PHILIPS

Ultrasound

Clinical case study

The eL18-4 PureWave linear array assists in the diagnosis of a fetal renal abnormality

eL18-4 PureWave linear array transducer

Category

Fetal assessment

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Overview

The use of ultrasound in obstetrics has become a mainstay evaluation for the provision of excellent prenatal care. Obstetric ultrasound allows for the determination of gestational age, number of fetuses, type of multiple gestation, pregnancy viability, placental location and the diagnosis of minor and major fetal anomalies. As technology evolves, the use of a variety of different types of ultrasound transducers to improve image quality and penetration has become commonplace in practices routinely performing ultrasounds for pregnant patients. Traditionally, obstetric ultrasound has used both transabdominal and transvaginal transducers to achieve optimal imaging of maternal and fetal anatomy. Curvilinear transabdominal transducers are the most commonly used in obstetrics, with frequencies routinely from 5.0 to 9.0 MHz. As the frequency increases, the transducers typically provide improved resolution, but begin to lose tissue penetration.[1] In the last decade, obesity has become a global epidemic requiring clinicians performing ultrasound to constantly balance the need for penetration versus ideal resolution.

Patient history

A 21-year-old pregnant patient at 25-0/7 weeks gestation presented to clinic for evaluation of a suspected renal abnormality on outside ultrasound. An obstetric ultrasound was conducted at our practice utilizing a Philips EPIQ 7W with a C5-1 curvilinear transducer. The ultrasound evaluation demonstrated a vertex male fetus with a normal estimated fetal weight. The fetal anatomic survey identified no apparent fetal abnormalities, with the exception of suspected left renal agenesis **(Figure 1)**.

Both 2D and color flow Doppler images using the C5-1 transducer provided substantive evidence to support the diagnosis of unilateral left renal agenesis, however some imaging was suggestive of a left pelvic atretic kidney **(Figures 2 and 3)**.

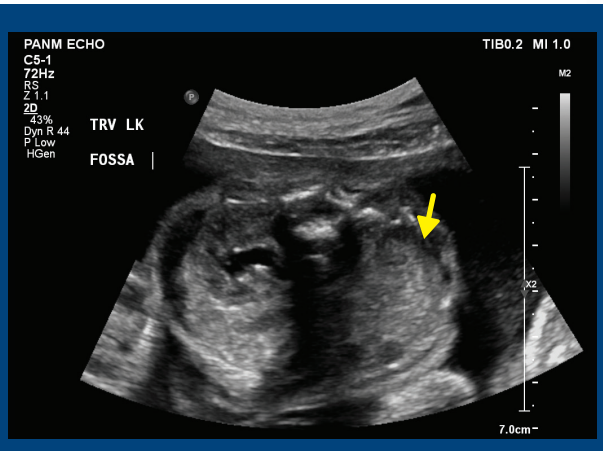

Figure 1
C5-1 transducer transverse image with absent left renal fossa.

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

Research protocol

The patient was enrolled in a clinical evaluation study of the eL18-4 PureWave linear transducer which was ongoing at the time of her initial consultation at our practice. Utilizing the eL18-4 PureWave linear transducer on the Philips EPIQ 7W, additional imaging was performed with particular focus on the fetal renal anatomy. MicroFlow Imaging (MFI) available on the eL18-4 transducer, designed to image low velocity blood flow, was utilized to assess the renal vasculature.

Findings

The resolution of the normal right kidney was clearly improved with the use of the eL18-4 linear transducer **(Figures 4 and 5)**. Uniform penetration was noted in both the near and far field using the linear transducer and provided additional imaging to support the diagnosis of a left pelvic atretic kidney. With MFI, the right renal artery was noted emanating from the aorta, and the left pelvic atretic kidney appeared to have vascular flow coming from the left iliac artery **(Figure 6)**. The patient was informed of the findings and referred to pediatric nephrology for antenatal consultation with a plan for postnatal evaluation of the infant.

