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• Select “Slide Show” from the menu option on top
• Select “From the beginning”
• Slowly click through the presentation
• You will notice I really enjoy PP animation
• Have fun!---Good luck
QUESTION????
What is the major abnormality on this ECG?

Pertinent information:
- 26 y/o female
- No significant cardiac risk factors.
- No history of any cardiac symptoms.
- No cardiac murmur
The rate, rhythm, axis, and intervals all appear normal. There are no significant findings of hypertrophy or significant q waves. However, look at the T wave inversion in lead V2. Also, notice the low/flat T waves in V3. Are these normal or abnormal findings?

Typically V2 and V3 T waves are inverted in infants but upright in adults. Remember, this is a 26 y/o.
In adults an inverted T wave can be seen in many conditions. Some of these conditions have significant mortality implications. Some do not. See the following figures.

<table>
<thead>
<tr>
<th>Conditions With Mortality Concerns</th>
<th>Benign causes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arrhythmogenic right ventricular cardiomyopathy</td>
<td>Normal variant when involving one lead</td>
</tr>
<tr>
<td>Drugs/Medications, e.g. Digitalis</td>
<td>Lead Placement</td>
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<tr>
<td>Wolff-Parkinson-White</td>
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<tr>
<td>Pulmonary embolism</td>
<td>Persistent Juvenile T-wave Pattern</td>
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<tr>
<td>Ischemia</td>
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<td>CNS catastrophic events</td>
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<td>Bundle branch blocks</td>
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<tr>
<td>Normal variant when involving one lead</td>
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<tr>
<td>Brugada Syndrome</td>
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</tbody>
</table>

Let’s focus on this last one.
As mentioned, inverted T waves in V1-3/4 are frequently seen in infants and children. This is a normal finding and typically called a “juvenile T wave pattern”. This T wave inversion reflects the non-pathologically hypertrophied right ventricle that resulted from the increased pulmonary circulation in utero.

The T wave inversion gradually disappears in childhood and eventually the typical T wave in V2-6 is upright. V1 can at times remain inverted without pathology. However, rarely the T wave inversion in V2-3 persists into young adulthood, especially young women.

The inverted T waves are typically asymmetric (unlike the typical symmetrical T wave inversion seen in ischemic disease). This can be a normal variant and is called persistent juvenile T wave pattern.
Since the finding of T wave inversion in the chest leads has many causes, some of which have significant mortality implications, it is important to consider all causes. The following are all important in sorting it out:

- The age of the individual
- Family history of sudden death or cardiac disease.
- Symptoms such as chest pain, SOB, or syncope.
- Physical exam findings such as a heart murmur.

The message is that these findings can represent serious disease at times but also can be completely benign.

In an individual with cardiac symptoms (e.g. chest pain, shortness of breath) or signs (e.g. heart murmur) the ECG findings could suggest a much more serious condition. Likewise, a strong family history of sudden death or early CAD would need to be taken into consideration.

Persistent juvenile T-wave pattern and improper lead placement are two of the benign situations you should be aware of.

In this case, after the ECG findings were noted, an echo and stress test were performed and found to be normal. The final clinical diagnosis was indeed persistent juvenile T wave pattern on the resting ECG.
ECG Puzzler Solved—It appears to be “Persistent Juvenile T Wave Pattern”

So, in a young woman, when asymmetric T wave inversions are seen only in V2-3, there is no history of cardiac symptoms or signs, there is no other suspicious history such as family history of sudden death or similar, and the cardiovascular exam is normal consider the diagnosis of persistent juvenile T wave pattern.

This concludes this issue’s ECG Puzzler. Contact me if you have questions!