

The Importance of Medical Imaging in Diagnosing Zika Virus in Fetuses and Neonates

ABOUT

Zika virus has been linked to several birth defects such as microcephaly, cortical atrophy, corpus callosa dysgenesis, pachgyria, and has affected ventricular size¹ (See Figure 1).

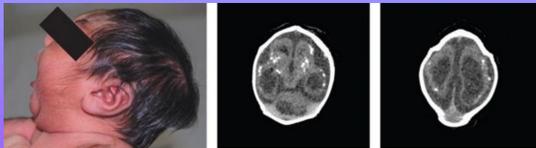


Figure 1: Patient diagnosed with Zika-related microcephaly, noted on CT scan.²

The Centers for Disease Control and Prevention (CDC) recommends that any pregnant woman who has traveled to a country where Zika is considered an epidemic get a fetal sonogram, whether or not she is showing symptoms.³

DIAGNOSING

Although there still no known explanation as to how Zika virus causes developmental issues in fetuses, the numbers are staggering when looking at how Zika and birth defects are related. In one case study, over 80% of neonates infected with Zika virus had imaging findings consistent with microcephaly and ventriculomegaly.⁴ Recent studies have shown the importance of diagnostic imaging when it comes to recognizing these abnormalities in the fetus and neonates.⁵ In relation to diagnosing Zika virus in fetuses and neonates, modalities such as ultrasound, magnetic resonance imaging (MRI), and computed tomography (CT) are typically utilized.

MODALITIES

ULTRASOUND

Ultrasound is considered one of the less expensive and safest option for both mother and fetus and is typically the first modality utilized when Zika infection is suspected.³ In almost all Zika related case studies, microcephaly was a common find and was usually accompanied with brain calcifications (See Figure 2).

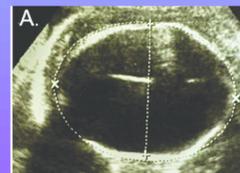


Figure 2. Axial ultrasonography of a fetus with Zika related microcephaly and brain calcifications.³

CT

CT can also be used to demonstrate a wide range of abnormalities, including microcephaly and cortical atrophy associated with Zika virus. In one case study, reconstructed 3-D CT images were even used to explain the abnormalities to parents and help them understand how the abnormality was affecting their child . Reconstructed 3-D images are especially useful for evaluating parenchymal calcifications and demonstrating skull abnormalities (See Figure 3).⁶

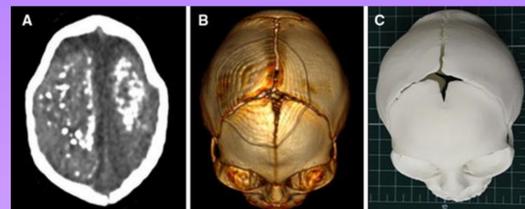


Figure 3: 3-D CT reconstruction demonstrates brain calcifications (A) and skull deformities can be shown in the physical modeling of same patient (B, C).⁶

MRI

MRI is the top imaging choice when it comes to evaluating Zika related abnormalities in neonates due to the high spatial resolution and contrast resolution.⁶ In one particular case study in which 23 neonatal patients suspected of having the Zika virus were examined, MRI was utilized to determine the different brain abnormalities imaged and calculate the percentages of those patients who had the abnormality. Results were as follows: malformations of cortical development (95-100%), delayed myelination/dysmyelination due to abnormal white matter (88-100%), ventriculomegaly (85-100%), and callosal abnormalities (75-94%).⁷ (See Figure 4).⁵

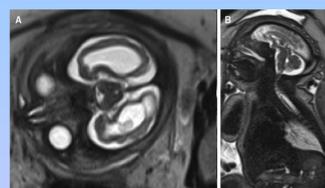


Figure 4: MRI imaging on Zika infected fetus illustrates thin corpus callosum and ventriculomegaly.⁶

THE ROLE OF IMAGING TECHNOLOGISTS

As of 2017, the World Health Organization states that Zika is continuing to spread.⁸ Imaging has played a tremendous role in not only evaluating the fetus and neonate for manifestations of the Zika virus but also for learning more about the infectious disease.⁸ According to one source, “technologists should be conscientious about collecting clinical histories from patients and be mindful to inquire about any recent travel that could influence the imaging protocol”. It is crucial that imaging professionals also be aware of this disease and its radiographical appearances because any delay in complete or proper imaging could prolong an accurate diagnosis and also delay observation of disease advancement.³

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