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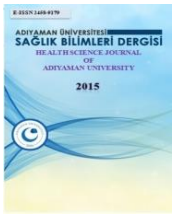

Araştırma/Research

Treatment of fetal persistent supraventricular tachycardias: Experience in a tertiary perinatal medicine center

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Abstract

Objective: To evaluate the outcomes of persistent fetal supraventricular tachycardia patients treated in our clinic.

Material and Methods: Patients who were treated due to fetal persistent supraventricular tachycardia in one and a half year period are evaluated retrospectively. Patient specific treatments and outcomes are recorded. The efficacy of drugs is reported.

Results: Total eight of fetal persistent supraventricular tachycardia cases were treated in this period. Three out of eight were hydropic fetuses. Digoxin alone digoxin combined sotalol were used for the treatment according to the presence of hydrops fetalis. Antiarrythmic treatment was successful at seven out of total eight fetal persistent supraventricular tachycardia cases.

Conclusion: Digoxin alone seems effective for supraventricular tachycardia treatment if fetal hydrops is not present. In case of fetal hydrops, addition of sotalol may be a good alternative.

Keywords: Digoxin, Fetal Arrhythmia, Hydrops Fetalis, Sotalol

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Fetal persistan supraventriküler taşikardilerin tedavisi: Tersiyer bir perinatal tıp merkezi deneyimi

Özet

Amaç: Kliniğimizde tedavi edilen persistan fetal supraventriküler taşikardi hastalarının sonuçlarını değerlendirmek.

Gereç ve Yöntemler: Bir buçuk yıllık dönemde fetal persistan supraventriküler taşikardi nedeniyle tedavi edilen hastalar retrospektif olarak değerlendirildi. Hastaya özel tedavi ve sonuçları kaydedildi. İlaçların etkinliği bildirildi.

Bulgular: Toplam sekiz fetal persistan supraventriküler taşikardi vakası bu dönemde tedavi edildi. Sekiz hastanın üçü hidropik fetüslerdi. Hidrops fetalis varlığına göre tedavi için sadece digoksin ve digoksinle kombine sotalol kullanılmıştır. Antiaritmik tedavi, toplam da sekiz fetal persistan supraventriküler taşikardi vakasının yedisinde başarılıydı.

Sonuç: Tek başına digoksin, eğer fetal hydrops yok ise supraventriküler taşikardi tedavisinde etkili görünmektedir. Fetal hidrops durumunda, sotalol ilavesi iyi bir alternatif olabilir.

Anahtar Kelimeler: Digoksin, Fetal Aritmi, Hidrops Fetalis, Sotalol

Introduction

Fetal arrhythmias are encountered in approximately one percent of pregnancies. They are commonly benign and have no negative effect on the prognosis of pregnancy. Premature atrial contraction is the most frequent arrhythmia during pregnancy and commonly benign characterized, requires no intervention. However, a benign-onset arrhythmia may alter its character on follow-up, resulting in fetal hydrops and fetal loss (1, 2). Fetal tachyarrhythmia describes a fetal heart rate (FHR) over 160 beats per minute (bpm). The types of fetal tachyarrhythmia are grouped in three types: sinus tachycardia, supraventricular tachycardia (SVT) and atrial flutter (3).

Five to 10 percent of fetal tachyarrhythmias are associated with congenital heart defects (4). SVT is the most frequent type of fetal tachyarrhythmia and accounts for up to 90 percent of fetal tachycardias (5). FHR is characterized in a regular rate that's typically between 220 and 260 bpm. FHR is rarely higher as 300 bpm. SVT periods are commonly intermittent but SVT can be sustained for hours or days (6). The mechanism of fetal tachycardia for SVT is usually atrioventricular reentrant tachycardia and an accessory connection between atria and ventricle is the cause of tachycardia. Atrio-ventriucular (AV) conduction rate is 1:1 in fetal re-entrant

SVT. This conduction rate is 2:1 in atrial flutter and only half of signals can be conducted to ventricles (7).

Treatment of fetal SVT should not be delayed if it's persistent. Persistent tachycardia is being described when the SVT period involves 50% or higher of fetal cardiac rhythm. Persistent SVT leads to fetal heart failure and hydrops. Hydrops is more likely to develop prior to 32 weeks pregnancy (8).

In this study we reported our experience on fetal SVT patients treated and followed, in a busy tertiary perinatal medicine center, in one year period.

Material and Methods

This retrospective descriptive study is conducted in Department of Obstetrics and Gynecology, Maternal-Fetal Medicine Unit, Sanliurfa Education and Research Hospital, Sanliurfa, Turkey. Retrospectively collected data is acquired from patients who have been treated and followed due to persistent fetal SVT between July 2017 and July December 2018. The unit is a busy tertiary centre at east of Turkey getting referral patients from the region with approximately 40000 deliveries in a year. Approval and permission for the study about provision of patient data is taken from institutional board (registration number: 96537014-000-1244). All patients were underwent detailed about the evaluation of fetal heart and differential diagnosis of fetal arrhythmia. The ultrasound device used for the diagnosis and evaluation was a Voluson E8 system (GE Healthcare, Milwaukee, WI). Fetal cardiac rhythm evaluation is made by pulse wave Doppler sonography from left ventricular outflow location. All patients with persistent (if present >50% of the time during a 30 minutes sonographic evaluation) SVT and treated were included in the study. Fetal atrial flutter cases are not included in this study. If a major fetal cardiac anomaly was present these are excluded from the study.

