

The "Reverse Break" Pattern in Wolff-Parkinson-White Syndrome: A Rare Electrocardiographic Marker for Right Posteroseptal Accessory Pathways

Hüsnü Değirmenci, MD^{1*}, Halil İbrahim Tanrıseven, MD², Muhammed Zeki Mertcan, MD³ and Muhammet Tahir Gül, MD³

¹Professor, Department of Cardiology, Mengucek Gazi Training and Research Hospital, Erzincan Binali Yildirim University, Erzincan, Turkey.

²Specialist, Department of Cardiology, Mengucek Gazi Training and Research Hospital, Erzincan Binali Yildirim University, Erzincan, Turkey.

³Resident, Department of Cardiology, Mengucek Gazi Training and Research Hospital, Erzincan Binali Yildirim University, Erzincan, Turkey.

*Correspondence:

Hüsnü Değirmenci, MD, Professor, Department of Cardiology, Mengucek Gazi Training and Research Hospital, Erzincan Binali Yildirim University, Erzincan, Turkey.

Received: 01 Sep 2026; Accepted: 30 Sep 2026; Published: 11 Oct 2026

Citation: Hüsnü Değirmenci, Halil İbrahim Tanrıseven, Muhammed Zeki Mertcan, et al. The "Reverse Break" Pattern in Wolff-Parkinson-White Syndrome: A Rare Electrocardiographic Marker for Right Posteroseptal Accessory Pathways. Recent Adv Clin Trials. 2026; 6(5): 1-3.

ABSTRACT

Background: The surface electrocardiogram (ECG) remains the cornerstone for localizing accessory pathways (APs) in Wolff-Parkinson-White (WPW) syndrome prior to catheter ablation. The "reverse break" (or double transition) pattern in the precordial leads is a uniquely rare and highly specific finding for posteroseptal pathways.

Case Presentation: A 60-year-old female with no prior medical history presented with recurrent palpitations. Her baseline 12-lead ECG exhibited normal sinus rhythm with overt pre-excitation. Notably, the precordial leads demonstrated a distinct reverse break sign: a negative delta wave in V1, an abruptly prominent positive delta wave in V2, and a return to a negative delta wave in V3. Echocardiographic evaluation was unremarkable. Based on this specific ECG morphology, a right posteroseptal AP was suspected. An electrophysiological study utilizing 3D electroanatomical mapping (EnSite™ Precision) confirmed the earliest pre-excited ventricular activation at the right inferoposterobasal (posteroseptal) region. Subsequent targeted radiofrequency ablation was successful; the post-ablation ECG showed normal sinus rhythm and the complete disappearance of delta waves.

Conclusion: The reverse break pattern is a reliable and easily identifiable surface ECG signature that strongly predicts a right posteroseptal AP. Early recognition of this morphological shift significantly aids electrophysiologists in pre-procedural planning and improves ablation efficiency in anatomically complex regions.

Keywords

Wolff-Parkinson-White syndrome, Reverse break pattern, Posteroseptal accessory pathway, Electrocardiography, Catheter ablation, Electroanatomical mapping.

Introduction

Although Wolff-Parkinson-White (WPW) syndrome was first described over nine decades ago in 1930, the electrophysiological diversity it presents continues to be a subject of fascination for

cardiologists. For symptomatic patients, radiofrequency (RF) catheter ablation is the definitive, curative treatment. The success, safety, and efficiency of this procedure rely heavily on the accurate pre-procedural localization of the accessory pathway (AP) using the 12-lead surface electrocardiogram (ECG).

The posteroseptal (PS) region represents a particularly challenging anatomical target due to its intricate structure, where the coronary sinus (CS) ostium, the middle cardiac vein, and both right and

left endocardial/epicardial tissues converge. Because of this complexity, identifying highly specific ECG markers that predict exact AP localization is of paramount clinical importance. While standard precordial R-wave progression follows a sequential transition, an atypical fluctuation known as the "reverse break" (or double transition) pattern is a rare but diagnostically invaluable ECG variation. We present a case of a patient exhibiting a classic reverse break pattern on her baseline ECG, leading to a successfully mapped and ablated right posteroseptal AP, discussed in the context of recent literature.

Case Presentation

A 60-year-old female with no notable medical history presented to our cardiology outpatient clinic reporting sudden-onset, recurrent palpitations. Cardiovascular physical examination and routine laboratory findings were within normal limits. A comprehensive transthoracic echocardiogram revealed normal biventricular size and systolic function, ruling out underlying structural heart disease.

