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## *Case Reports*

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### **Catastrophic WPW Syndrome in a 13-month child: Cure by Radiofrequency Ablation**

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Wolff-Parkinson-White (WPW) syndrome occurs due to an accessory atrioventricular bypass tract. The prevalence of WPW electrocardiographic pattern has been estimated to be 0.1%-0.3% in the general population, with the annual incidence of new cases reported to be 4 per 100,000 population per year (1). While the commonest age of presentation is the second decade of life (2), unusually tachycardia episodes occur in infancy. These episodes may be fatal, especially if resistant to medication. Radiofrequency (RF) ablation is a curative procedure for WPW syndrome but is technically demanding and potentially hazardous in infancy. We report the successful cure of catastrophic WPW syndrome in a 13 month child by radiofrequency ablation.

#### **Case Report**

A 13-month-old boy weighing 10 kg

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was referred to us from Nagpur for RF ablation of WPW syndrome. When the child reached Mumbai, he developed a rapid heart rate of 250 beats/minute and was admitted in the intensive cardiac care unit. The baby had been having recurrent episodes of paroxysmal narrow-QRS and broad-QRS tachycardias since the age of 2 months. A diagnosis of WPW syndrome with a structurally normal heart had been made. Initially amiodarone had been given but in view of recurrence of tachycardias,, this was changed to oral flecainide 25 mg thrice a day at another hospital. Thrice he had needed to be electrically cardioverted for hemodynamically unstable tachycardias.

On presentation to us, the child was drowsy with a feeble pulse and evidence of poor perfusion. The electrocardiogram revealed a regular wide-QRS tachycardia which was presumably orthodromic tachycardia with aberrant conduction. Cardioversion with 10 J, 20J and 40 J only transiently terminated the tachycardia for a few seconds. Episodes of atrial flutter, orthodromic tachycardia and polymorphic ventricular tachycardia (*Fig. 1*) were also noted. A 5 mg/kg bolus dose of intravenous amiodarone was infused over 30 minutes, followed by a drip @ 5 mg/kg/24 hours despite which tachycardia continued. After 4 hours, paradoxical respiration with hypoxemia was noted and the child was intubated and artificially ventilated, with an infusion of vecuronium 0.2 mg/kg/hour intravenously. Gastrointestinal bleeding developed, necessitating infusion of 80 ml of whole blood. A pacing electrode was inserted under fluoroscopic guidance transvenously to attempt pace termination

