

■ Case Report

## Transient Fetal Non-Immune Second-Degree 2:1 Atrioventricular Block: A Case Report

### *Geçici Fetal İmmün Olmayan Atriyoventriküler Blok 2:1 Atriyoventriküler Blok: Olgu Sunumu*

Zornitsa Vassileva\*<sup>1</sup> , Elena Pavlova<sup>2</sup> , Dimiter Markov<sup>2</sup> , Petya Radulova<sup>3</sup> 

<sup>1</sup>Department of Pediatric Cardiology, Medicinski University, Sofia, Bulgaria

<sup>2</sup>Department of Obstetrics and Gynecology, Medicinski University, Sofia, Bulgaria

<sup>3</sup>Department of Neonatology, Universitetska Akusero Ginekologicna Bolnica Majcin Dom EAD, Sofia, Bulgaria

#### Abstract

We present a case of a transient second-degree 2:1 conduction atrioventricular (AV) block in a fetus with a structurally normal heart and fetal heart rate of 74 bpm at 21 weeks of gestation (WG). The maternal medical history was unremarkable and the autoantibody screening was negative. The subsequent follow-up documented complete resolution of the AV block at 25 WG. The fetal heart rate and AV conduction remained normal until delivery. The postnatal electrocardiogram (ECG) demonstrated normal sinus rhythm and duration of corrected QT (QTc)-intervals. These observations remained normal upon follow-up. Although uncommon, second-degree AV block can be one of the underlying causes of fetal bradycardia.

**Keywords:** fetal; atrioventricular block; second-degree; transient

#### Öz

Biz yapısal olarak normal kalp ve 21. gebelik haftasında (w.g.) fetal kalp hızı 74 bpm olan bir fetüste geçici ikinci derece 2:1 iletim AV bloğu olgusunu sunuyoruz. Annenin tıbbi öyküsünde özellik yoktu ve otoantikör taraması negatifti. Sonraki takip, AV bloğunun 25 w.g'de tam çözünürlüğünü belgeledi. Fetal kalp hızı ve AV iletimi doğuma kadar normal kaldı. Doğum sonrası EKG normal sinüs ritmini ve QTc aralıklarının süresini gösterdi. Takip sonrasında bu gözlemler normal kaldı. Nadir de olsa ikinci derece AV blok, fetal bradikardinin altında yatan nedenlerden biri olabilir.

**Anahtar Kelimeler:** fetal; atriyoventriküler blok; ikinci derece; geçici

## 1. Introduction

The atrioventricular (AV) block represents an abnormal conduction between the atria and the ventricles. It can be first-degree (prolonged AV conduction), second-degree (intermittent AV conduction), or third-degree with complete interruption of AV conduction (complete AV block - CAVB). About 45% of cases with CAVB are associated with congenital heart defects (CHD) – left isomerism, congenitally corrected transposition of the great arteries, etc. Other 50% are immune-mediated - maternal anti-Sjögren's syndrome-related antigen A autoantibodies (anti-SSA) and anti-Sjögren's syndrome type B antibodies (anti-SSB) and only about 5% of cases are isolated (1-3). Most often the impairment of the AV node is permanent and the AV conduction is irreversibly disrupted (4). Rarely, an isolated transient non-immune second-degree AV block can be observed (5-6).

## 2. Case Presentation

A 33-year-old, gravida 2 para 1 (G2P1) was referred for fetal echocardiography at 21 WG due to fetal bradycardia (fetal heart rate (FHR) = 70 beats per minute (bpm)) detected during a routine second-trimester scan. The patient medical and obstetric history was unremarkable. No previous medication use, nor any suspicion of past maternal infection was reported. The fetal echocardiogram demonstrated a structurally normal heart with normal systolic function. However, the fetal heart rate was 74 bpm. M-mode (Figure 1) and Pulsed wave Doppler (Figure 2) examination revealed a second-degree 2:1 conduction AV block.

