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The role of ultrasound in the antenatal diagnosis of ventricular septal defect



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Background

Congenital heart disease (CHD) is a leading cause of infant morbidity and mortality and is responsible for 20% of all neonatal deaths (Arenas-Ramirez et al., 2024)

Heart defects are identified as the most prevalent of all congenital anomalies with ventricular septal defect being the most common diagnosis both antenatally and within the first year of life (Wang, 2023). Defined as the presence of a pathologically abnormal communication between the right and left ventricles, haemodynamic compromise is likely with septal defect and may arise due to a shunt formation via the intraventricular septum (Dakkak, 2024).

CHD has an overall incidence of 3/1000-10/1000 live births with septal defects accounting for approximately 30% of all cases., research has shown that epidemiologically the rates of VSD vary worldwide (Wang, 2023).





Prevalence of different cardiac anomalies including ventricular septal defect

Ultrasound image demonstrating the use of colour Doppler to highlight an intact septum



Ultrasound image demonstrating the use of colour Doppler to highlight a large bi-directional VSD



Hints and Tips

Visualise the intraventricular septum perpendicular to the beam

Use colour Doppler to assess the flow across the septum

When using colour Doppler, adjust the pulse repetition frequency (PRF) to optimise the image

First trimester vs second trimester screening: An ongoing debate

Debate continues regarding the feasibility of including cardiac evaluation within the first trimester ultrasound examination. It is acknowledged that by 11-14 weeks gestation the heart is fully formed and major structural abnormalities will be visible (Hildebrad 2020). Furthermore, Arenas-Ramirez et al., (2024) identify that following a meta-analysis there was an early detection rate of above 63% in those deemed low risk and 79% in those considered high risk.

Arguably, Hildebrad (2020) also recognises early detection may be a source of increased anxiety for parents. Additionally, there may be a high rate of either false negative or false positive results at early gestations.

The importance of the four-chamber view

Bravo-Valenzuela *et al.*, (2017) highlight the significance of the four-chamber view, recognising it as the plane which allows detailed evaluation of the main cardiac structures.

It allows correct situs to be confirmed and additionally: position, size, shape and axis can be assessed as well as the alignment and function of heart valves (Chaubal, 2017).

The intraventricular septum should be assessed carefully from apex to crux. If the septum is not imaged perpendicular to the angle of insonation a pseudo VSD may be evident due to acoustic drop out (ISUOG 2013).



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