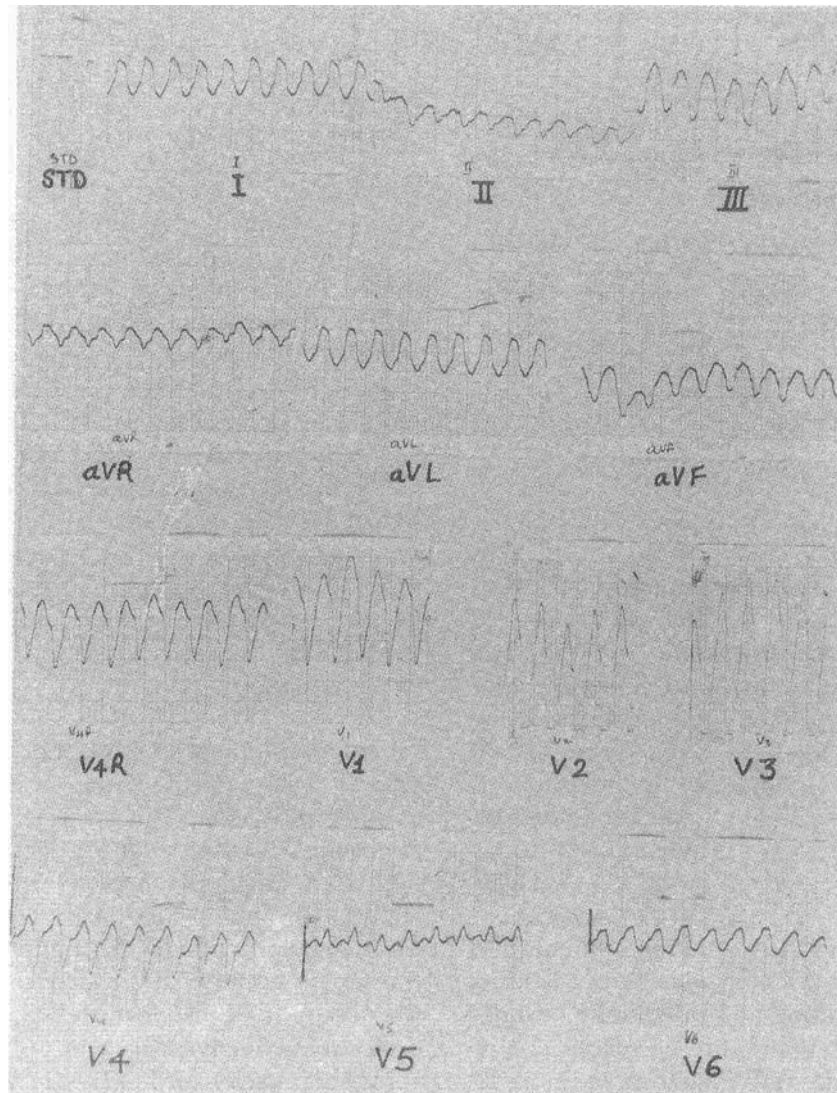


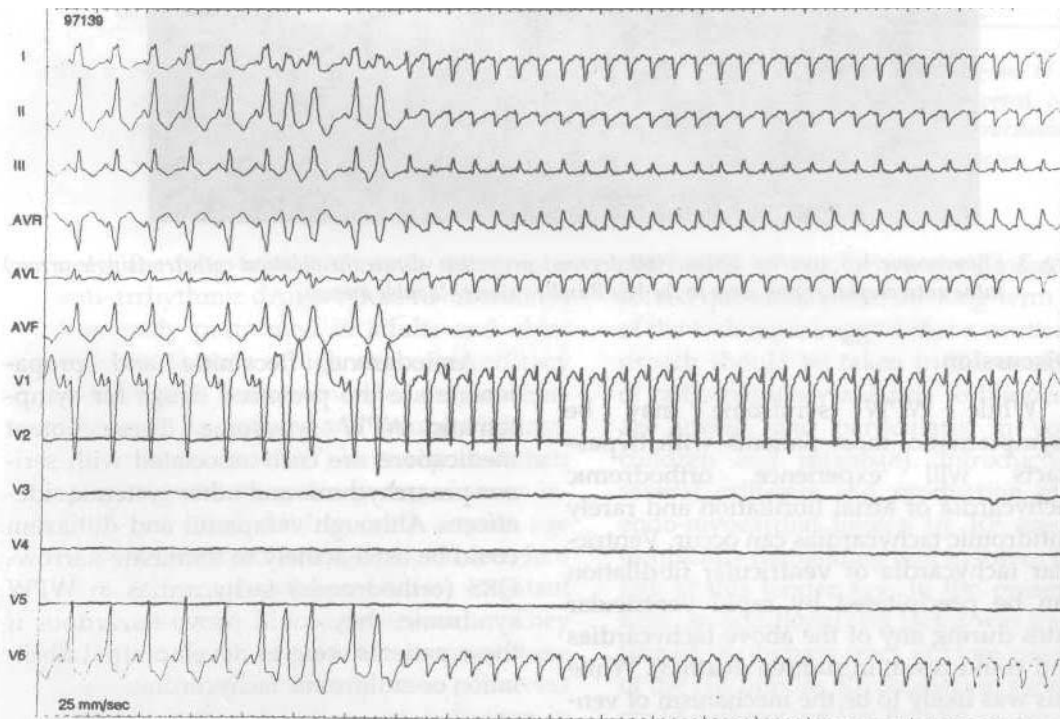
Fig. 1. Polymorphic ventricular tachycardia at he rate of 250 beats/minute.

