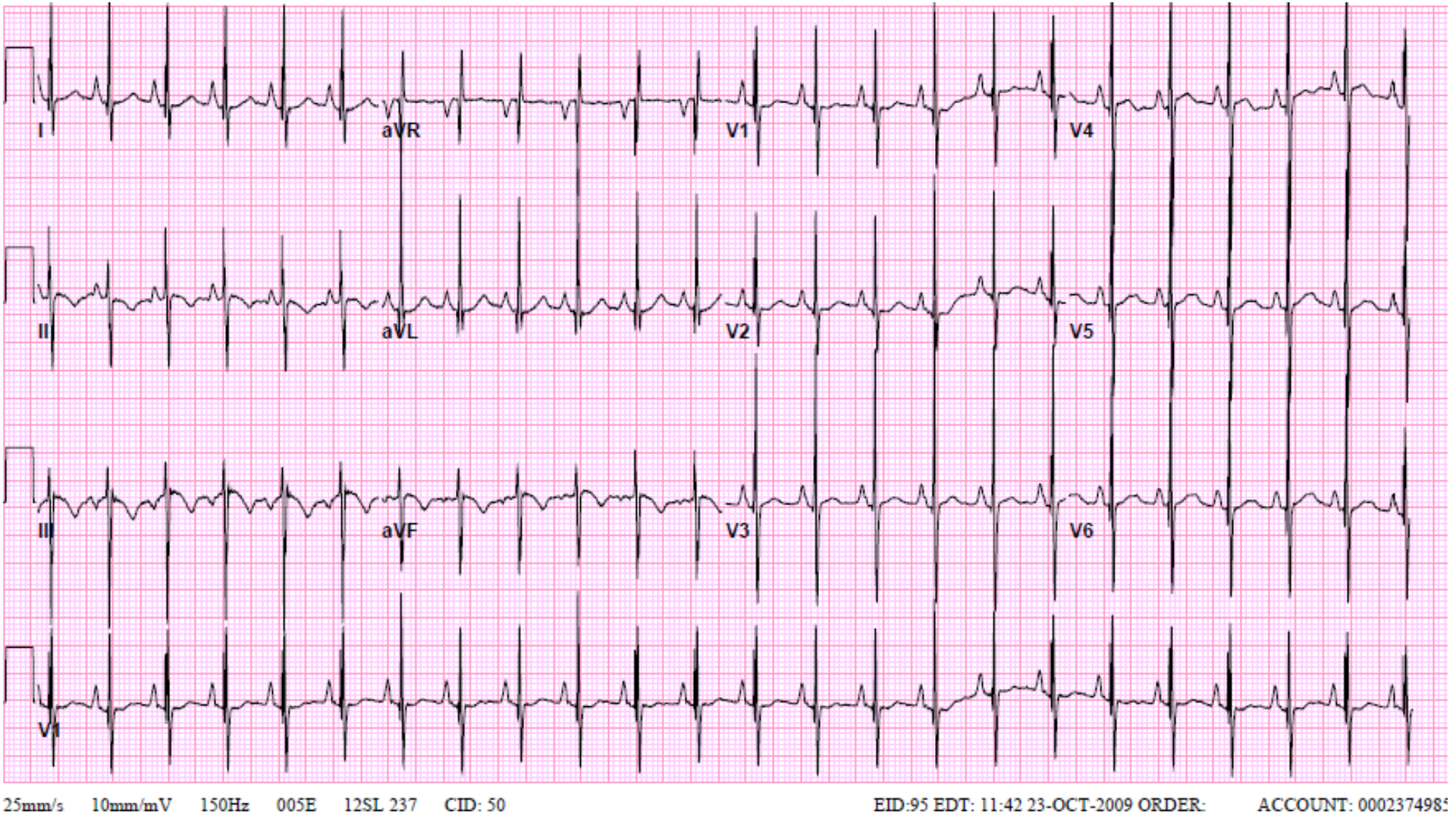
This ECG was performed in a 2 month old with known congenital heart disease:



There are at least 4 abnormalities on this ECG. What are they (1 point each)?
Bonus question--any idea what this kid's congenital heart disease is (2 bonus points)?

The abnormalities (that I can see, anyway) include:

1) Right atrial enlargement: tall (at least 3 little boxes), peaked P waves in multiple leads. RAE gives you this pattern because the patient will have more atrial tissue immediately adjacent to the sinus node, thereby increasing the electrical amplitude without affecting the P wave duration very much. This is to contrast with left atrial enlargement which tends to prolong the P wave as it takes longer for electricity to propagate that far from the sinus node.

2) Left superior axis (or extreme left axis deviation): QRS is upright in lead I, downward in lead aVF.

3) Left ventricular hypertrophy: tall R wave in lead V6 (greater than 98%ile for age).

4) Right ventricular hypertrophy: deep S wave in lead V6 (greater than 98%ile for age), also upright T waves in lead V1 in a child <10 years old.

This child had a complete atrioventricular canal defect (CAVC) with a large ASD and VSD. The physiology explains the ECG findings: RAE due to large L-->R shunt at the atrial level; L superior axis because of the conduction abnormalities typically seen in this congenital heart lesion; LVH from volume overload of the LV (recall that when we say "ventricular hypertrophy" on an ECG we do not distinguish between dilation and hypertrophy)--CAVC gives you LV dilation when the L-->R shunt at the VSD level is large; RVH occurs as the result of exposure of the RV to systemic vascular resistance via the VSD. Another way to think of it is that the VSD is large enough to allow some equalization of pressure between the RV and LV, resulting in compensatory RV hypertrophy.