Her baseline 12-lead ECG during sinus rhythm revealed a classic pre-excitation pattern characterized by a short PR interval and a widened QRS complex. A detailed analysis of the precordial leads highlighted an unusual morphological sequence: the delta wave and QRS complex were negative in lead V1, transitioned to a prominent positive deflection in V2, and abruptly reverted to a negative polarity in V3 (Figure 1A and 1B). Furthermore, negative QRS polarity was observed in the inferior leads (II, III, aVF). As defined by Bera et al., the presence of a monophasic tall R wave in V2 larger than in V1 and V3, paired with a deep negativity in V3, was interpreted as a classic "reverse pattern break" sign.



Figure 1: Baseline surface ECG demonstrating the "reverse break" pattern.

(A) The full 12-lead ECG shows overt pre-excitation. (B) A magnified view of the precordial leads V1-V3 highlights the atypical morphological transition: a negative delta wave in V1 indicated by the red arrow, an abruptly prominent positive deflection in V2 indicated by the blue arrow, and a return to a negative delta wave in V3 indicated by the yellow arrow. This double transition pattern strongly indicates a right posteroseptal accessory pathway.

Given the risk of AP-mediated tachyarrhythmias, an electrophysiological study (EPS) was planned. The procedure was performed utilizing the EnSite™ Precision 3D electroanatomical mapping system. Activation mapping during sinus rhythm precisely pinpointed the earliest pre-excited ventricular activation site to the right posteroseptal (inferoposterobasal) region (Figure 2). The 3D map perfectly corroborated the anatomical location predicted by the surface ECG. Targeted RF energy was delivered to this specific right endocardial site, resulting in the immediate and permanent loss of AP conduction. Following ablation, the patient's ECG demonstrated a return to normal sinus rhythm, a normalized PR interval, a narrow QRS complex, and the complete disappearance of delta waves. The patient had an uneventful recovery and was discharged the following day in excellent condition.

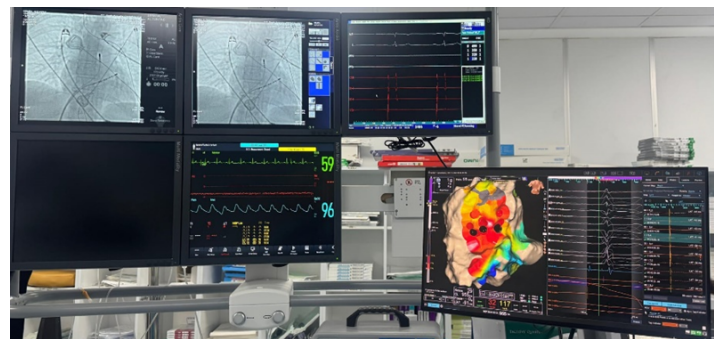


Figure 2: 3D electroanatomical activation mapping using the EnSite™ Precision system.

The activation map during sinus rhythm demonstrates the earliest pre-excited ventricular activation site (red zone) localized precisely at the right posteroseptal (inferoposterobasal) region, perfectly correlating with the anatomical location predicted by the baseline surface ECG.

Discussion

WPW syndrome is a heterogeneous clinical entity that can present with many different ECG faces. When presenting as a wide QRS complex tachycardia, it can easily be misdiagnosed as ventricular tachycardia (VT) or atrial fibrillation with bundle branch block. As highlighted by Cao et al., failure to recognize pre-excitation patterns—especially when intermittent or masked—may lead to the inappropriate administration of atrioventricular (AV) nodal blocking agents (e.g., diltiazem), which can precipitate life-threatening ventricular arrhythmias. Therefore, accurate recognition of pre-excitation morphologies is crucial, regardless of whether the pattern is persistent or intermittent. A recent multicenter registry by Rauber et al., encompassing 392 WPW

patients, demonstrated that intermittent pre-excitation should not be considered a reliable noninvasive marker of "low risk". as the antegrade conductive properties (ERP/SPERRI) and AVRT inducibility in these patients did not significantly differ from those with persistent pre-excitation. This underscores the necessity for invasive electrophysiological evaluation and potential ablation for any specific pre-excitation morphology identified on a surface ECG.

