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Case Report

Atrial Flutter in a Newborn: A Case Report

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ABSTRACT

Background: Neonatal Cardiac Arrhythmias are found in 1% to 5% of newborns during the first 10 days of life. The most common symptomatic arrhythmia in the neonatal period is Supra Ventricular Tachicardia(SVT), which has an incidence of 1/25,000. Idiopathic neonatal atrial flutter (AFL) is a rare rhythm disorder usually occurring in the first days of life and characterized by sustained tachycardia in newborns and infants with an atrial rate around 340-580 beats/minute(BMP). AFL may manifest as asymptomatic tachycardia, congestive heart failure, or hydrops and may be life-threatening and fatal.

Case presentation: We reported a 38 weeks female neanate presented with tachycardia during the first physical examination and recieved adenosine therapy and cardioversion.

Conclusion : AFL, as a rare but life-threatening rhythm disorder in the fetal and neonatal period that can cause fetal hydrops and infant death, should be considered by neonatologists.

Keywords: Atrial flutter, Newborn, Neonatal cardiac arrhythmias

Introduction

The goal of the health system is to provide the highest quality of life for most people and for this reason, we should pay attention to rare diseases specially in neonates(1).Atrial flutter (AFL), as an uncommon type of fetal and neonatal arrhythmias (2), is a classic example of re-entry tachycardia in the atrial myocardium (2,3). This type of tachycardia accounts for approximately one-third of all neonatal cardiac arrhythmias (3, 4) and occurs in 1%-5% of newborns (5). The diagnosis of AFL is usually based on a simple surface Electrocardiogram (ECG) that shows the typical continuous sawtooth pattern (2, 3). However, the diagnosis may be challenging, which needs the administration of adenosine to block atrial conduction down the atrioventricular node and allows for easy and rapid diagnosis of the classic pattern (3). In a typical neonatal AFL, the atrial rate is about 300-600 BPM (6) with generally 2:1, 3:1, or even 4:1 ventricular conduction (3).

Although patients may be asymptomatic, serious consequences may occur, such as severe heart failure that needs urgent therapy (2). There are different methods for converting neonatal AFL to normal sinus rhythm, including anti-arrhythmic drugs, pacing, and electrical cardioversion (2, 3, 4). Neonatal arrhythmias have a relatively good prognosis (2), and there is no need for prophylaxis beyond the neonatal period and chronic antiarrhythmic therapy (4).

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Case Report

We reported a 38-weak-term female baby with a birth weight of 3,300 g that was delivered by cesarean section from the 8th pregnancy of a 28-year-old mother. Although the APGAR scores were 9 and 10 at the 1st and 5th minutes, respectively, her heart rate was found as 280 bpm. The patient was transferred to the neonatal intensive care unit to continue the following management. The baseline

