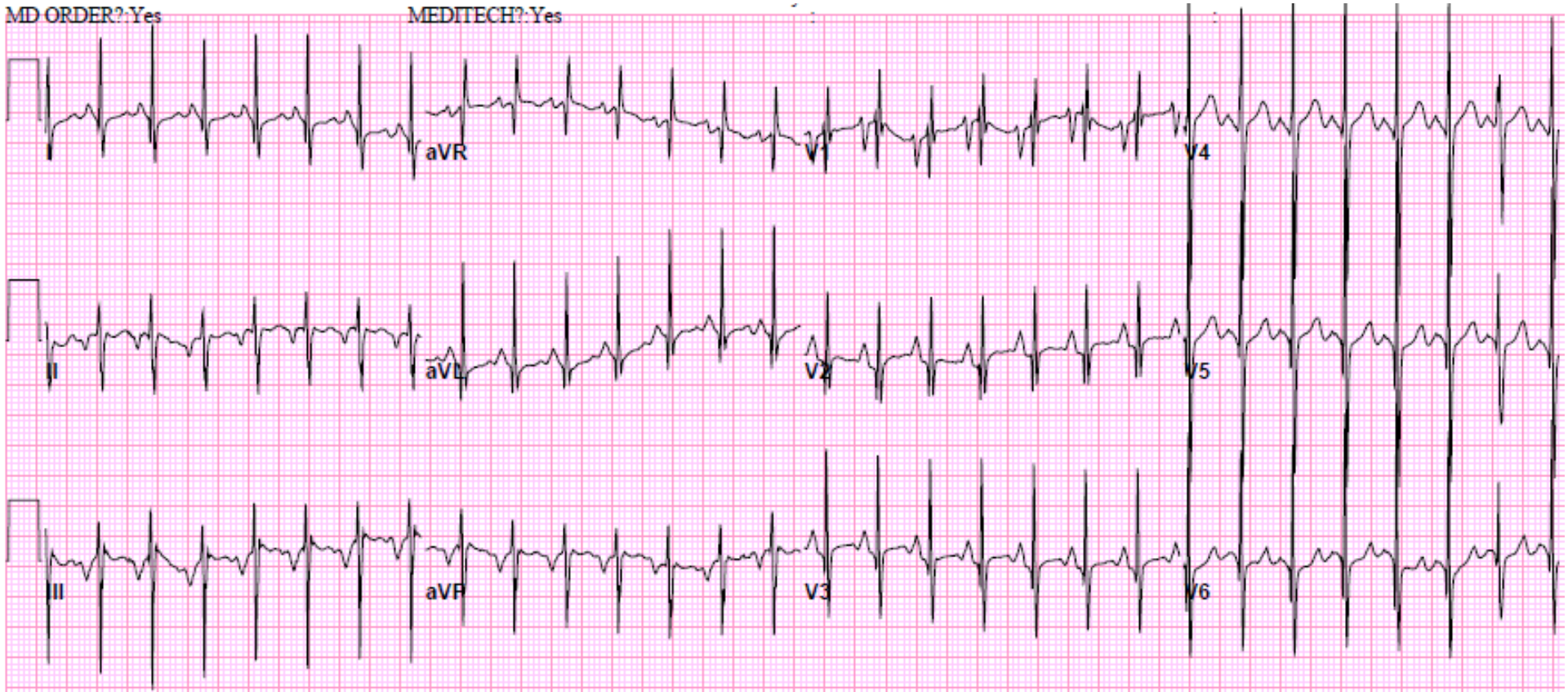
You are still seeing the same 2 month old patient from last week in your clinic with a history of congenital heart disease. Your attending continues to tell you “I’m not good with ECG’s, can you read this?”

……can you???

1) Is there any evidence of right ventricular hypertrophy on this ECG? If so, what findings suggest this?

