P-75

Fetal ventricular arrhythmia: the role of superior vena cava-aorta Doppler approach

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Introduction:
Fetal ventricular arrhythmias are rare, and their diagnosis is often challenging. The M-mode recording technique can be limited and difficult to interpret; the addition of simultaneous superior vena cava-aorta Doppler can improve diagnosis accuracy. Our aim is to illustrate in a didactic approach the main types of ventricular arrhythmias and the findings on superior vena cava (SVC)-aorta (Ao) Doppler images as well as available postnatal ECGs.

Methods: Among our cohort of 23 ventricular arrhythmias diagnosed over a period of 22 years at our institution, we selected 4 examples to illustrate the use of SVC-Ao Doppler recording in rare fetal arrhythmias.

Results: We describe an example of premature ventricular contraction (among 17/24 fetal ventricular arrhythmias) in figure 1A, followed by an example of ventricular tachycardia (among 4/24 ventricular arrhythmias) in figure 1B. Figures 1C and 1D illustrate a case of torsade de pointe, and finally figures 1E and 1F display a case of accelerated idioventricular rhythm and in both cases, confirmation of the diagnosis with postnatal ECG tracings.

Conclusions: The SVC-Ao Doppler recording is a valuable tool to improve diagnosis accuracy particularly in rare cases of fetal ventricular arrhythmias.
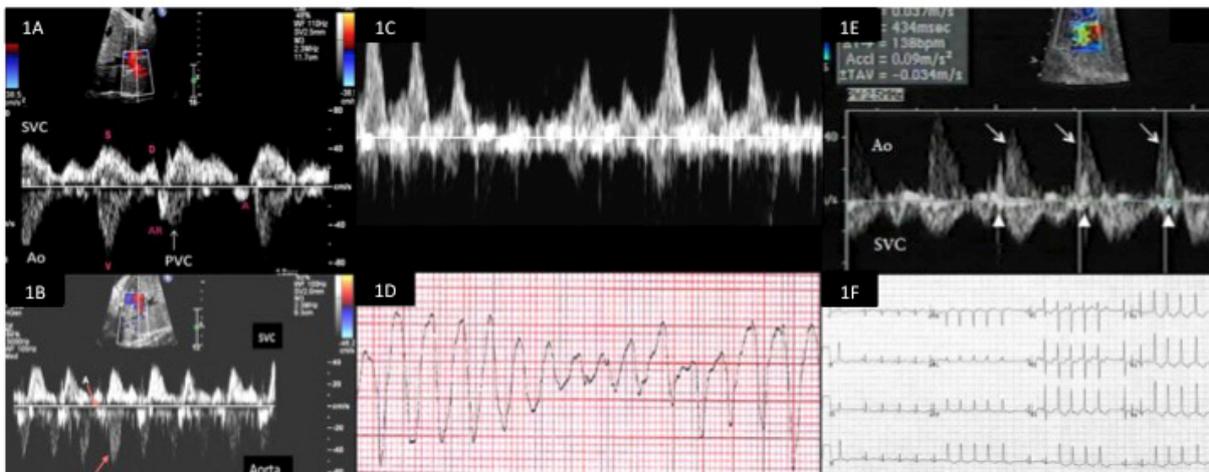
Figure legend: 1A. Superior vena cava (SVC)-aorta (Ao) Doppler recording demonstrating a premature ventricular contraction (PVC), with the occurrence of a premature aortic ejection with a lower amplitude than those in sinus rhythm with simultaneous retrograde atrial contraction (AR). 1B. SVC-Ao Doppler recording demonstrating an example of sustained ventricular tachycardia with complete atrio-ventricular dissociation and higher ventricular (V) rates compared to atrial contractions (A). 1C and 1D illustrate a case of torsade de pointe with typical unequal amplitude and irregular fast ventricular ejections (1C) and post natal torsade de pointes in 1D (lead II, 25mm/s speed). 1E and 1F illustrate a case of accelerated idioventricular rhythm: in 1E, SVC-Ao Doppler recording shows dissociation between a higher ventricular rate (V) at 170/min relative to a lower atrial rate (A) at 140/min. 12 lead-post natal ECG illustrated in 1F shows burst of accelerated idioventricular rhythm with a left bundle branch block pattern occurring at a rate about 20% faster than the sinus rate.