

# Malignant Arrhythmia as the First Manifestation of Wolff-Parkinson-White Syndrome: A Case with Minimal Preexcitation on Electrocardiography

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## ABSTRACT

*Wolff-Parkinson-White (WPW) syndrome is defined as the presence of an accessory atrioventricular pathway which is manifested as delta waves and short PR interval on electrocardiography (ECG). However, some WPW cases do not have typical findings on ECG and may remain undiagnosed unless palpitations occur. Sudden cardiac death may be the first manifestation of WPW and develops mostly secondary to degeneration of atrial fibrillation into ventricular fibrillation. In this report, we present a case of undiagnosed WPW with minimal preexcitation on ECG and who suffered an episode of malignant arrhythmia as the first manifestation of the disease.*

**Keywords:** Atrial fibrillation, preexcitation, sudden cardiac death

# Arritmia Maligna como Primera Manifestación del Síndrome de Wolff-Parkinson-White: Un Caso con Preexcitación Mínima en la Electrocardiografía

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## RESUMEN

*El síndrome Wolff-Parkinson-White (WPW) se define como la presencia de una vía accesoria atrioventricular que se manifiesta como ondas delta, e intervalos cortos de PR en el electrocardiograma (ECG). Sin embargo, algunos casos de WPW no tienen resultados típicos en el ECG, y pueden permanecer sin diagnosticar a menos que se produzcan palpitaciones. La muerte cardíaca súbita puede ser la primera manifestación de WPW, y se produce principalmente de forma secundaria a la degeneración de la fibrilación auricular en fibrilación ventricular. En este reporte, presentamos un caso no diagnosticado de WPW con preexcitación mínima en el ECG, con un episodio de arritmia maligna como primera manifestación de la enfermedad.*

**Palabras claves:** Fibrilación atrial, muerte cardíaca repentina, preexcitación

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## INTRODUCTION

Wolff-Parkinson-White (WPW) syndrome is produced by an accessory atrioventricular pathway, which is diagnosed by electrocardiogram (ECG) changes as short PR interval (< 120 ms) and presence of a delta wave. Supraventricular tachyarrhythmias are mostly encountered and preexcited atrial fibrillation (AF) with rapid ventricular response may cause life-threatening complications. About 50% of WPW cases are asymptomatic and are diagnosed incidentally (1). Here, we report a case of undiagnosed WPW with minimal pre-

excitation on ECG who presented with haemodynamic instability and wide QRS tachycardia as the first symptom of the disease.

## CASE REPORT

A previously asymptomatic 32-year old male patient was admitted to our emergency department with a complaint of first-time occurring severe palpitation and dizziness which started 20 minutes ago. On physical examination, he was lethargic, his skin was pale and diaphoretic, his pulse was weak, irregular and tachycardic (> 160 beats/min). His arterial blood pressure was measured 70/30 mmHg and the remainder of the physical examination was within normal limits. His medical and family history was unrevealing for any history of coronary artery disease, unexplained syncope

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or sudden death. A 12-lead ECG revealed an irregular, wide QRS complex tachycardia with delta waves most apparent in leads V1–V4 and in some narrow QRS beats (Fig. 1). Pre-

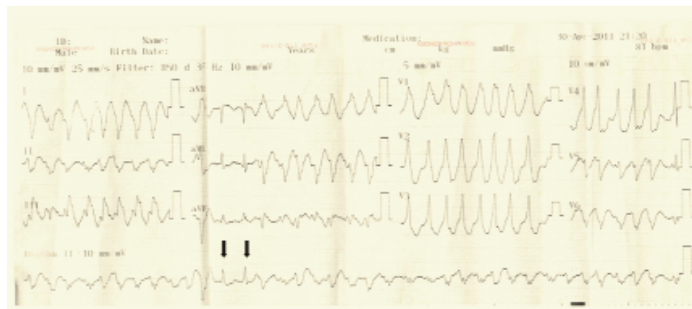


Fig. 1: Initial 12-lead electrocardiogram showing wide QRS tachycardia compatible with preexcitated atrial fibrillation. Beats #10 and #11 (arrows) are conducted through atrioventricular node which resulted in narrow QRS.

