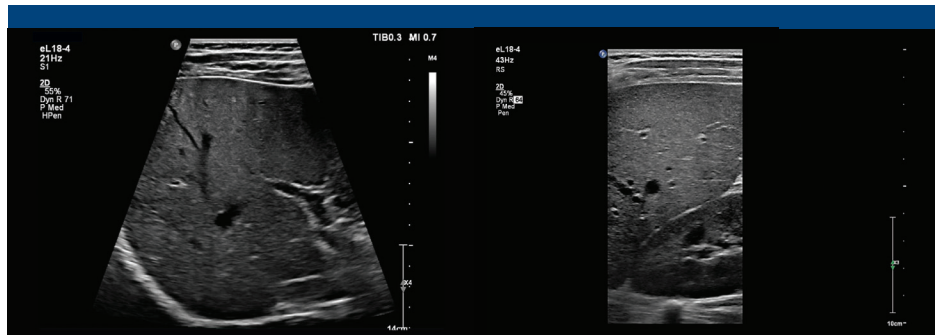


Figure 5 Using the eL18-4 transducer and the true Trapezoid mode allow visualization of fine details down to 14 cm through the liver in this patient of average build.

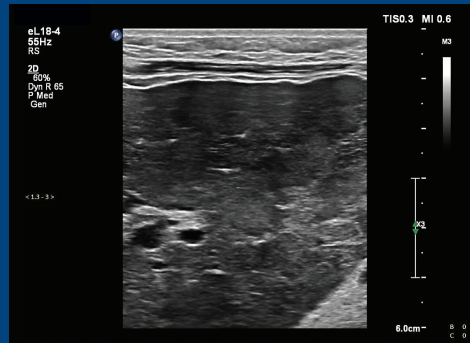


Figure 6 The eL18-4 shows multiple suspicious liver nodules, not well depicted on the prior ultrasound. More rapid triage to CT could have been achieved if this transducer had been utilized in the first instance.

Gallbladder

A patient with primary biliary cirrhosis (PBC) underwent surveillance with ultrasound for suspected biliary sludge. An interval MRI had shown questionable enhancement in the gallbladder, raising the possibility of an alternate pathology.

Subsequently, the patient was referred for a contrast enhanced ultrasound which showed a gallbladder lesion. The use of MFI also confirmed the central vascularity. By performing first MFI, during the previous ultrasound surveillance, the practice may have prevented a delay in diagnosis **(Figure 7)**.

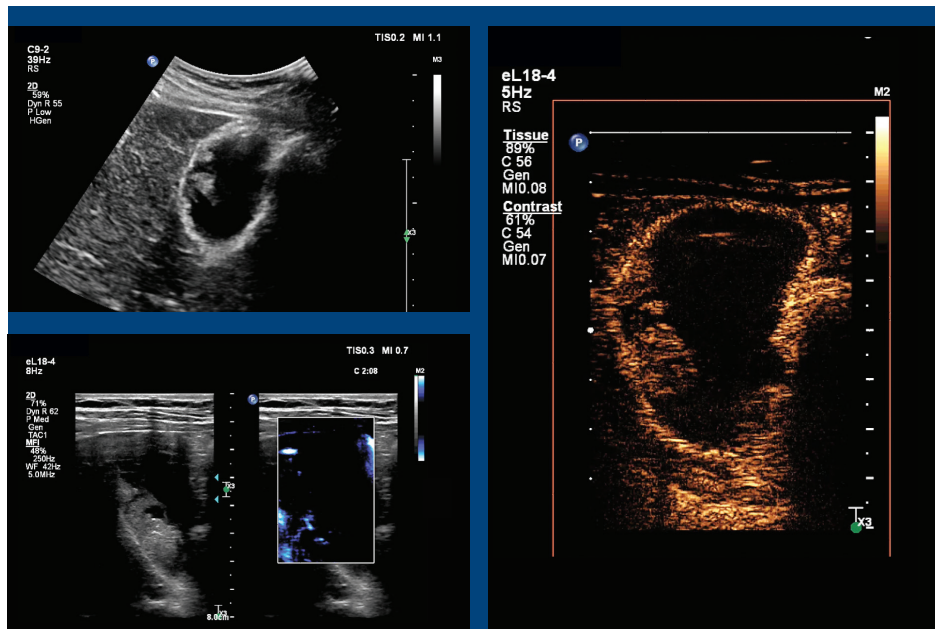


Figure 7 MFI showed a clear central vascularity that has been confirmed by contrast ultrasound, indicating a surgical lesion that requires consideration of cholecystectomy.

Renal transplant

At day 2 postoperative, this kidney transplant was demonstrating poor function, assessed on call, with reduced velocities at the medial aspect of the transplant kidney. However, B-mode imaging did not reveal any specific cause for this. Standard Doppler provides a broad but limited assessment in renal transplant vascularity. It is helpful for large vessel flow dynamics, but won't necessarily reveal kidney perfusion abnormalities.

Usually, contrast ultrasound is necessary to characterize perfusion abnormalities. MFI, however, depicts areas of reduced or absent perfusion at a capillary level. These areas also show reduced echogenicity on B-mode imaging, and are in keeping with a small polar infarct (**Figures 8 and 9**).

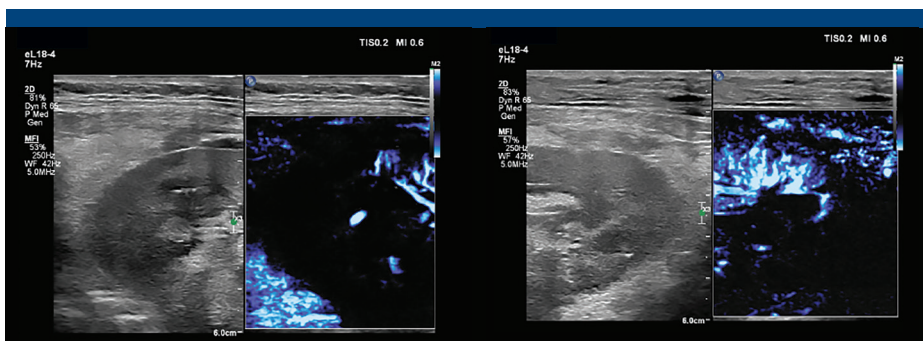


Figure 8 MFI demonstrates flow up to the periphery of the lateral aspect of the kidney. Medially, flow is more focally sparse.

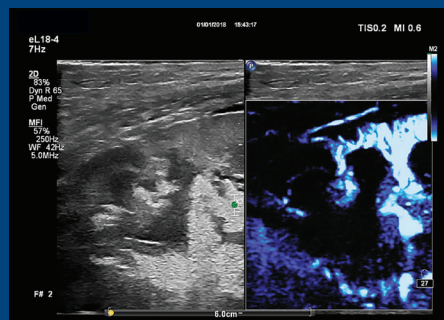


Figure 9 Further interrogation reveals an area of reduced echogenicity and perfusion defect due to polar infarct.

Conclusion

Advanced capabilities of the eL18-4 transducer are blurring the lines of what has previously been considered small parts imaging, allowing for effective abdominal scanning as well. MFI, a new proprietary method for low and weak blood flow detection, can now display the tortuous venous drainage through testis and achieve textbook-like anatomical

detail. It also aids visualization of vascularity and avascularity, including genuine perfusion assessment in renal transplant. These more refined assessment across small and abdominal scanning affect diagnosis and can positively impact the treatment pathway.

Results from case studies are not predictive of results in other cases. Results in other cases may vary.