of the tachycardia. Intermittent ventricular tachycardia was confirmed by recording ventriculoatrial dissociation. Rapid pacing from the right atrium and subsequently from the right ventricle only transiently terminated the tachycardia. The pacing electrode was removed and amiodarone was continued. After 6 hours sinus rhythm returned, revealing a short PR interval and delta waves, the pattern suggesting a right

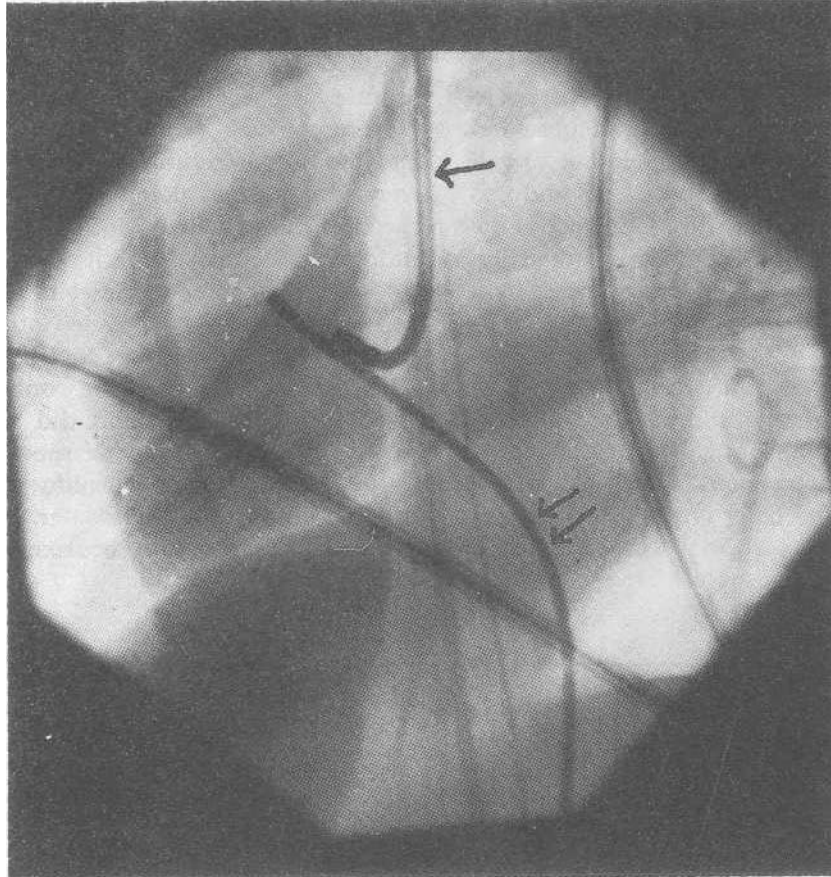
anteroseptal location of the bypass tract. The next morning the child was shifted to the cardiac catheterization laboratory. Under general anesthesia, punctures were taken and sheaths introduced into the right femoral vein, right femoral artery and right internal jugular vein. A 4F electrode catheter was positioned in the His bundle region and a 5F (Webster, CA, USA) RF ablation catheter was introduced via the jugular

access. Orthodromic tachycardia (*Fig. 2*) was easily inducible. Mapping revealed the accessory pathway to be located very close to the His Bundle region (*Fig. 3*) where continuous electrical activity was observed (*Fig. 4*). RF energy was delivered at a power output of 10 W for 30 seconds and this resulted in immediate disappearance of the delta wave (*Fig. 5*). The normal conduction system was not affected as evidenced by a PR interval of 80 msec, H-V interval of 44 msec and an AV Wenckebach point of <220 msec. No tachycardia was now inducible in spite of vigorous stimulation protocols from the right atrium and the right ventricle. The catheters and sheaths were removed and the baby was shifted back to the ICCU. The artificial ventilation was continued.