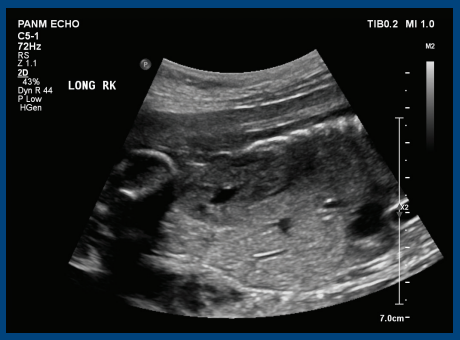

Figure 2 C5-1 transducer coronal image with absent left renal fossa.

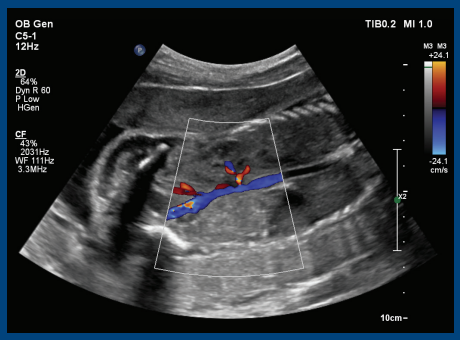

Figure 3 C5-1 transducer coronal image with color flow to right kidney.

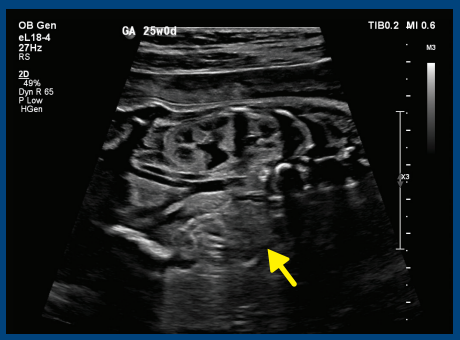

Figure 4 eL18-4 PureWave linear transducer coronal image of right kidney and left pelvic atretic kidney.

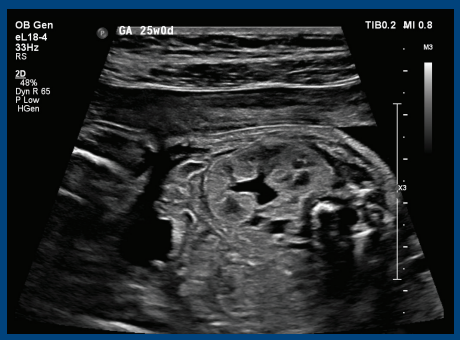

Figure 5 eL18-4 PureWave linear transducer transverse image of right kidney.

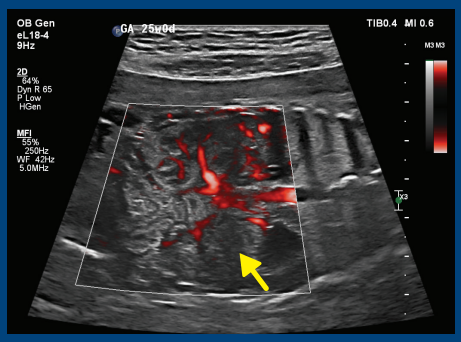

Figure 6 eL18-4 PureWave linear transducer coronal image using MFI with vascular flow to right kidney and left pelvic atretic kidney likely emanating from left iliac artery.

Conclusion

The role of ultrasound is clearly defined in the realm of obstetrics and the prenatal diagnosis of fetal anomalies. Often additional imaging of certain fetal abnormalities may be conducted with MRI to confirm or refute an initial diagnostic finding noted on ultrasound. With advanced transducer technology such as the eL18-4 PureWave linear transducer, our reliance on MRI to further evaluate maternal and fetal anatomy may diminish as we become more confident in its capabilities. In this patient's case, the differential diagnosis was delineated using our existing curvilinear transducer; however, with the use of the eL18-4 PureWave linear transducer with MFI, the diagnosis was enhanced, providing both the clinician and the patient a higher degree of confidence in the true diagnosis of the fetus.

Reference

1 Brant WE. Ultrasound basics: Getting started. Ultrasound: The Core Curriculum. Lippincott Williams & Wilkins, New York, 2001.

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

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