excitated AF causing haemodynamic compromise was diagnosed and emergent electrical cardioversion with 200 joules was performed that restored the sinus rhythm. A subsequent ECG showed minimal preexcitation with borderline PR interval of 120 ms, normal ST segment and T waves and apparently small delta waves only in leads III and aVF (Fig. 2). Laboratory examination revealed normal electrolyte

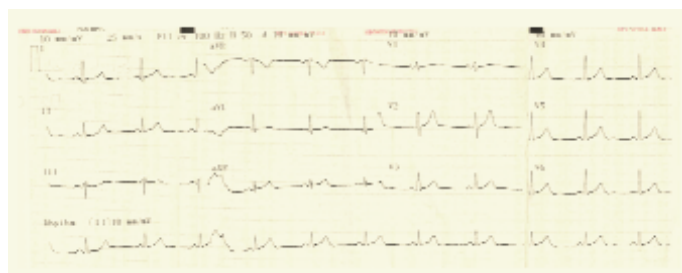


Fig. 2: 12-lead electrocardiogram after direct current electrical cardioversion showing minimal preexcitation with small delta waves only in leads III and aVF.

levels and thyroid function. Electrophysiologic study (EPS) was performed during hospitalization. Programmed electrical stimulation revealed left lateral and posteroseptal accessory pathways (AP) and subsequent radiofrequency ablation of these APs resulted in normal ECG. The patient was discharged the day after the procedure and follow-up over the subsequent six months was uneventful.

## DISCUSSION

The frequency of WPW in the general population is 0.1% to 0.3% (2). Presence of delta waves and short PR interval on ECG during sinus rhythm are essential for diagnosis of WPW except for concealed APs which are activated only during arrhythmias. The degree of initial slurring (delta wave) and widening of QRS complex define the level of preexcitation.

In some cases, diagnosis of an accessory pathway on ECG may be challenging to recognize and the patient may remain undiagnosed unless palpitations occur.

Eisenberger *et al* recently published a report in which they analysed ECGs of 238 WPW cases and reported that 15% of patients had minimal delta waves and 10% of patients had PR interval longer than 120 ms on surface ECG (3). Unfortunately, the rate of arrhythmia in the minimal preexcitation group has not been reported. In case of clinical suspicion of WPW, atrioventricular blocking agents such as adenosine which facilitates the antegrade conduction through AP during sinus rhythm can be used to expose delta waves on ECG.

The incidence of AF has been reported to be 11.5%–39% in WPW (4). Accessory pathways with short refractory periods (RP) may conduct atrial impulses to the ventricle with a very high rate which may result in deterioration into ventricular fibrillation and sudden cardiac death (SCD). The rate of SCD in WPW patients was reported to be 0.15% per year (5). Unfortunately, criteria derived from surface ECG and EPS parameters are inadequate to establish the risk of SCD in WPW patients. In our case, during sinus rhythm, delta waves were very small which shows that only a minor part of the atrioventricular conduction is through the AP. However, his first episode of AF resulted in life-threatening haemodynamic results.

Atrioventricular node blocking agents like adenosine and calcium channel blockers may induce ventricular fibrillation in preexcitated AF (6, 7). Procainamide and ibutilide are the preferred drugs for chemical cardioversion of AF (8, 9). The use of intravenous amiodarone should be done with caution (10).

Routine use of EPS and prophylactic ablation of APs in asymptomatic WPW cases has been investigated by Pappone *et al*. They recommended ablation of the AP in patients who have multiple APs, APs with RP shorter than 240 ms and sustained arrhythmias especially AF, due to the increased risk of SCD during follow-up (11, 12). Also, in patients with rheumatic mitral stenosis, ablation of AP may be performed in asymptomatic cases due to the low tolerability of AF episodes and technical difficulties of the procedure after prosthetic valve implantation (13).