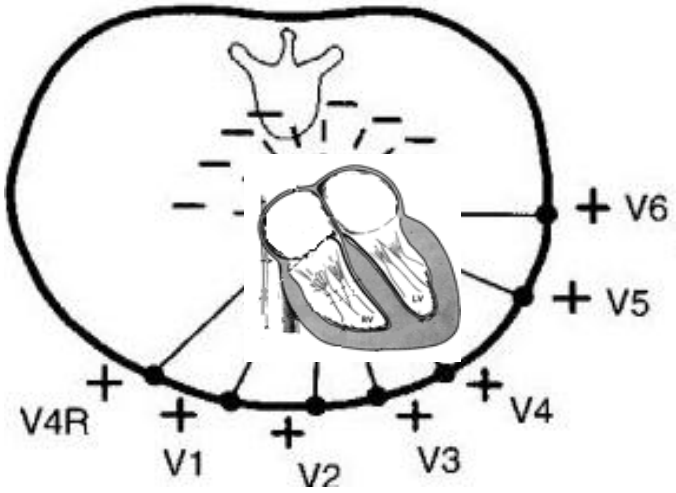
2) Is there any evidence of left ventricular hypertrophy on this ECG? If so, what findings suggest this?



1) Is there any evidence of right ventricular hypertrophy on this ECG? If so, what findings suggest this?

There are a couple of findings suggestive of RVH on the ECG. Let's first review how we diagnose ventricular hyperetrophy using an ECG.

Typically we use the precordial leads (V1-V6) to help us with the diagnosis of ventricular hypertrophy. Recall that these leads are arranged in a more-or-less axial or transverse plane on the chest.



Leads V1 and V6 are particularly helpful. Lead V1 "looks" at the heart from the right, while lead V6 "looks" at the heart from the left.

Therefore, electrical signals moving through the RV (toward the right) will create a positive signal in lead V1 (an R wave), and a negative signal in lead V6 (an S wave).

Conversely, electrical signals moving through the LV (toward the left) will create a positive signal in lead V6 (R wave) and a negative signal in lead V1 (S wave).

Thus, we see that the following is true:

In lead V1, R wave is indicative of RV forces, and S wave is indicative of LV forces.

and

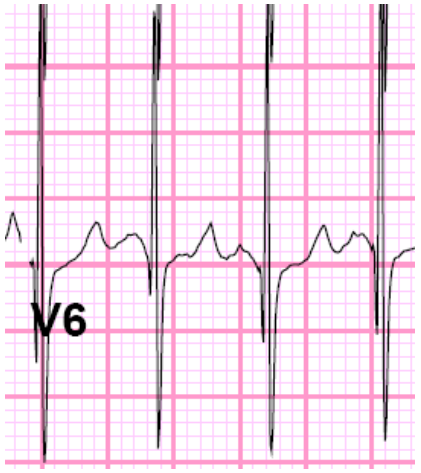
In lead V6, R wave is indicative of LV forces, and S wave is indicative of RV forces.

Continue to the next slide…

"Voltage criteria" for ventricular hypertrophy:

We now see that if there were right ventricular hypertrophy (RVH), there should be a tall R wave in lead V1 and a deep S wave in lead V6. What is considered an abnormal amplitude of these waves depends a lot on your age. You can find age-matched controls in the Harriet Lane (see this link).

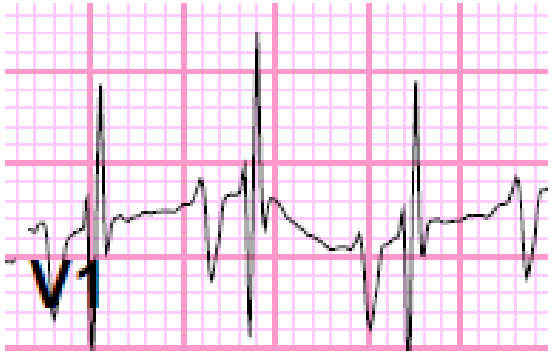
In our patient, the R wave in S1 is not particularly large, but the S wave in lead V6 is quite abnormal →



There are a few other patterns you need to be aware of that can be suggestive of RVH:

