

Advanced Imaging in Vasa Previa: the Role of 3D Doppler Angiography

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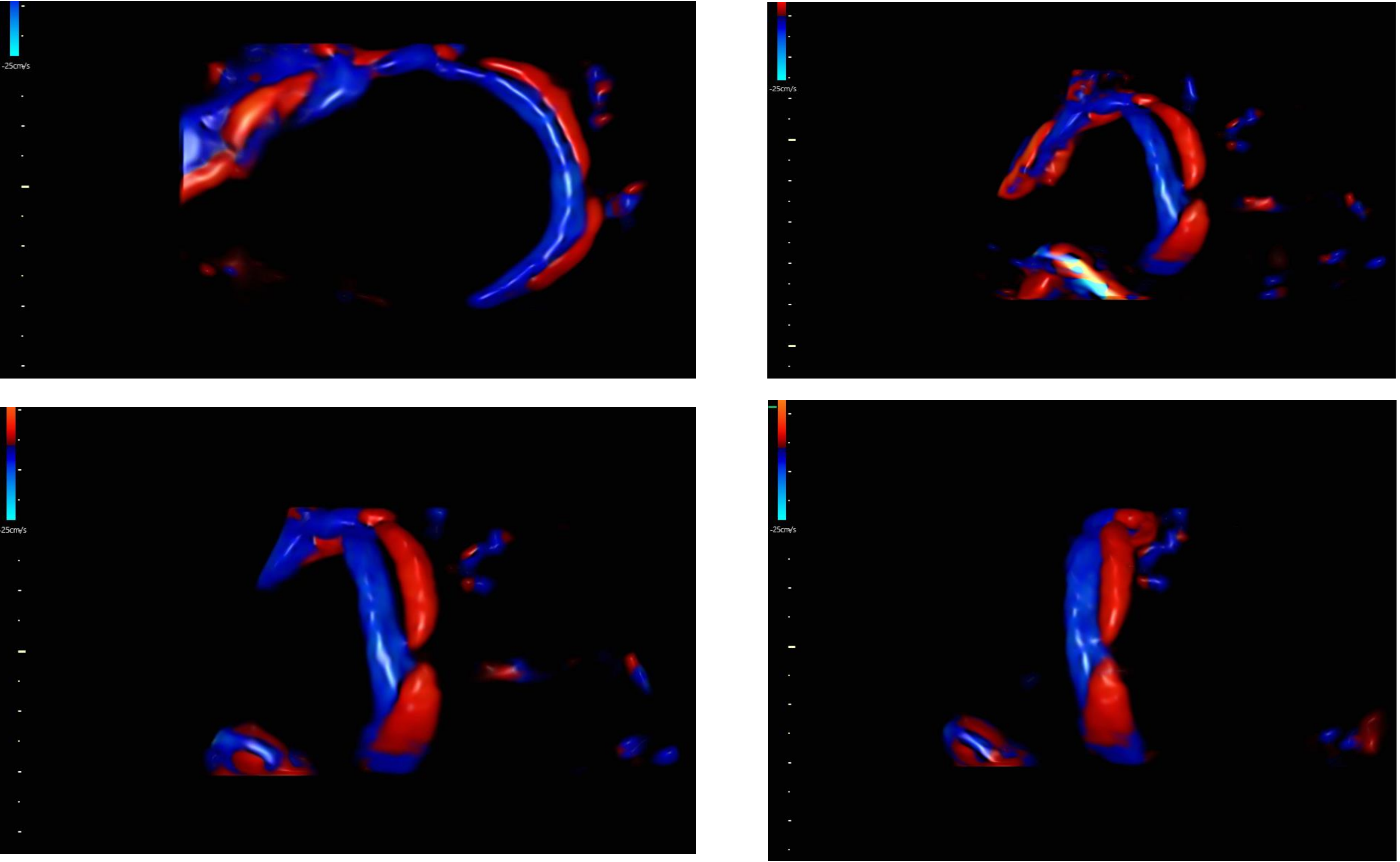
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Accurate diagnosis of vasa previa (VP) may be challenging. Three-dimensional (3D) transvaginal ultrasound (TVU) Doppler angiography is transforming the evaluation of VP by enabling detailed vascular mapping and precise spatial assessment of the unprotected fetal vessels in relation to the internal cervical os.

We present our standardized technique for VP evaluation using this advanced imaging modality. Utilizing color-flow Doppler, a 3D volume encompassing the cervix, cervical canal, fetal vessels, and surrounding structures is acquired. Multi-planar imaging with axial views and 3D-rendered reconstructions provides comprehensive visualization of fetal vessel anatomy, trajectory, and proximity to the internal cervical os.

