# VENTRICULAR PREMATURE COMPLEX (VPC): EVALUATION AND MANAGEMENT

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Last reviewed: October 2026

## I DEFINITION AND ECG CHARACTERISTICS

- **Definition:** A **VPC** (or Premature Ventricular Contraction) is an ectopic impulse originating from the ventricular myocardium or His-Purkinje system.
- **QRS Morphology:** Broad and bizarre, with a duration greater than one hundred twenty milliseconds.
- **Repolarization:** Discordant ST segment and T wave (pointing in the opposite direction of the main QRS vector).
- **Atrial Relationship:** Typically lacks a preceding P wave. It may conduct retrogradely to the atria or leave the Sinus Node undisturbed.
- **Compensatory Pause:** Usually a “full” compensatory pause. The RR interval containing the **VPC** equals exactly two normal Sinus RR intervals because the Sinus Node rhythm is not reset.

## II MORPHOLOGICAL LOCALIZATION (EXAM HIGH YIELD)

- **Principle:** The surface **ECG** accurately localizes the origin of the ectopic focus, which is critical for planning catheter ablation.
- **Right Ventricular Outflow Tract (RVOT):** - The most common site for idiopathic **VPCs**.
  - **Morphology: LBBB** pattern (negative in V1) with a tall, positive inferior axis (strongly positive in II, III, aVF).
- **Left Ventricular Outflow Tract (LVOT):** - **Morphology:** Transition zone in precordial leads occurs early (by V1 or V2). Can have an **LBBB** or **RBBB** pattern, but maintains an inferior axis.
- **Left Ventricular Fascicular Origin:** - Originates from the Purkinje network. Relatively narrow QRS (often one hundred ten to one hundred thirty milliseconds).
  - **Left Anterior Fascicle: RBBB** pattern with Right Axis Deviation.
  - **Left Posterior Fascicle: RBBB** pattern with Left Axis Deviation.
- **Epicardial Origin:** - **Morphology:** Slurred initial QRS upstroke (pseudo-delta wave) due to slow muscle-to-muscle conduction before reaching the Purkinje system. Prolonged intrinsicoid deflection (greater than eighty-five milliseconds).

## III RISK STRATIFICATION: BENIGN VERSUS MALIGNANT

- **Priority:** The absolute priority in evaluating **VPCs** is determining the presence of underlying structural heart disease.
- **VPC-Induced Cardiomyopathy:** A high burden of **VPCs** (typically defined as greater than ten to fifteen percent of total daily heartbeats, or greater than ten thousand per day on Holter) can independently cause a reversible, dilated **LV** dysfunction.
- **The R-on-T Phenomenon:** A **VPC** falling on the peak or downslope of the preceding T wave (the vulnerable period of repolarization) can trigger Polymorphic Ventricular Tachycardia or Ventricular Fibrillation, especially in the setting of acute ischemia or Long QT Syndrome.
- **Complexity:** Multiform (multiple morphologies), couplets, or runs of Non-Sustained Ventricular Tachycardia (**NSVT**) suggest a higher arrhythmic risk and strongly mandate an Echocardiogram or **CMR** to rule out scar, Ischemic Cardiomyopathy, or Arrhythmogenic Right Ventricular Cardiomyopathy (**ARVC**).

## IV MANAGEMENT ALGORITHM

- **Asymptomatic with Normal Heart:** - No specific antiarrhythmic therapy indicated.
  - Advise lifestyle modifications (reduction of caffeine, alcohol, and stress).
- **Symptomatic with Normal Heart:** - **First-line:** Beta-blockers or Non-Dihydropyridine Calcium Channel Blockers (Verapamil or Diltiazem); catheter ablation is also a Class I first-line option for symptomatic idiopathic RVOT or fascicular VPCs (ESC 2022).
- **High Burden with LV Dysfunction (VPC Cardiomyopathy):** - **First-line:** Radiofrequency Ablation (**RFA**). It is a Class One indication. Successful ablation of the dominant morphology reliably reverses the **LV** dysfunction within three to six months.
  - **Alternative:** Amiodarone if ablation is strictly contraindicated or fails, though long-term toxicity limits its use in young patients. Class One C agents (Flecainide) can be used if structural ischemic disease is definitively ruled out.

## V THE INDIAN CLINICAL CONTEXT

- **RVOT vs ARVC:** In Indian tertiary referral centers, differentiating benign **RVOT** ectopy from early **ARVC** is the primary diagnostic dilemma in young, symptomatic adults. **ARVC** often presents initially with isolated **LBBB** morphology **VPCs**. The presence of T wave inversions in leads V1 through V3 beyond puberty, Epsilon waves, or a fragmented QRS necessitates a dedicated structural **CMR** before dismissing the **VPCs** as benign idiopathic variants.