First line therapy after the diagnosis of fetal persistent SVT was maternal oral digoxin to all cases irrespective of fetal hydrops (oral loading dose of 1.5mg/day followed by a maintenance regimen of 1mg/day). After 72 hours, if there was no response, the treatment was changed to second-line therapy and sotalol was added (starting dose 80 mg orally once a day; increased up to 240mg/day max) to digoxin. Also, digoxin dose was reduced to 0.25mg/day. Daily electrocardiograms were obtained to look for QT prolongation to evaluate the maternal

sotalol toxicity for first five days of drug use and then weekly. After normalization of fetal cardiac rhythm, patients were continued the drugs during pregnancy. All patients are consulted to cardiology prior to treatment about maternal status and drug use.

After discharge from hospital all patients were underwent to serial follow-up, performed once weekly for maternal cardiovascular profile and optimization of drugs as per the response of fetal arrhythmia. All fetuses were followed up to term if fetal heart rate normalized or earlier if there was a fetal hemodynamic indication.

Statistical analyses were performed using MedCalc Statistical Software (MedCalc Software, Ostend, Belgium). Statistical data was reported descriptively due to small number cases included in the study. Categorical variables were given as median (minimum-maximum).

Results

A total of eight patients were diagnosed having persistent fetal SVT who were started antiarrythmic drugs, during the study period. The maternal age at the diagnosis was 29 ± 4.3 years. The mean GA at diagnosis was 26.7 ± 2.2 weeks. Median gravida was three (2-5). Hydrops fetalis was present in three fetuses. Any major cardiac anomaly was not present at all of fetuses with persistent SVT. One patient had a history of one pregnancy with fetal SVT leaded to fetal hydrops and fetal demise at the previous pregnancy. She was treated with flecainide during that pregnancy. This fetus was hydropic again. All non-hydropic five fetuses were responded to digoxin in the first week of treatment and fetal cardiac rhythm of all were normalized until the delivery. The three hydropic fetuses did not respond to digoxin treatment in first 72 hours and the treatment was changed to digoxin combined sotalol. These were responded to second-line therapy in the first week and fetal cardiac rhythm was normalized. Pregnancies were continued uneventful at two of these under antiarrythmic drug therapy. The arrhythmia was recurred under treatment two weeks later after discharge and drug dose could not be increased due to maternal bradycardia. Fetal hydrops was increased and baby was delivered by cesarean section due to fetal distress at 33th week of pregnancy. This baby died three days after delivery. Patient specific characteristics and outcomes of pregnancies are reported in **Table 1**.

Table 1: Patient distribution, treatment options and pregnancy outcomes

	Maternal Age	GA at diagnosis	Hydrops	Treatment	GA at delivery	Neonatal outcome
Case 1	24	28	negative	Digoxin	39	good
Case 2	37	27	negative	Digoxin	38	good
Case 3	33	24	negative	Digoxin	39	good
Case 4	32	29	negative	Digoxin	40	good
Case 5	25	24	negative	Digoxin	39	good
Case 6	27	27	positive	Digoxin+Sotalol	38	good
Case 7	29	30	positive	Digoxin+Sotalol	38	good
Case 8	28	27	positive	Digoxin+Sotalol	33	neonatal ex

Abbreviations: Gestational age (GA).

Discussion

Fetal hydrops may be the main referral indication of fetal tachyarrhythmias. The presence of fetal hydrops seems to be the most important factor affecting the success of antiarrythmic treatment. In our study group, all non-hydropic fetuses were responded to first-line therapy with maternal oral digoxin. Hydropic fetuses did not respond and the treatment was changed to second–line therapy. Fetal mortality is being known to be 50% associated with the presence of fetal hydrops. This mortality rate may be decreased to 10% with effective treatment (9). Placental passage of digoxin is being reduced in case of fetal hydrops and antiarrythmic efficacy reduces (10). The main goal of antiarrythmic treatment is to provide a normal fetal cardiac rhythm but if this is not possible reducing the arrhythmic rate of fetal cardiac rhythm should be aim to prevent fetal hydrops.

Maternal serum digoxin levels were not evaluated in our study group. Digoxin dosages were determined according to maternal cardiac status and fetal response. When maternal serum digoxin levels are taken into consideration, the target level is 1 to 2 ng/ml (8). However, maintenance dose of digoxin used was maximum 1mg/day in our study group. Maternal sotalol toxicity was evaluated with electrocardiograms by evaluating QT interval. Corrected QT interval >480 milliseconds suggests sotalol toxicity (11). In our study population one patient was not tolerated sotalol dosage over 240mg/day.

Jaeggi et al. reported that flecainide and digoxin as the first line treatment agents and had better conversion rates than sotalol on a large study group with 98 SVT cases (8). However, 60% success at conversion is reported when digoxin is combined with sotalol as a second line

therapy (12). In our study group, sotalol was used as second-line therapy when digoxin was not successful. Sotalol was successful on conversion to normal rhythm at two out of three patients with fetal hydrops.

An interesting finding in our study group was fetal SVT at a patient's consecutive two pregnancies. That was the third pregnancy of this patient and prior pregnancy was resulted with fetal demise. Also, SVT was resistant to treatment again and conversion was not successful. We could not find a specific factor for recurrence and resistance to drugs retrospectively.

The small number of cases included in the study and retrospective design are the major limitations of this study. Also, we could not have the data about the non-persistent SVT cases due to inadequate medical records. However, we describe a first and second-line therapy alternative for specifically to fetal persistent SVT treatment. All fetal tachyarrhythmias are not included in the study.

Overall, despite the limitations of this study, digoxin alone seems to be an effective first-line therapy for non-hydropic fetuses with SVT. In case of fetal hydrops, digoxin combined sotalol may be a good alternative for conversion to normal cardiac rhythm.

Funding
None

Conflicts of Interest
None

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