

Ventricular Hypertrophy

Lancashire & South Cumbria Cardiac Network



Left Ventricular Hypertrophy

- The left ventricular myocardium will thicken as a reaction to hypertension, aortic stenosis and mitral regurgitation.
- These are conditions → ventricle has to perform more work than usual. Results in an increase in muscle mass.

ECG Criteria

- V1 & V2 → deep S waves greater than 30mm
- V4, V5, V6, I & AVL → tall R waves greater than 27mm
- * Or sum of S wave V1 + R wave V6 should be greater than 37mm *
- Left Axis Deviation
- Ventricular activation time greater than 0.12secs

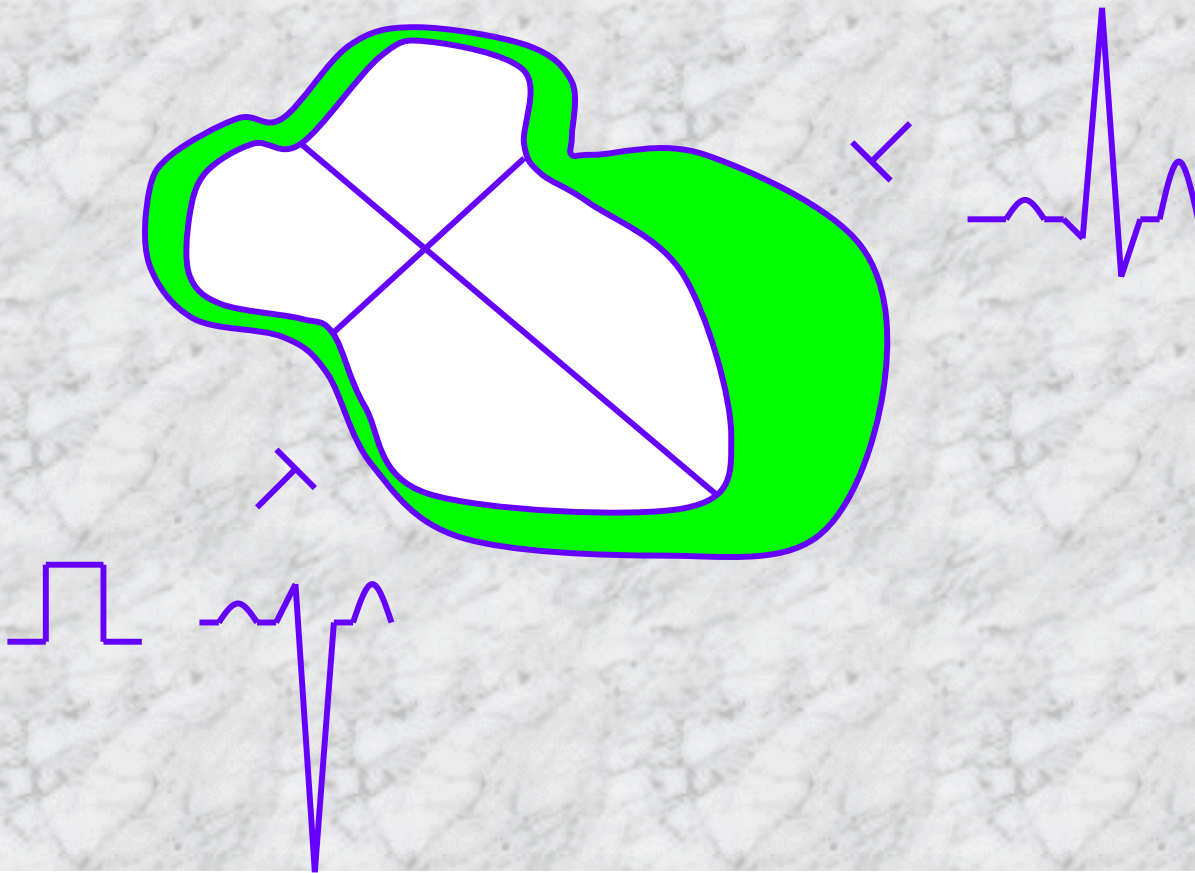
Strain Pattern

- Leads facing the LV (V5 & V6) may show a strain pattern.
- This is a reflection of the abnormal state of the myocardium.

ECG for strain

- In leads facing the LV, usually in V5, V6, I & AVL
- Depressed, convex ST segment depression
- Inverted T waves

Left Ventricular Hypertrophy



Right Ventricular Hypertrophy

- This usually occurs in cor pulmonale, and in some congenital heart defects when the RV becomes dominant.
- In RVH, the potential force of the RV is greatly increased.