Over the next 24 hours the child had a stormy course. Gastric bleeding recurred, the SGOT was 120 IU/l and there were profuse lung secretions with collapse of the right upper lobe. Whole blood, fresh plasma, ranitidine, ceftriaxone and amikacin were administered along with intensive tracheobronchial suction with change of the endotracheal tube which was partly blocked. The child's parameters gradually improved and he was weaned off ventilatory support 36 hours after the RF ablation procedure. Subsequently he continued to make steady recovery and did not have any further tachycardia or preexcitation. He was discharged in a healthy condition after 7 days. Two months later, the child was healthy and had no recurrence of preexcitation.



*Fig. 2. Orthodromic tachycardia at a rate of 250 beats/minute precipitated during electrophysiology study. Initial portion of the tracing shows sinus rhythm with preexcited QRS complexes.*



*Fig. 3. Fluoroscopic left anterior oblique (60 degrees) projection shows the ablation catheter (single arrow) in the anterosental region close to the His Bundle catheter (double arrow).*

While WPW syndrome may be asymptomatic, most patients with bypass tracts will experience orthodromic tachycardia or atrial fibrillation and rarely antidromic tachycardias can occur. Ventricular tachycardia or ventricular fibrillation can be precipitated by rapid ventricular rates during any of the above tachycardias and could result in sudden death (3). While this was likely to be the mechanism of ventricular tachycardia in our patient, an additional proarrhythmic effect of flecainide (4) could also have contributed.

fenone are the preferred drugs for symptomatic WPW syndrome. These potent medications are each associated with serious proarrhythmic and other systemic side-effects. Although verapamil and diltiazem could be used acutely to terminate narrow-QRS (orthodromic) tachycardias in WPW syndrome, they could prove hazardous if these patients were to develop atrial fibrillation or antidromic tachycardias.

RF ablation is the treatment of choice for symptomatic WPW syndrome(5), since it achieves a permanent cure without the



*Fig.4. Intracardiac electrogram showing continuous electrical activity in the bipolar electrogram of the RF catheter (rfd) at the site where successful radio frequency energy was subsequently delivered. Note the presence of similar continuous activity in the His bundle catheter(HBE) implying a paraHisian location of the pathway. rfu1 denotes the unipolar recording from the electrode of the RF catheter.*

need for long-term potentially hazardous anti-arrhythmic drugs. While RF ablation is frequently performed in adults and older children(6) with a high degree of efficacy and safety, it is recommended only in resistant cases in infants and young children. Case and coworkers(7) have reported their initial experience with a group of seven infants and small children (with a mean age of 10 months and average patient weight 6 kg) having incessant, medically resistant supraventricular tachycardias. They achieved successful ablation in six of these patients. Although the high rates of success and impressive safety of the technique in the short term suggests that it should be considered as first-choice therapy for chil-

dren with serious tachyarrhythmias, unresolved questions about the long-term safety of the technique suggest that a cautious approach should be taken in the application of radiofrequency ablation to the pediatric age group, and particularly in younger children and infants(8). Introduction of several catheters and production of focal endo-myocardial lesions by RF energy is technically demanding and involves higher risk at this tender age. In the present patient, an additional risk factor was the location of the bypass tract in close proximity of the His Bundle. RF ablation in such cases could damage the His Bundle, causing atrioventricular block (9). A 5F RF ablation catheter was used instead of the 7F catheter-