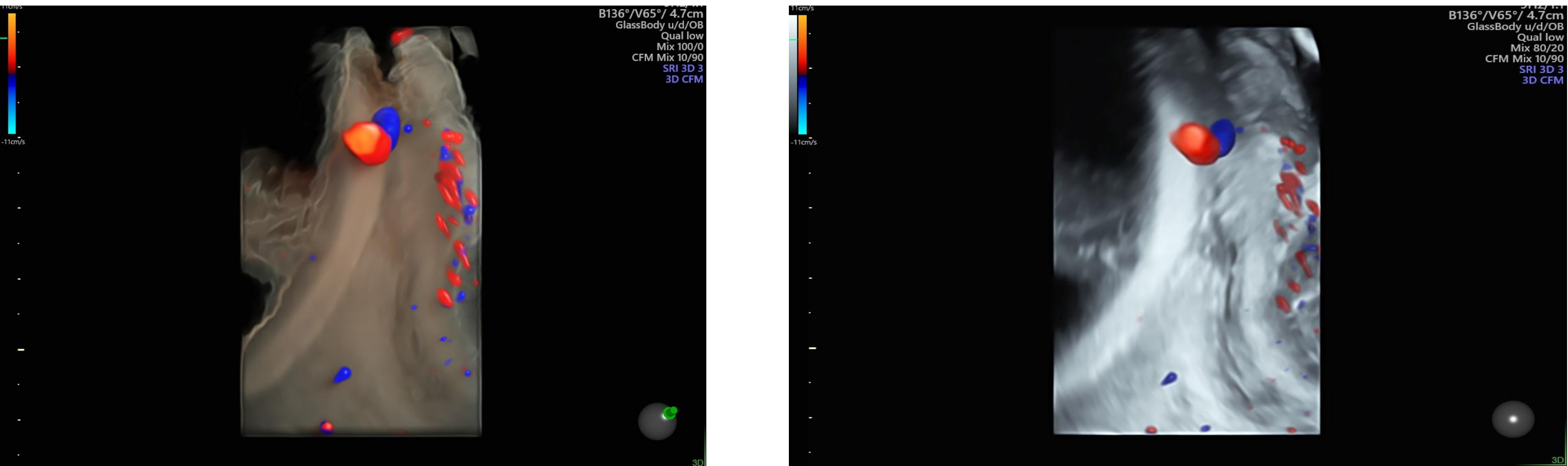
By dynamically manipulating 3D-rendered and multiplanar images along the x, y, and z axes, we achieve precise assessment of vessel number, trajectory, and flow direction, allowing for improved differentiation between fetal and maternal vessels. When necessary, fetal head displacement is performed to optimize visualization, further improving diagnostic accuracy.



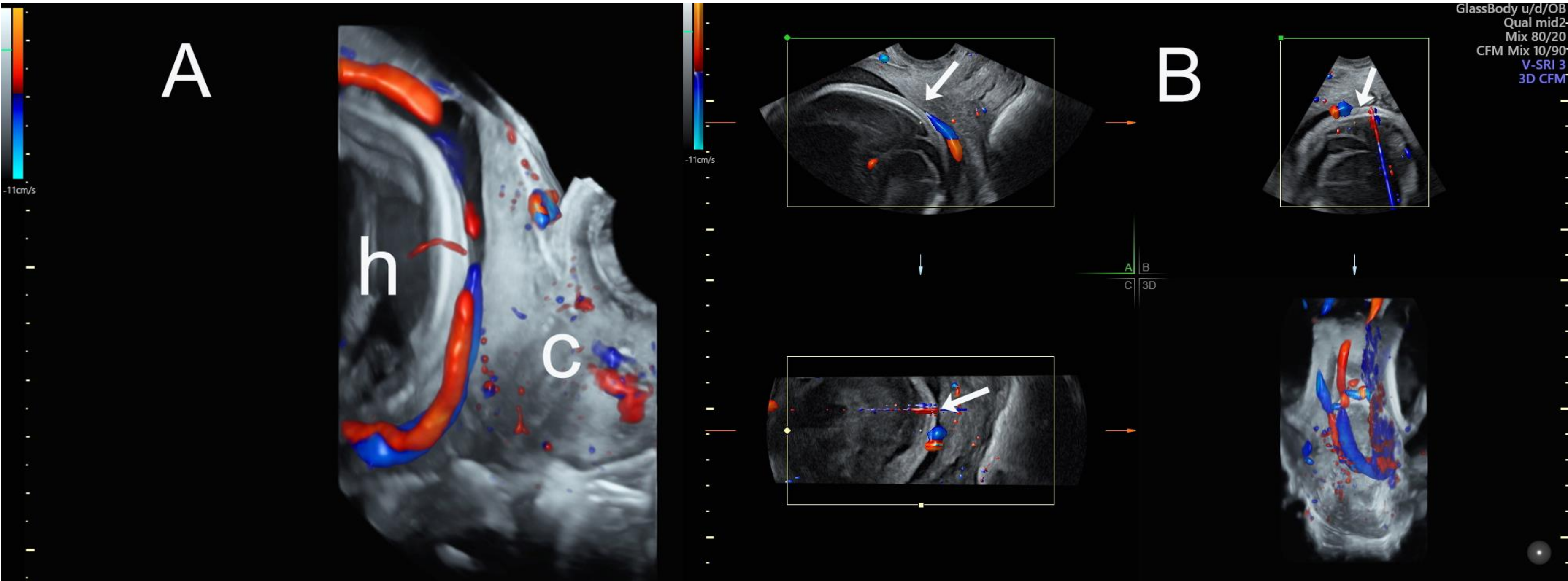
Color flow Doppler angiography showing the anterior velamentous cord insertion with fetal vessels then running sagittally over the cervix to insert into the posterior placenta. These images show that there are two fetal vessels with blood running in opposite directions as depicted by the red flow (towards the transducer) and blue flow (away from the transducer). As the volume is progressively rotated through the x-axis, the precise number, course, and direction of the vessels are clearly shown.

CONCLUSION

3D Doppler angiography greatly enhances diagnostic accuracy with VP. We now routinely implement this technique in all suspected cases of VP, demonstrating its value in enhancing diagnostic accuracy and guiding clinical management. In all cases, we have been able to accurately map out the fetal vessels. By integrating routine 3D Doppler angiography into VP assessment, clinicians can detect VP earlier and with greater precision, ultimately contributing to safer perinatal outcomes.



TVU with 3D Doppler angiography showing the fetal head and the cervix with a fetal vessel running transversely at the level of the internal os. By rotating this volume in the x-axis, the course of the vessel can be clearly mapped out. The internal os and cervical canal are clearly seen.



3D TVU with color flow Doppler angiography. A is the rendered image in a sagittal plane. While B shows the multiplanar image. The exact course of the 2 fetal vessels is clearly shown as is their relationship to the internal os (arrow)