Ivabradine for congenital junctional ectopic tachycardia in siblings

Sir,

Junctional ectopic tachycardia (JET) remains a difficult arrhythmia to manage, and persistent JET in children often results in ventricular dysfunction, heart failure, and high mortality.[1,2] Familial JET occurs in 20%–40% of cases.[3] The efficacy of antiarrhythmic agents in controlling JET is suboptimal, and many agents including digoxin, amiodarone, propranolol, and flecainide have been tried, alone or in combination.[1-3] Radiofrequency ablation is effective but is a difficult procedure in small children and is not as widely available.

We report two siblings with JET and ventricular dysfunction who were not controlled despite multiple antiarrhythmic agents, and both of them responded dramatically to ivabradine. All other drugs were gradually withdrawn, and both these patients were managed with ivabradine as monotherapy.

PATIENT 1

A 2-month-old female child weighing 3.6 kg was admitted with excessive irritability and difficulty in feeding for 1 month. She was diagnosed to have congenital JET based on narrow complex QRS tachycardia with heart rate around 190–200 beats/min and atrioventricular (AV) dissociation with ventricular rate faster than atrial rate [Figure 1a]. Echocardiogram revealed a moderate left ventricular (LV) dysfunction with ejection fraction of 40% and an otherwise structurally normal heart. Her initial medication included appropriate dosages of amiodarone, propranolol, flecainide, and enalapril. Her heart rate was controlled to 170 beats/min but the arrhythmia continued.

Ivabradine was added in 0.05 mg/kg/dose twice a day. She converted immediately to normal sinus rhythm within few hours [Figure 1b]. Over the course of the next week, all other drugs were tapered and stopped. The prolonged QT interval [Figure 1b] due to amiodarone therapy also subsequently normalized. She maintained normal sinus rhythm and her LV function was also normalized.

PATIENT 2

The elder brother of the above patient was a 2-year-old male child and was diagnosed with congenital JET in our institute soon after birth and was being treated with weight-based maximum doses of metoprolol,

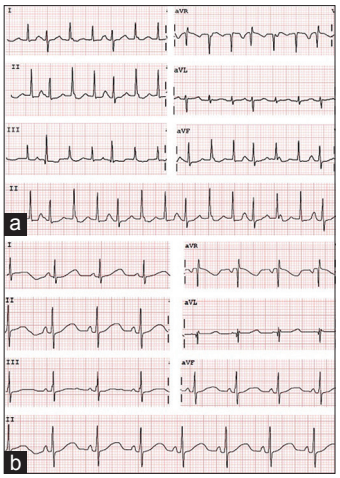

Figure 1: (a) Narrow complex tachycardia rate of 168/min, with atrioventricular dissociation and ventricular rate faster than atrial rate suggestive of junctional ectopic tachycardia. The patient was on amiodarone, propranolol, and flecainide treatment to achieve this rate control. (b) ECG showing normal sinus rhythm postivabradine therapy 4 h after the first dose

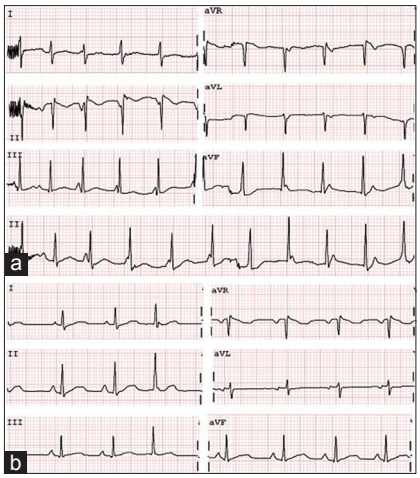

Figure 2: (a) Echocardiogram in patient 2 showing junctional ectopic tachycardia with a controlled rate of 120–130/min. (b) ECG in patient 2 after therapy with ivabradine showing normal sinus rhythm

amiodarone, and flecainide. He had moderate LV systolic dysfunction with an ejection fraction of 40%–45%. He still persisted with JET [Figure 2a] for most of the times. Due to remarkable response to ivabradine in the younger sibling, ivabradine was administered to him also at the dose of 0.05 mg/kg/dose twice a day. After the first dose of ivabradine, the patient reverted to sinus rhythm with a rate of 92 beats/min [Figure 2b]. Other antiarrhythmic drugs were tapered gradually.

Both of these patients are maintaining sinus rhythm now for over 4 months and their ventricular function have normalized.

Ivabradine for JET is more recently reported, but not widely recognized.[4,5] A small series of 5 children with congenital JET successfully treated with ivabradine has been reported.[5] Ivabradine was used in 0.05–0.1 mg/kg/d in 2 divided dosages and was increased up to 0.28 mg/kg/d if required. The drug was well tolerated without any significant side effects in that report. It has been found effective for postoperative JET as well.[6] The mechanism of action of ivabradine in the treatment of JET is not clear, but it relates to ivabradine's effects on HCN channels, which are present abundantly in AV node like tissues. Ivabradine is primarily metabolized by CYP3A4 in the gut and liver, and CYP3A4 inhibitors such as ketoconazole and diltiazem might increase the plasma levels of ivabradine. The bradycardic effects of ivabradine might be additive with amiodarone, and hence, the concurrent use may be avoided, but the combination was found to be safe in a small study.[5]

The report is to enhance the awareness about the possibility of ivabradine use in the management of congenital JET in children. Further studies seem warranted.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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