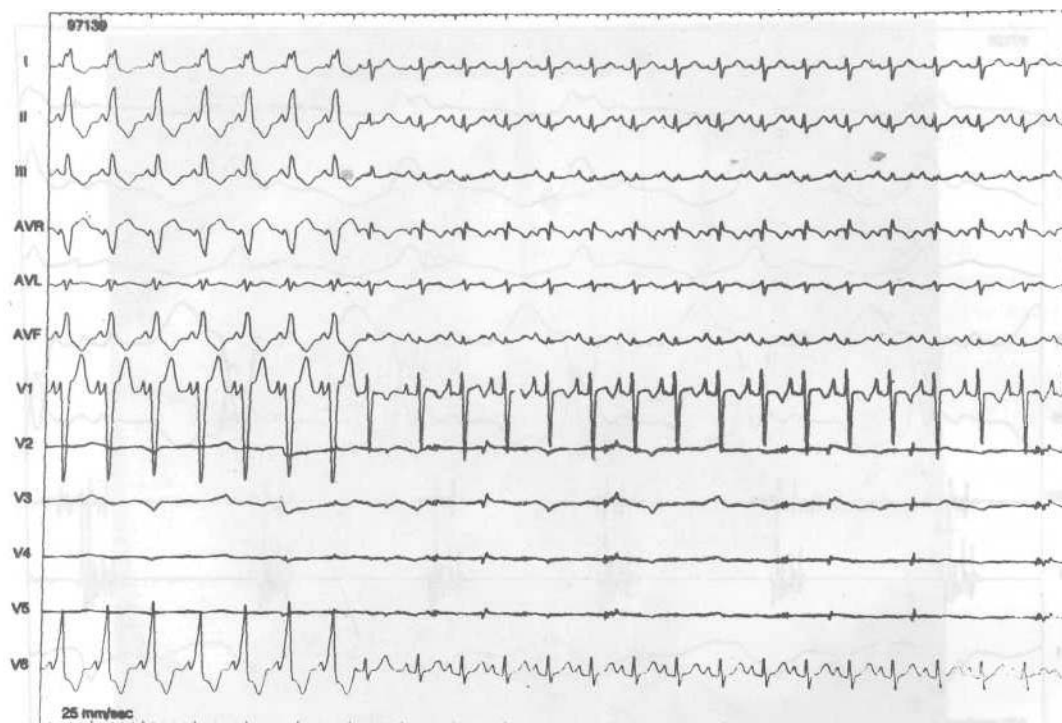


Fig. 5. Electrocardiographic tracing showing disappearance of preexcitation during successful radiofrequency energy application.

ters which are otherwise employed for older patients. This 5F catheter did not have capability for monitoring tip temperature. Hence we administered low energy of 10W, as described previously for para-Hissian pathways(10), whereas usually 30-40 W is administered. ParaHissian bypass tracts are usually close to the endocardium and the His Bundle is deeper, so if care is taken they can be ablated successfully(10).

The critical condition of the child suggested that the child would not have tolerated repeated tachycardias. This is a unique report of RF ablation as a life-saving measure in such a sick child with WPW syndrome.

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## Pulmonary Venous Occlusive Disease

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Pulmonary venous hypertension (PVH) is usually encountered clinically as a consequence of left ventricular failure, mitral valve disease, fibrosing mediastinitis and rarely because of pulmonary veno-occlu-

sive disease (PVOD). The hall-marks of PVH are pulmonary congestion and edema. Pulmonary venous hypertension elicits pulmonary arterial hypertension, which may obscure PVH clinically. PVH is said to exist when pulmonary venous pressure exceeds 12 mm Hg(1). Recently, the first case of PVOD was reported from India(2). We also report our experience with a similar patient.

### Case Report

An 8-year-old boy, resident of Jodhpur, was admitted with the complaints of cough, swelling of both feet, pain in both knees and breathlessness at rest for 7 days. He was also complaining of cough, breathlessness off and on for the past 1 year with loss of weight for which he was taking treatment from a nearby dispensary. He was in good health before this.

On admission, he was pale, had edema

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