

EP09.26 Leveraging AI to automate pulmonary vein detection: a path to improved total anomalous pulmonary venous return screening



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Introduction

Total anomalous pulmonary venous return (TAPVR) accounts for 1–3% of congenital heart defects (CHD), and its detection rates are among the lowest, averaging around 20%. Evaluating pulmonary venous (PV) connections at the four-chamber (4CH) view during routine fetal cardiac screening is a standard of care, yet this critical step is sometimes overlooked.

Objectives

This study investigates the use of an AI model to automatically assess quality criteria (QC) at the 4CH view, ensuring that evaluation of PV return is not omitted. By standardizing this process through AI models, we aim to contribute to prenatal detection of TAPVR.

Conclusion

Automated QC using AI could enhance compliance with 4CH fetal heart view guidelines by addressing the frequent omission of PV visualization. Such AI use could enhance exam quality by ensuring critical anatomical structures are properly documented and act as a safeguard. Flagging the lack of PV visualization could improve CHD screening rates and reduce sonographer variability. As next steps, new models will be explored for TAPVR screening.

Methods

Sonio Detect, an FDA-cleared AI model, was trained on 9000 rigorously annotated ultrasound images from multiple US and European centers to automatically detect views and structures, and in particular, to evaluate PV visibility at the standardized fetal 4CH view. Validation was conducted on additional 4CH images independently annotated by expert sonographers, obstetricians, and MFM specialists, assessing whether PVs were adequately visualized. The model's performance was measured using sensitivity and specificity metrics.

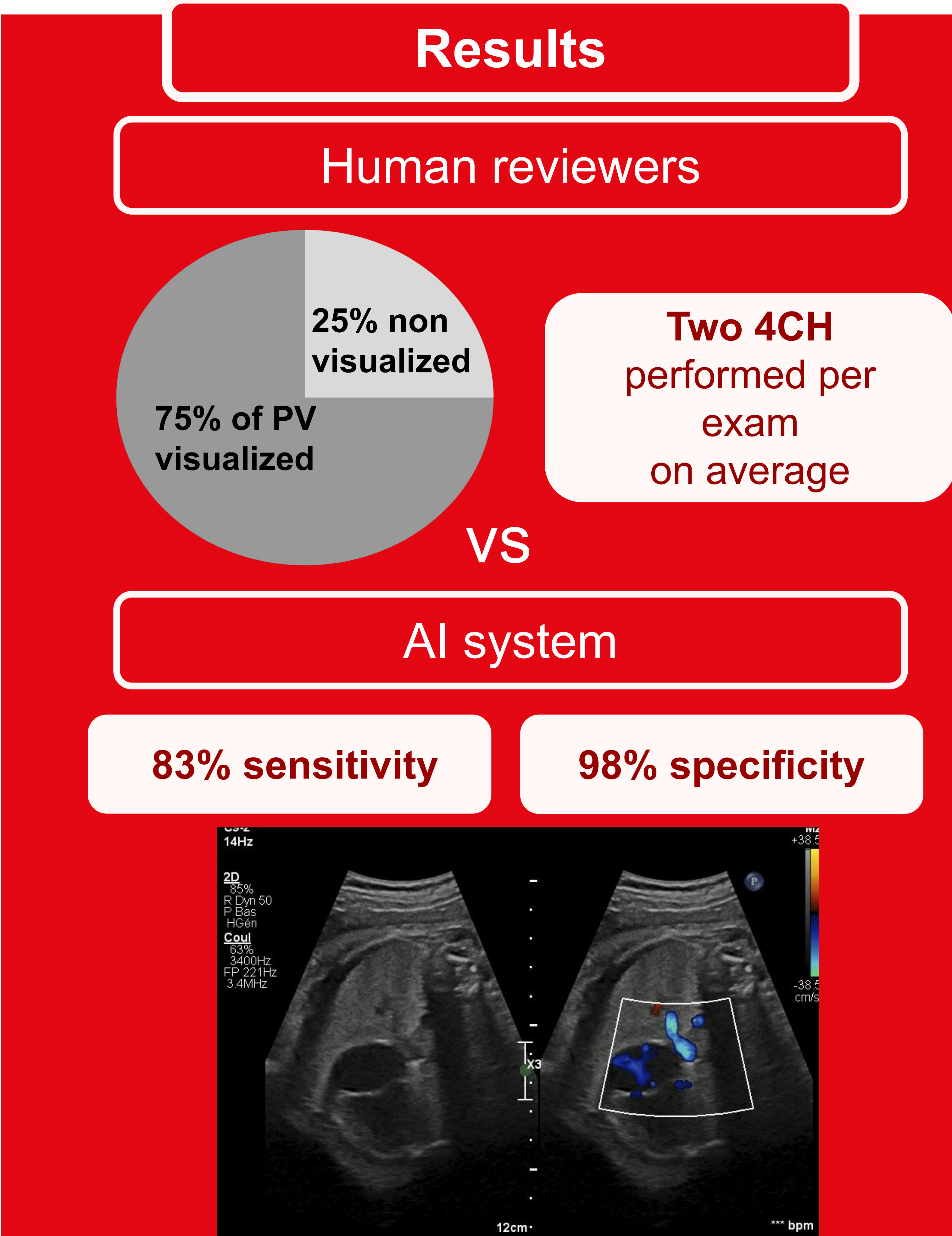


Figure. AI detection of pulmonary veins not connected to the atria in a fetus with complex heart disease

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