The atrial rate was 149 bpm, while the ventricular rate - 74 bpm. The fetal cardiovascular function was normal.

ECG of both parents demonstrated a regular sinus rhythm with normal QTc-intervals. The maternal laboratory tests including complete blood count, electrolytes, renal, hepatic, thyroid function, and anti-SSA and anti-SSB antibodies were within normal range. The follow-up examination repeated one week later revealed the persistence of the 2:1 AV block with normal fetal cardiac function. The patient was re-scanned again one week later. This time a normal fetal heart rate of 130-145 bpm was documented. The third fetal echocardiography at 25 WG demonstrated a fetal heart rate of 134-144 bpm with normal AV conduction (Figure 3).

The patient was followed up regularly and the fetal heart rate, as well as the AV conduction, remained normal until delivery. A female neonate was delivered transvaginally, with a birth weight of 3010 g, 48 cm in length. The APGAR score in the first and fifth minute was 7 and 9, respectively. The adaptation period was unremarkable with neonatal heart rate between 95 and 130 bpm in the first seven days of life. The postnatal echocardiography revealed a structurally and functionally normal heart. The serial ECGs on the first, third, and fifth days demonstrated regular sinus rhythm, normal AV-conduction and QTc-intervals. The complete blood count, blood culture, and blood gas analysis were within reference ranges. The newborn was discharged home on the eighth day postpartum, weighing 3370 g.

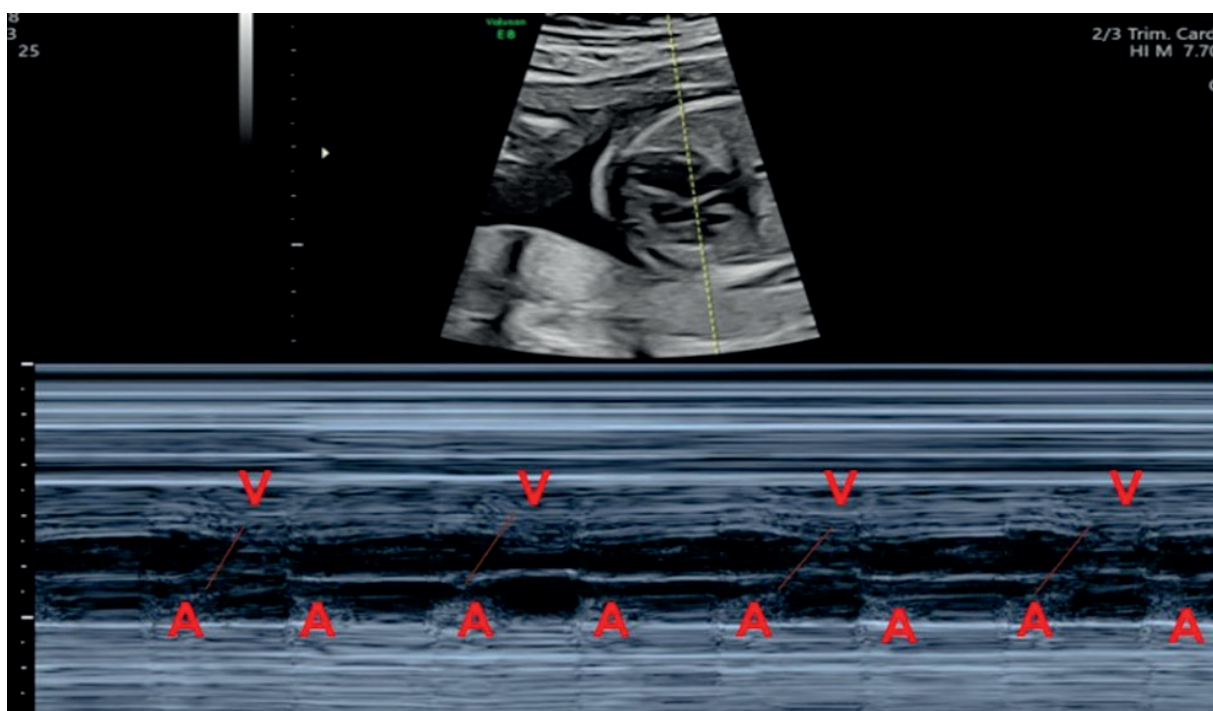


Figure 1. M-mode tracing through the right atrium and the left ventricle revealing 2:1 atrioventricular conduction at 21 WG



