

# A Review of Findings in Fetal Cardiac Section Drawings

## Part 2: High Abdominal Views

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**Objective.** The goal of this presentation is to review some of the common and rare fetal heart abnormalities and to provide an easy approach to these findings with schematic drawings. **Methods.** Over the past 10 years, we collected cases in which the common views of the heart were abnormal and the differential diagnoses that existed for each. This presentation shows the normal sonographic sections and then variations of these sections and the associated anomalies. We used illustrative drawings to present these findings, enabling us to point out the main sonographic features of abnormalities of the heart. **Results.** This work reviews 4 fetal abnormalities in schematic drawings. **Conclusions.** This short review highlights several of the anomalies that can be recognized on the common sonographic views. The drawings tend to simplify the findings but should serve as a basis for those doing fetal echocardiography when they encounter an unusual finding. **Key words:** drawings; fetal echocardiography; prenatal sonography.

**T**his second part of our 3-part series of Image Presentations is focused on the anomalies recognizable on high abdominal views during prenatal sonographic investigation. We not only assessed the findings at the level of the heart but also looked at the consequences of anomalous development in adjacent regions, this time at the level of the upper abdomen. We provide the reader with easy, memorable schematic drawings of those findings.

### Materials and Methods

Over the past 10 years, we assembled and compared the sonographic findings of some cardiac anomalies. Their typical traits enabled us to make a few schematic drawings of those findings, this time at the level of the high abdominal transverse view.

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This work shows a normal reference section first and then drawings representing anomalies. The drawings are presented with the fetus in the cephalic dorsal position (Figure 1). The colors used in the drawings are conventional medical artist colors and do not represent flow directions, as in color Doppler sonography, or fetal blood oxygenation.

In Figures 3–6, we illustrate some of the anomalies that can be seen at the level of the high abdominal transverse sonographic view. Figure 2 is a drawing of a normal transverse high abdominal view and serves as a reference view for comparing the subsequent drawings representing anomalies.

In the section represented in Figure 2, we see the stomach on the left side and the confluence of the hepatic veins into the inferior vena cava on the right side.

## Results

### Case 1

This case shows a vein behind the liver (Figure 3). This vein cannot represent the inferior vena cava because the inferior vena cava is at the confluence of the hepatic veins. The vessel represents the azygos or hemizygos continuation of an inferior vena cava interruption.<sup>1,2</sup>

This is typical of left isomerism, a condition in which the fetus has 2 left sides: the normal side and a mirror image of the left side on the right. The stomach could have been on the right side as well.

### Case 2

This case represents a rare but pathognomonic finding (Figure 4). The inferior vena cava is anterior to the aorta. This is typical of right isomerism,<sup>3,4</sup> a condition in which the fetus has 2 right sides, the normal side and a mirror image of the right side on the left. The stomach could have been on the right side as well.

### Case 3

In this case, there is a vessel flowing caudally, posterior to the hepatic veins (Figure 5). It is much more anterior than the vessel described in case 1.

This is typical of an anomalous pulmonary venous return with an infradiaphragmatic connection.<sup>5,6</sup> In an oblique parasagittal view, the image would show the anomalous vein with a color similar to that of the aorta but with venous and not arterial flow. The flow would be in the reverse direction of that of the inferior vena cava.

