Artificial intelligence and fetal ultrasound

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Artificial intelligence (AI) has recently become a highly interesting subject. Its rapid development has sparked controversy. The United Nations adopted the first global resolution on AI in March of this year, which established regulations protecting human rights and personal data.

The first steps in AI in medical diagnosis were taken in liver, breast, and thyroid imaging. Over the last couple of years, research and manufacturers of ultrasound diagnostic equipment have also focused on developing AI in fetal ultrasound. This area has been and remains a challenge for diagnosis, with inherent difficulties related to fetal position and mobility, variable fetal growth, differences in the amount of amniotic fluid and placental position, and the characteristics of maternal tissues.

The benefits of AI-assisted fetal ultrasound are highly appealing, as the past two decades have seen the establishment of standardized protocols for fetal ultrasound screening sections, including biometry, weight estimation charts, and various other aspects. The publication of such guidelines by professional organizations has stimulated researchers in this field, leading to the development of publications and software that clearly outline the path for integrating AI into clinical routine practice. Literature from the last 3-5 years indicates concrete data supporting the use of AI in first-trimester ultrasound, from automatic detection and measurement of nuchal translucency to automatic biometry, accurate sagittal sectioning, detection of chorionicity and amnionicity, and more. Despite significant limitations in diagnostic use, the useful assistance of AI is clearly demonstrated. Last year, Horgan et al. published the first review on the use of AI in fetal ultrasound. A total of 127 publications were considered eligible, primarily related to the first trimester, placental assessment, biometry, echocardiography, neurosonography, fetal anatomical assessment, and lung maturity.

On the other hand, the progress of equipment and the quality of ultrasound imaging have allowed manufacturers to launch new AI software on the market. About 15 years ago, those interested in fetal ultrasound were happy to use ultrasound machines with the first automatic measurements. However, nowadays, AI identifies standard sections and automatically saves them in real-time or automatically processes a 3D volume indicating standardized sections through guidelines. AI indicates the quality of the sections acquired by the sonographer, increases ultrasound efficiency, indicates the number of omissions, reduces interobserver variability, suggests fetal anomalies, and overall enhances the quality of obstetric ultrasound. When we add AI simulation devices, which can contain a multitude of congenital anomalies that the sonographer virtually scans, we can better understand the beneficial impact on training for younger generations.

It is obvious that we are only in a stage of exponential growth regarding AI's involvement in the field of fetal ultrasound, with clear benefits for diagnosis and the training of young specialists.

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