Illuminating definition for fetal cleft lip and palate with TrueVue photorealistic 3D visualization

TrueVue photorealistic
3D visualization

Category
Fetal cleft lip/palate assessment

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**The EPIQ ultrasound
system features an uncompromised
level of clinical performance to meet
the challenges of today's most
demanding Ob/Gyn practices.**

Overview

Diagnostic ultrasound is widely used for the prenatal evaluation of growth and anatomy as well as for the management of multiple gestations and fetal anomalies.

Detailed fetal anatomy scans provide higher resolution, resulting in more comprehensive evaluations of fetal anatomy. Three-dimensional (3D) ultrasound imaging can provide enhanced images of fetal features with such detail, enabling a deeper level of preparation by clinicians.

Patient history

A 29-year-old gravida 2 para 1 pregnant female was referred to Center for Fetal Diagnosis and Treatment at the Children's Hospital of Philadelphia (CFDT) with the history of a fetus with bilateral cleft lip and palate. The patient related an estimated date of delivery of 4/25/2018 which projected to a gestational age of 29 weeks 0 days at the time of evaluation. Amniocentesis revealed a normal male microarray. The maternal medical and family histories were both unremarkable. The paternal family history included a sister with unilateral cleft lip and palate who also had epilepsy with severe neurologic deficits including the inability to ambulate or articulate, as well as a lifelong requirement of G-tube feeding. The family reported that these neurocognitive issues were thought to be secondary to meningitis as a neonate. Ultrasound performed at the outside center at 21 weeks 2 days revealed a bilateral cleft lip and palate. Fetal MRI was also performed outside shortly thereafter, but was suboptimal due to motion artifact. The patient was referred to CFDT for further evaluation and counseling regarding diagnosis, prognosis and management options.

Protocol
A complete detailed examination of the fetal anatomy was performed utilizing the Philips EPIQ 7 system and a variety of transducers including the V6-2, C9-2 and L12-5.

Findings
The detailed fetal anatomic survey noted a male fetus in a cephalic presentation with an anterior placenta, free of the region of the internal cervical os. The amniotic fluid index was normal measuring 18.6 cm with a deepest pocket of 5.5 cm. Fetal biometry estimated the average gestational age at approximately 29 weeks 6 days, with an estimated fetal weight of 1442 grams, which was normal at the 64th percentile. Bilateral cleft lip and palate was identified, right slightly greater than left.

The TrueVue 3D imaging demonstrated deep extension into the posterior hard palate. Active swallowing motions were identified with fluid in the oropharynx and normal gastric distension.

Conclusion

Orofacial clefts, with or without cleft palate, have an incidence of 1 per 940 births in the United States, according to the Centers for Disease Control and Prevention (CDC), and represent one of the most common fetal anomalies.

The diagnosis of a cleft lip or palate can be associated with multiple syndromes. The risk associated with orofacial clefts rises if they are bilateral, involve only the palate, or are associated with other congenital anomalies on ultrasound. Using the V6-2 MHz broadband curved volume array transducer with TrueVue, we were able to clearly visualize the fetal perioral region, including the lips, alveolar ridge and hard palate. This was performed using the 3D surface-rendered oropalatal (SROP) view with an open mouth (**Figure 1**), as well as traditional 3D surface rendering (**Figure 2**) and two-dimensional (2D) sonographic views using the C9-2 curved array transducer (**Figure 3**).

Philips TrueVue technology allows the user to move the light source anywhere within the 3D image, including varying levels of depth, which enhanced the characterization of the facial defects and allowed us to more clearly define the clefts of the alveolar ridge, the protruding premaxillary prolabium, and the involvement into the secondary palate (**Figure 1-arrows**).

This remarkable definition allows the clinician to make a more precise prediction of the severity of the defect, which in turn can assist the surgeon and the parents with realistic expectations regarding potentially difficult future surgeries, as well as final cosmetic results.

References

Rotten D, Levaillant J-M, Benouaiche L, Nicot R, Couly G. Visualization of Fetal Lips and Palate Using a Surface-Rendered Oropalatal (SROP) View in Fetuses with Normal Palate or Orofacial Cleft Lip With or Without Cleft Palate. Ultrasound Obstet Gynecol. 2016;47:244-246.

Platt LD, DeVore GR, Pretorius DH. Improving Cleft Palate/Cleft Lip Antenatal Diagnosis by 3-Dimensional Sonography. J Ultrasound Med. 2006;25:1423-1430.

Rotten D, Levaillant JM. Two- and Three-Dimensional Sonographic Assessment of the Fetal Face. 2. Analysis of Cleft Lip, Alveolus and Palate. Ultrasound Obstet Gynecol. 2004;24:402-411.
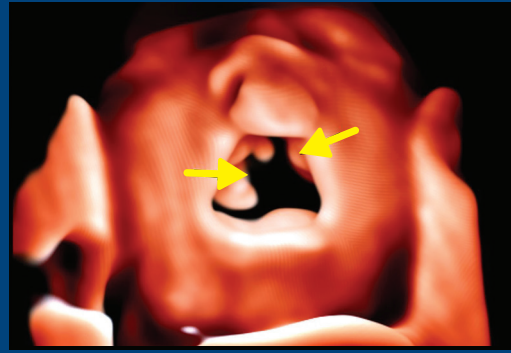
Figure 1 3D surface rendered oropalatal (SROP) view with an open mouth using the V6-2 transducer with TrueVue technology. Bilateral cleft lip, as well as a more defined view of the bilateral clefts extending into the secondary palate (arrows), was clearly identified.

Figure 2 3D surface rendered view using the V6-2 transducer with True Vue technology. Bilateral cleft lip and the protruding premaxillary prolabium are clearly visualized.
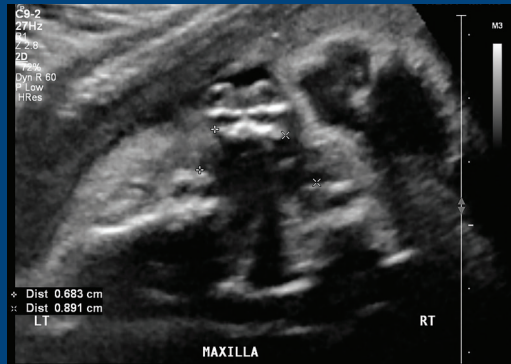

Figure 3 2D transverse view using the C9-2 transducer, measuring the bilateral defects in the alveolar ridge, but not able to determine the extension of the clefts into]the secondary palate.

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

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