ECG Criteria

- R wave ↑ in leads over right ventricles V1, V2, V3. V4
- The S wave in V6 becomes more conspicuous
- Right Axis Deviation
- Moderate RVH – R wave dominance V1, V2
- Severe RVH – R wave dominance V1-V4

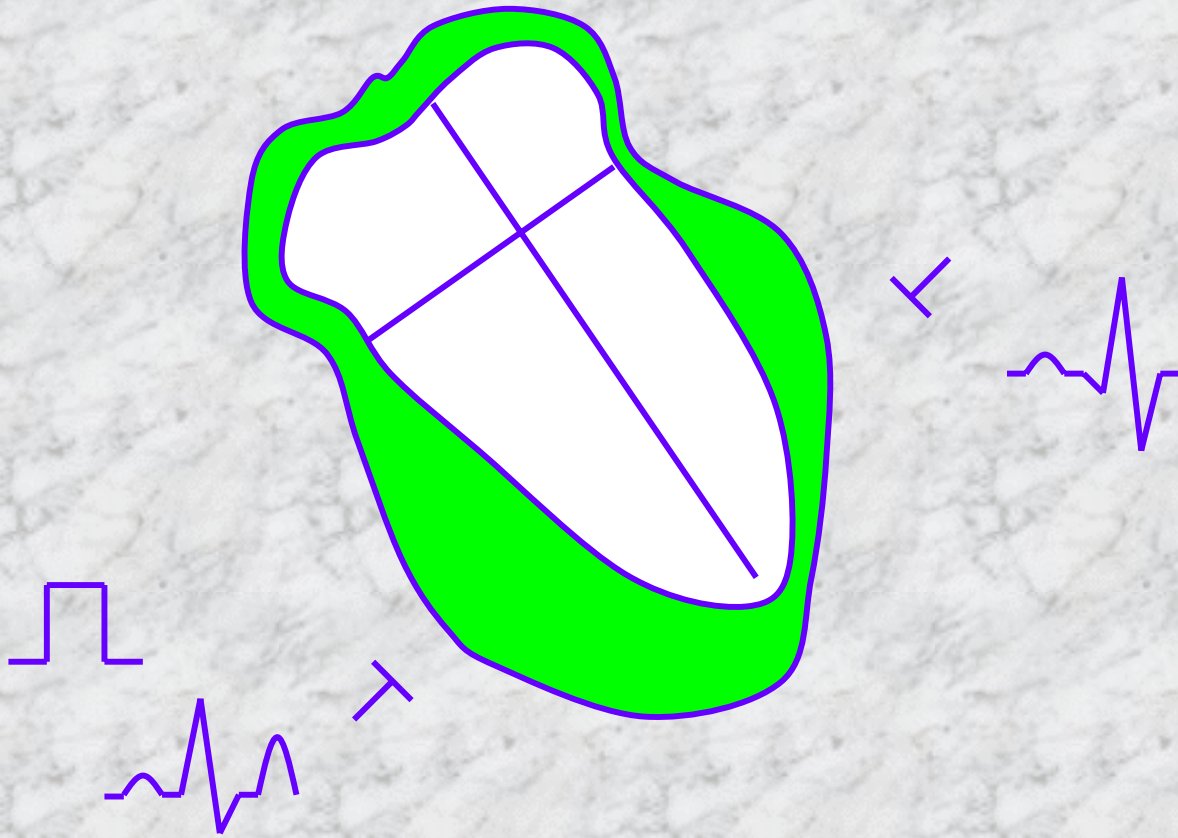
Strain Pattern

- Leads facing the RV (V1 & V2) may show a strain pattern.
- This is a reflection of the abnormal state of the myocardium.

ECG for Strain

- Seen in leads facing the right ventricle (V1, V2, V3)
- Depressed convex ST segment
- Inverted T wave

Right Ventricular Hypertrophy



Bi-Ventricular Hypertrophy

- This is difficult to diagnose from the ECG since the phases of ventricular activation, 2 + 3 occur together then the ↑ forces of activation may cancel each other out giving rise to a normal QRS amplitude.

- However, the duration may still be above 0.12 seconds.

- If either ventricle is more dominant then that ventricular hypertrophy will more evident on the ECG.

ECG Criteria

- It may exist without ECG changes
- QRS duration may be \uparrow to above 0.12 seconds.
- T wave \downarrow may be present in the precordial leads
- ECG criteria met for LVH with an axis of $+90^\circ$ (RAD) is suggestive (not diagnostic) of biventricular hypertrophy
- Occasionally RVH with LAD is seen

Clinical Significance

- Aortic valve disease + pulmonary hypertension
- Cardiomyopathy
- Occasionally – congenital heart disease

Summary

- LVH - Tall R Waves facing Left Ventricle
Deep S waves opposite
- RVH - Tall R waves facing Right Ventricle
- Biventricular Hypertrophy - no ECG changes, increase in duration can be seen