

Cardioversion in Infantile Atrial Flutter

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ABSTRACT

Atrial flutter (AFL) is a rare arrhythmia in neonatal and infantile period. Potentially, AFL might lead to severe morbidity and even a fatal outcome. However it can have a good prognosis with early diagnosis and prompt appropriate treatment. Synchronized electrical cardioversion or transoesophageal atrial overdrive pacing is recommended in both stable and unstable cases. Antiarrhythmic drugs can be tried in stable newborns though the sinus rhythm takes some time to return to normal. Excellent prognosis has been noted in newborns and infants having AFL after sinus rhythm has been restored. The risk of recurrence is low and prolonged antiarrhythmic therapy is less likely to be required. However follow-up after discharge is essential to look for any possibility of recurrent arrhythmia and possible untoward effects of treatment.

Keywords: Arrhythmia, Atrial flutter, Cardioversion.

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INTRODUCTION

Atrial flutter is a rare cardiac arrhythmia occurring in children and is recognized by regular and fast atrial activity between QRS complexes at a rate ≥ 240 beats per minute.¹ It is not always associated with structural cardiac anomalies though it might affect hearts having congenital anomalies like atrial septal defect, complex cyanotic heart defects, transposition of great arteries, Ebstein's anomaly and some valvular anomalies along with some postoperative cases such as atrial septal defect, tetralogy of Fallot, D-transposition (Mustard or Senning repair) or single ventricle (Fontan repair).^{2,3} Activation of the whole atrium has been described in atrial flutter while in postoperative cases AFL is considered to be based on re-entry mechanism in a large atrial area.⁴ Typically the reentry circuit is located at the cavotricuspid isthmus (CTI) in CTI dependent AFL. However many other mechanisms may also be present in CTI independent AFL which may originate in right atrium (RA) or left atrium (LA). The clinical presentation depends on the ventricular rate which is usually slower than the atrial rate because of an accompanying atrioventricular block.⁵ Atrial flutter can predispose to ventricular fibrillation which makes AFL a potentially lethal arrhythmia.⁶ The management depends on the aetiological factors and includes electric cardioversion to restore sinus rhythm in neonates and young infants with AFL. The other options available are transoesophageal pacing or antiarrhythmic drugs digoxin or amiodarone.⁷

Keeping in view the rarity of the condition in young children and the importance of managing AFL we are presenting this case report.

CASE REPORT

We present a case of atrial flutter diagnosed at the age of 4 months in a baby boy. The patient presented to us with parental concern of rapid heart rate for which the baby had been taken to a pediatrician who had advised 2D echocardiography. Further history taking revealed that cardiocography (CTG) during antenatal checkup had shown foetal tachycardia which was not followed or investigated postnatally. The baby weighed 2.8 kg at birth and remained an asymptomatic and well thriving baby. Transthoracic echocardiography revealed a rapid heart rate of 190 bpm along with irregular ventricular contractions with atrial and ventricular dyssynchrony. In addition, there was ventricular dysfunction with ejection fraction (EF) of 45%, dilated right atrium and right ventricle and a 10 mm ASD secundum left to right shunting. Despite these findings the baby was completely asymptomatic, with no difficulty in feeding, a respiratory rate of 34/min, no hepatomegaly and no signs of failure to thrive. A 12 Lead ECG (Figure-1A) was done immediately which showed flutter waves with 2:1 and 3:1 AV block. The ventricular rate was 174/min and flutter waves were 414/min. Baseline tests including infection screening (complete blood picture, C-reactive protein) were done and samples for TSH and T4 were sent. The baby was successfully cardioverted with 0.5 J/kg of synchronized biphasic DC shock. Heart rate came down to 130 bpm (Figure-1B). Afterwards, patient had

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continuous cardiac monitoring for 24 hours and was discharged the next day on oral propranolol.



Figure-1A): Atrial Flutter waves having saw-tooth appearance with 2:1 and 3:1 AV Block. B). Reversion with Heart Rate 130 beats per minute.

DISCUSSION

Atrial flutter in neonates and young infants is a rare type of arrhythmia, known by a sawtooth appearance on ECG with interspersed QRS complexes. The atrial rate in AFL could be as high as 500 beats/ min and shows an association with 2:1 atrioventricular (AV) conduction. Intrauterine atrial flutter is often diagnosed on CTG during the third trimester when the atrium attains a large size and can lead to hydrops foetalis and foetal heart failure. Knowledge of this arrhythmia is thus essential for its prompt management during intrauterine and neonatal life.³ Sotalol has been mentioned to be effective in 50% to 80% of the cases with Digoxin and amiodrone being the second choice for foetal AFL.⁸ In newborns AFL usually presents within the first week of life and is not associated with any structural heart abnormality.⁹ Synchronized electrical cardioversion or transoesophageal atrial overdrive pacing is recommended in both stable and unstable cases.⁷ Antiarrhythmic drugs can be tried in stable newborns though the sinus rhythm takes some time to return to normal. Digoxin is the preferred drug with the addition of flecainide or amiodarone in case of no response.¹⁰ Chronic AFL can potentially lead to compromised cardiovascular status.¹¹ However in our case there was no evidence of cardiac failure at the time of presentation.

External electrical cardioversion is often used for terminating AFL and is considered to be an effective and safe procedure reverting AFL to normal rhythm in

more than 90% cases. For electric cardioversion (ECV) a direct current preferably biphasic shock is used starting at 0.5-1 joules per kg under sedation or anaesthesia. To avoid anaesthesia, sometimes atrial overdrive is preferred by some doctors and patients which has the added benefit of being able to pace if sick sinus syndrome develops after AFL is reverted. Multifunctional devices can be implanted which allow anti-tachycardia and 50-Hertz burst pacing along with internal ECV of the AFL.⁴ The complications of electric cardioversion are hypotension, sedation related issues, possible ventricular fibrillation if shock synchronization is inappropriate, tachycardias like torsade de pointes and AFL with 1:1 conduction and diagnostic bradycardias because of unmasking a sick sinus or sick AV node.¹² Follow up with Holter ECG, and echocardiography is recommended after successful cardioversion of AFL to look for any recurrence.

Excellent prognosis has been noted in newborns and infants having AFL after sinus rhythm has been restored. The risk of recurrence is low and prolonged antiarrhythmic therapy is less likely to be required. However follow-up after discharge is essential to look for any possibility of recurrent arrhythmia & possible untoward effects of treatment.¹⁰

CONCLUSION

Atrial flutter is a rare type of cardiac arrhythmia in neonatal and early infantile period which responds well to electric cardioversion and has a low risk of recurrence.

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Author,s Contribution

Following authors have made substantial contributions to the manuscript as under:

AA: Intellectual contribution, concept and final approval

KA: Intellectual contribution, concept and final approval

SR: Idea, concept and manuscript writing

MAF: Formatting, critical review and final approval

TA: Final approval, manuscript writing and proof reading

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Infantile Atrial Flutter

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