Use of ECG in Hypertension

An **Electrocardiogram (ECG or EKG)** is a valuable tool in evaluating hypertension and its effects on the heart. While ECG does not directly measure blood pressure, it helps detect complications caused by **long-term high blood pressure**.

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1. Why is ECG Important in Hypertension?

Hypertension puts extra strain on the **heart and blood vessels**, leading to structural and electrical changes. ECG helps:

✓ **Detect heart damage** due to prolonged high BP.

✓ **Identify complications** like arrhythmias, heart enlargement, and ischemia.

✓ **Monitor the effectiveness of hypertension treatment** over time.

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2. ECG Findings in Hypertensive Patients

a) Left Ventricular Hypertrophy (LVH)

- **Most common ECG abnormality in hypertension.**
- Hypertension forces the heart to work harder, causing **thickening of the left ventricle**.
- **ECG signs:**
  - Tall R waves in **leads V5 & V6**.
  - Deep S waves in **V1 & V2**.
  - Increased **Sokolow-Lyon Index** (S wave in V1 + R wave in V5/V6 > 35 mm).

b) Left Atrial Enlargement

- Due to **pressure overload in the heart**.
- **ECG signs:**
  - **Wide, notched P wave** in lead II.
  - **Negative P wave in V1**.

c) Ischemic Changes (Silent Coronary Artery Disease)

- Long-term hypertension can cause **reduced blood flow** to the heart.
- **ECG signs:**
  - **ST depression, T-wave inversions** (signs of ischemia).
  - **Pathological Q waves** (suggest prior heart attack).

d) Arrhythmias (Irregular Heartbeat)

- Hypertension can cause **atrial fibrillation (AFib)**, increasing stroke risk.

- **ECG signs:**
  - **Irregular RR intervals** with no distinct P waves (AFib).
  - **Extrasystoles or ventricular ectopy** due to heart strain.

e) Left Axis Deviation (LAD) & Strain Pattern

- Due to **hypertensive heart disease**.
- **ECG signs:**
  - **LAD** – QRS axis shifting leftward (< -30°).
  - **Strain pattern** – ST depression and T-wave inversion in **V5-V6, I, aVL**.

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3. When is ECG Recommended for Hypertension?

✓ **At diagnosis** – To check for early heart involvement.
✓ **In resistant hypertension** – To identify secondary causes.
✓ **In long-term hypertension** – To monitor heart function over time.
✓ **If symptoms occur** – Chest pain, palpitations, dizziness, or breathlessness.

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4. Limitations of ECG in Hypertension

❌ ECG may **miss early heart damage** (Echocardiography is more sensitive for LVH).
❌ Some hypertensive patients may have a **normal ECG despite underlying disease**.

Conclusion:

ECG is a **quick, cost-effective** tool to assess hypertension-related heart damage, detect complications, and guide treatment. However, **echocardiography and advanced imaging** may be needed for a more detailed assessment.