Ablating APs in the posteroseptal region is notoriously difficult. PS pathways can extend into the coronary sinus, CS diverticula, or along the epicardial surface. Furthermore, as demonstrated in a case by Tanaka et al., PS pathways frequently exhibit an "oblique course", where the ventricular insertion may be right-sided while the atrial insertion extends leftward. In Tanaka's case, while a right-sided ablation successfully eliminated antegrade conduction, establishing a retrograde block required a transseptal approach for additional ablation at the left atrium (6 o'clock position of the mitral annulus). Anticipating such anatomical and electrical complexities prior to the procedure is critical for optimal catheter selection, preparing for potential transseptal puncture, and reducing fluoroscopy time.

In this context, the atypical "reverse break" or "double transition" pattern on the surface ECG serves as an impeccable roadmap. Bera et al. defined the reverse pattern break (RPB) as a monophasic tall R in lead V2 larger than in V1 and V3, alongside an R/S < 1 (or deep S wave) in V3. In their analysis of 66 PS ablations, RPB demonstrated a 94% specificity and a 77% positive predictive value (PPV) for localizing proximal CS and complex PS pathways, outperforming older established criteria such as a negative delta in lead II or a deep S in V6.

Similarly, Jagadish et al. reported a case of a 52-year-old male where a double transition pattern—negative QRS complexes in V1 and V3 with a positive QRS in V2—successfully predicted an endocardial right posteroseptal AP. The diagnostic strength of this pattern was further validated by Turan et al. in a large cohort of 338 WPW patients. They found that 33% of patients successfully ablated in the posteroseptal area exhibited this double transition pattern, and crucially, the V1 (-) < V2 (+) > V3 (-) configuration predicted a right endocardial localization with an impressive 95% accuracy [1-7].

The morphological pattern observed in our case perfectly fulfills both the RPB criteria described by Bera et al. and the double transition definitions by Turan and Jagadish. Our case beautifully

illustrates how this specific surface ECG finding seamlessly integrates with modern 3D electroanatomical mapping systems (EnSite™). The high predictive value derived from the baseline ECG dramatically shortened mapping time, directed the ablation catheter straight to the right inferoposterobasal target, and paved the way for a complication-free, curative outcome.

Conclusion

The reverse break (or double transition) pattern in the precordial leads is a rare, easily identifiable, and highly reliable surface ECG marker for right posteroseptal accessory pathways. Although advanced technologies such as 3D mapping and artificial intelligence-integrated algorithms have become standard in modern electrophysiology laboratories, the ability to interpret nuanced transition patterns on a standard 12-lead ECG remains an invaluable clinical skill. Recognizing this pattern empowers electrophysiologists to optimize pre-procedural planning, execute safer ablations, and achieve higher success rates in anatomically challenging regions.

References

1. Jagadish A, Mohamed K, Kommineni SK, et al. A Rare Case of Reverse Break Sign with Wolff-Parkinson-White Syndrome (26-CCC-17649-ACC). *J Am Coll Cardiol.* 2026; 87: 1323.
2. Turan OE, Yilancioglu RY, Ozcan EE. Precordial reverse pattern break on ECG: could it be a discriminator endo/epicardial ablation site of left posteroseptal accessory pathways. *Europace.* 2023; 25: euad122.617.
3. Bera D, Mukherjee SS, Narasimhan C, et al. Precordial reverse pattern break: A predictor of posteroseptal accessory pathways ablatable from the proximal coronary sinus. *Heart Rhythm.* 2022; 19: 1386-1388.
4. Rauber M, Antolić B, Alfieri S, et al. Intermittent Ventricular Pre-Excitation: Clinical Features and Electrophysiological Properties. *J Cardiovasc Electrophysiol.* 2025; 36: 2818-2826.
5. Tanaka Y, Sekihara T, Sakata Y, et al. Manifest Wolff-Parkinson-White Syndrome With a Posteroseptal Accessory Pathway Showing Right Posteroseptal Ventricular Insertion but Requiring Left Atrial Ablation for Retrograde Conduction Block. *Clin Case Rep.* 2025; 13: e71283.
6. Cao JJ, Saha B, Deshmukh AJ. The Many ECG Faces of Wolff-Parkinson-White Syndrome. *JACC Case Rep.* 2026; 31: 108905.
7. Brugada P. The Fascination of the Wolff-Parkinson-White Syndrome. *Arq Bras Cardiol.* 2026; 123: e20260471.