## CONCLUSION

In some WPW cases, recognition of an AP on ECG may be challenging due to the absence of typical delta waves. Minimal preexcitation on ECG does not indicate low risk of malignant arrhythmias. Electrophysiologic properties of AP should be delineated and radiofrequency ablation of the AP should be carried out in high-risk patients.

## Authors' Note

The authors declare that they have no competing interests.

## REFERENCES

1. Munger TM, Packer DL, Hammill SC, Feldman BJ, Bailey KR, Ballard DJ et al. A population study of the natural history of Wolff-Parkinson-White syndrome in Olmsted County, Minnesota, 1953–1989. *Circulation* 1993; **87**: 866–73.
2. Chung KY, Walsh TJ, Massie E. Wolff-Parkinson-White syndrome. *Am Heart J* 1965; **69**: 1–8.
3. Eisenberger M, Davidson NC, Todd DM, Garratt CJ, Fitzpatrick AP. A new approach to confirming or excluding ventricular pre-excitation on a 12-lead ECG. *Europace* 2010; **12**: 119–23.
4. Al-Khatib SM, Pritchett EL. Clinical features of Wolff-Parkinson-White syndrome. *Am Heart J* 1999; **138**: 403–13.
5. Montoya PT, Brugada P, Smeets J, Talajic M, Della Bella P, Lezaun R et al. Ventricular fibrillation in the Wolff-Parkinson-White syndrome. *Eur Heart J* 1991; **12**: 144–50.
6. Gupta AK, Shah CP, Maheshwari A, Thakur RK, Hayes OW, Lokhandwala YY. Adenosine induced ventricular fibrillation in Wolff-Parkinson-White syndrome. *Pacing Clin Electrophysiol* 2002; **25**: 477–80.
7. Strasberg B, Sagie A, Rechavia E, Katz A, Ovsyscher IA, Sclarovsky S et al. Deleterious effects of intravenous verapamil in patients with Wolff-Parkinson-White syndrome. *Cardiovasc Drugs Ther* 1989; **2**: 801–6.
8. Cummins RO, Hazinski MF, eds. Guidelines 2000 for cardiopulmonary resuscitation and emergency cardiovascular care: an international consensus on science. *Circulation* 2000; **102 (Suppl 1)**: I1–I384.
9. Viktorsdottir O, Henriksdottir A, Arnar DO. Ibutilide for treatment of atrial fibrillation in the emergency department. *Emerg Med J* 2006; **23**: 133–4.
10. Boriani G, Biffi M, Frabetti L, Azzolini U, Sabbatani P, Bronzetti G et al. Ventricular fibrillation after intravenous amiodarone in Wolff-Parkinson-White syndrome with atrial fibrillation. *Am Heart J* 1996; **131**: 1214–6.
11. Pappone C, Santinelli V, Rosanio S, Vicedomini G, Nardi S, Pappone A et al. Usefulness of invasive electrophysiologic testing to stratify the risk of arrhythmic events in asymptomatic patients with Wolff-Parkinson-White pattern: results from a large prospective long-term follow-up study. *J Am Coll Cardiol* 2003; **41**: 239–44.
12. Pappone C, Santinelli V, Manguso F, Augello G, Santinelli O, Vicedomini G et al. A randomised study of prophylactic catheter ablation in asymptomatic patients with the Wolff-Parkinson-White syndrome. *N Engl J Med* 2003; **349**: 1803–11.
13. Alper AT, Hasdemir H, Akyol A. Wolff-Parkinson-White syndrome and rheumatic mitral stenosis: an uncommon coincidence that can cause severe haemodynamic disturbance. *Indian Pacing Electrophysiol J* 2008; **8**: 304–7.