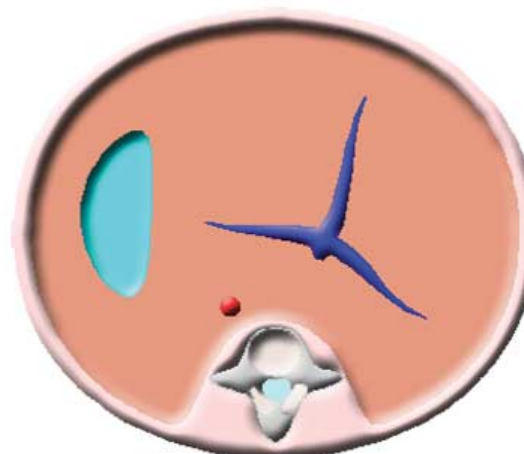
### Case 4

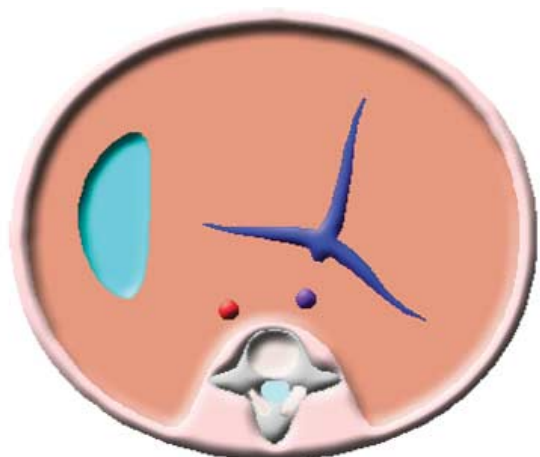
In this case, the inferior vena cava is larger than the aorta (Figure 6). This is typical of the form of

**Figure 1.** Fetus in the cephalic dorsal position. The subsequent drawings are depicted with the fetus in this position.

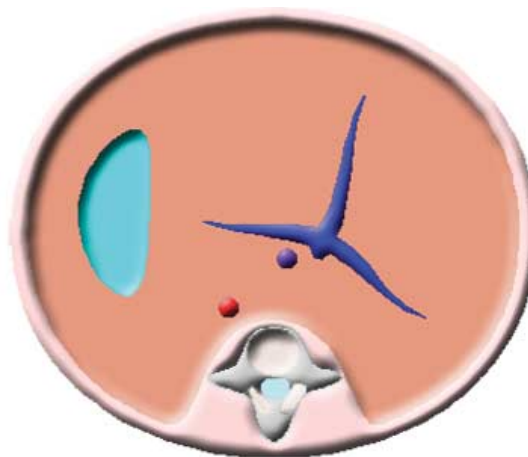


**Figure 2.** Normal cross section at the level of the upper abdomen just below the heart. The hepatic veins are represented. The stomach is depicted in cyan, the abdominal aorta in red, and the hepatic veins in blue.





**Figure 3.** Case 1. High abdominal transverse view showing a vessel (purple) behind the confluence of the hepatic veins (blue) next to the spine. The stomach is depicted in cyan on the left.



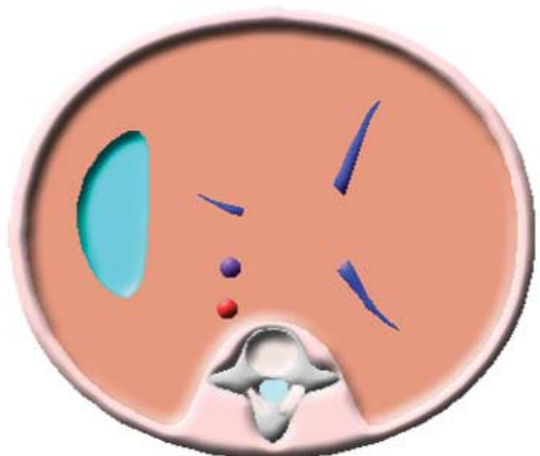
**Figure 5.** Case 3. High abdominal transverse view showing a vessel (purple) behind the hepatic veins (blue). The flow in the vessel behind the hepatic veins has a caudal direction.

ductus venosus agenesis with a connection of the umbilical vein to one of the iliac veins or the inferior vena cava. The dilatation of the inferior vena cava is due to an increase in the flow of the inferior vena cava that carries not only the normal flow of the lower part of the body (pelvis and legs) but also the return from the placental flow. This can be associated with Noonan syndrome.<sup>7</sup> Because of the lack of streaming of the oxygenated flow, the left heart receives a mix of oxygenated and deoxygenated blood, and one will often recognize cardiomegaly due to poor oxygenation of the myocardium.

### Conclusions

This short review highlights a few of the anomalies that can be recognized on high abdominal sonographic views. The importance is that, despite not being views primarily designed to recognize cardiac anomalies, these views are nevertheless very useful in these diagnoses. This list is far from exhaustive, and the drawings tend to simplify the findings, but these drawings should serve as a basis for those doing fetal echocardiography when they encounter an unusual finding.

**Figure 4.** Case 2. High abdominal transverse view showing the inferior vena cava (purple) anterior to the aorta (red).



**Figure 6.** Case 4. High abdominal transverse view showing a larger inferior vena cava in comparison with the aorta.



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