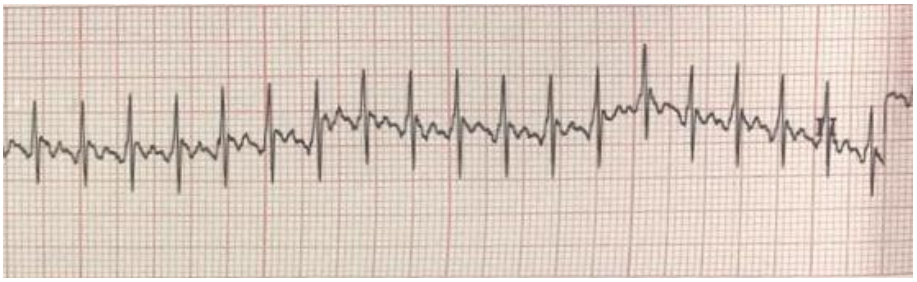

Figure 1. Baseline ECG

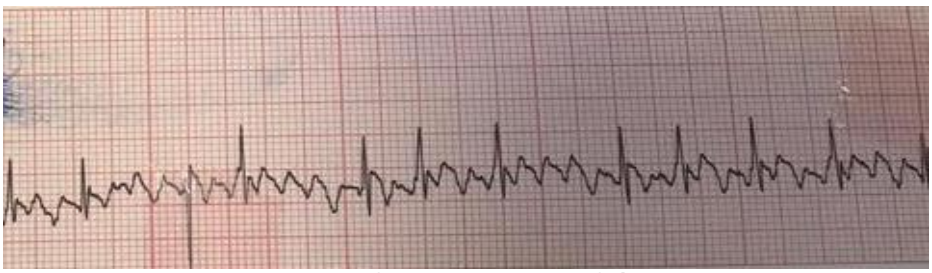

Figure 2.ECG after twice IV injections of adenosine

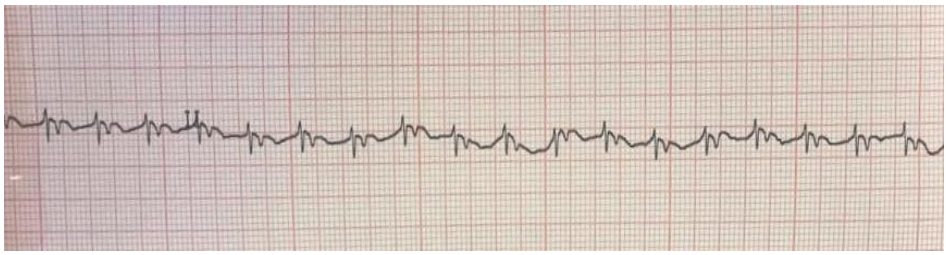

Figure 3. ECG after DC cardioversion with a dose of 2 J

ECG was consistent with supraventricular tachycardia (SVT) (Figure 1). At the time the baby was hemodynamically stable, immediate medical therapy was started with intravenous (IV) adenosine injection. IV bolus adenosine with dosages of 156 µg and 780 µg was administered twice due to the resistance of SVT to the first dose. The continuous cardiac monitoring revealed decreasing heart rate, and the following ECG demonstrated the 3:1 atrioventricular conduction AFL pattern (Figure 2). As AFL remained resistant to the medical therapy, synchronized direct current (DC) cardioversion was performed with the dose of 0.5 J/kg, and following the first shock, the rhythm changed to normal (Figure 3). The next day, Doppler echocardiography was done and revealed a structurally normal heart with preserved cardiac function. The chest X-ray taken during the admission time showed no abnormal pathology. During hospitalization, the baby did not experience any further episodes of AFL.

Discussion

Atrioventricular re-entry tachycardia and AFL are the most common underlying causes of SVT seen in neonates with no congenital cardiac anomalies. AFI rarely occurs outside the neonatal period (2) and is usually encountered in the first week of life (7). The most commonly determined mechanism for SVT in both the fetus and newborn is Atrioventricular re-entry (8). The atrial myocardium located around the tricuspid valve is the substrate or circuit responsible for the re-entry (3). Other mechanisms, such as abnormal automaticity or triggered activities, are less common and observed more frequently with increasing age (2).

As previously reported in a study by Pike JI et

al., fetuses and neonates with AFL are more likely to be macrosomic or have diabetic mothers (9). However, our case had none of the risk factors.

AFL can be a life-threatening situation and lead to death (4, 6). Medical therapies, using anti-arrhythmic drugs and atrial pacemakers or cardioversion are the treatment options based on hemodynamic stability (2, 4). When the patient is hemodynamically stable, the first line of therapy is anti-arrhythmic medications, while cardioversion is the choice in case of an unstable patient (7). Although medical therapy is a non-invasive method, it may be associated with some adverse effects that need precise monitoring, such as ventricular arrhythmias, atrioventricular block, hepatotoxicity, and thyroid abnormalities (4).

Atrial pacing with a success rate of 30%-70% is proven to have more advantages over medical therapy, including immediate rhythm conversion with no need for either long-term monitoring or laboratory tests. There are some significant drawbacks to pacing, such as intracardiac or transoesophageal catheter placement, the requirement of patient sedation, and a small but significant risk of degeneration of AFL into atrial fibrillation (10).

Several studies have demonstrated that DC cardioversion is the most effective method of cardioversion with a success rate of more than 85% (2, 4), as well as the most cost-effective and presumed shorter hospitalization (4). AFL cardioversion in neonates with as low as 0.25-0.5 J/kg voltage is often successful using current biphasic devices (2). Chances of AFL relapsing (6), need for sedation, risk of converting AFL to serious arrhythmia, and skin burning are some of the cardioversion's drawbacks (4).

Conclusion

Since AFL may result in severe heart failure and even death, it should be noted that careful clinical examination and on-time diagnosis of cardiac arrhythmia are of significant importance. AFL in treated infants has an excellent prognosis with a low risk of recurrence, and usually, there is no need for long-time anti-arrhythmic therapies. Despite all these, it should be mentioned that close follow-up even after a discharge is highly important to check for any suspicious signs of recurrence or possible side effects of treatments.

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