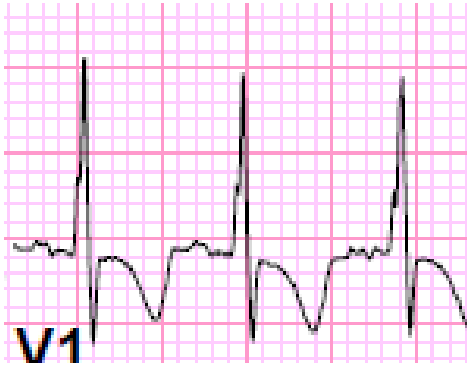
In lead V1:

-rSR' pattern →

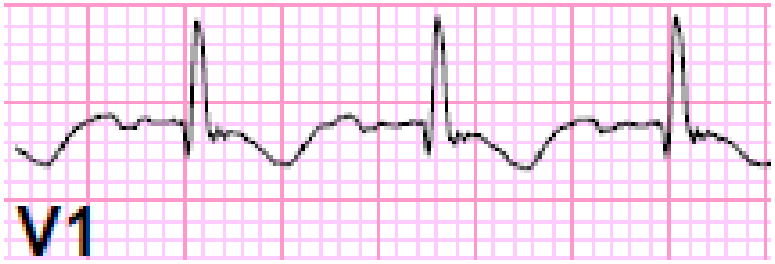


- R' is ≥5mm larger than r
- Our patient has this!

-Notched R wave upstroke →



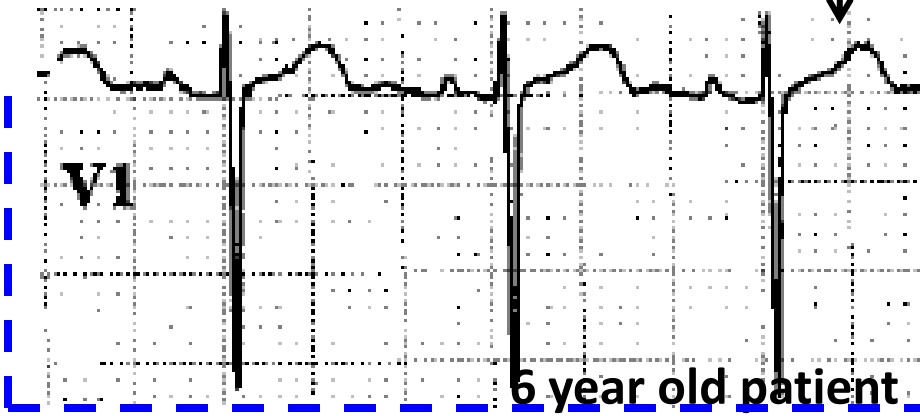
-qR pattern →



-**there should <u>never</u> be q waves in V1!**

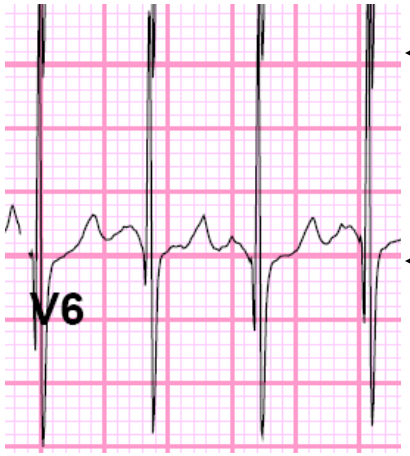
One other pattern you should be aware of for RVH:

-Upright T waves in lead V1 in a child <10 years old (and older than 72hrs!).



2) Is there any evidence of left ventricular hypertrophy on this ECG? If so, what findings suggest this?

If there were left ventricular hypertrophy (LVH), there should be a tall R wave in lead V6 and a deep S wave in lead V1.



We certainly see a tall R wave in our patient here.

Another pattern consistent with LVH is the presence of deep Q waves (≥5mm) in the lateral (V4-V6) or inferior leads (II, III, aVF).

Another pattern consistent with LVH (not in our patient) is **T wave (repolarization) abnormalities** in lateral leads: T wave flattening/inversion in V4-V6, or ST segment depression.