Figure 2. Doppler tracing of the left ventricular inflow/outflow demonstrating 2:1 atrioventricular conduction

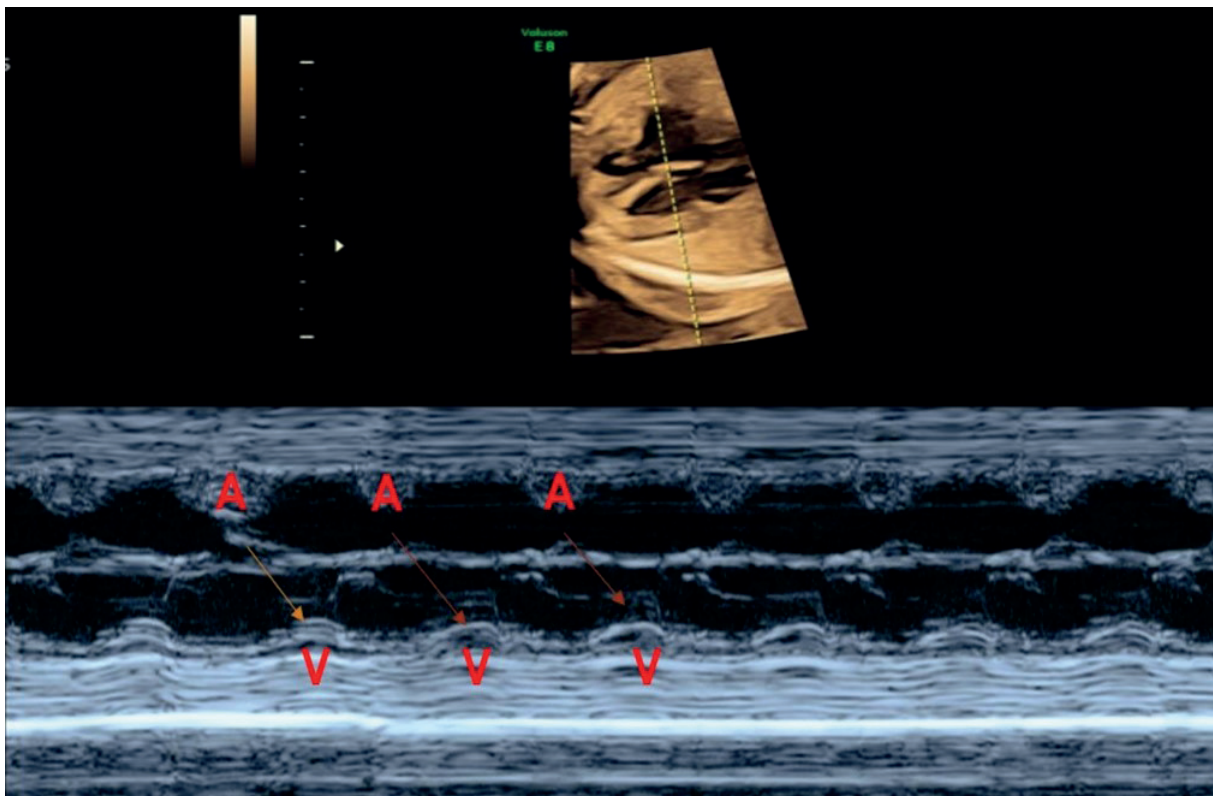


Figure 3. M-mode tracing through the right atrium and the left ventricle revealing 1:1 atrioventricular conduction at 25 WG

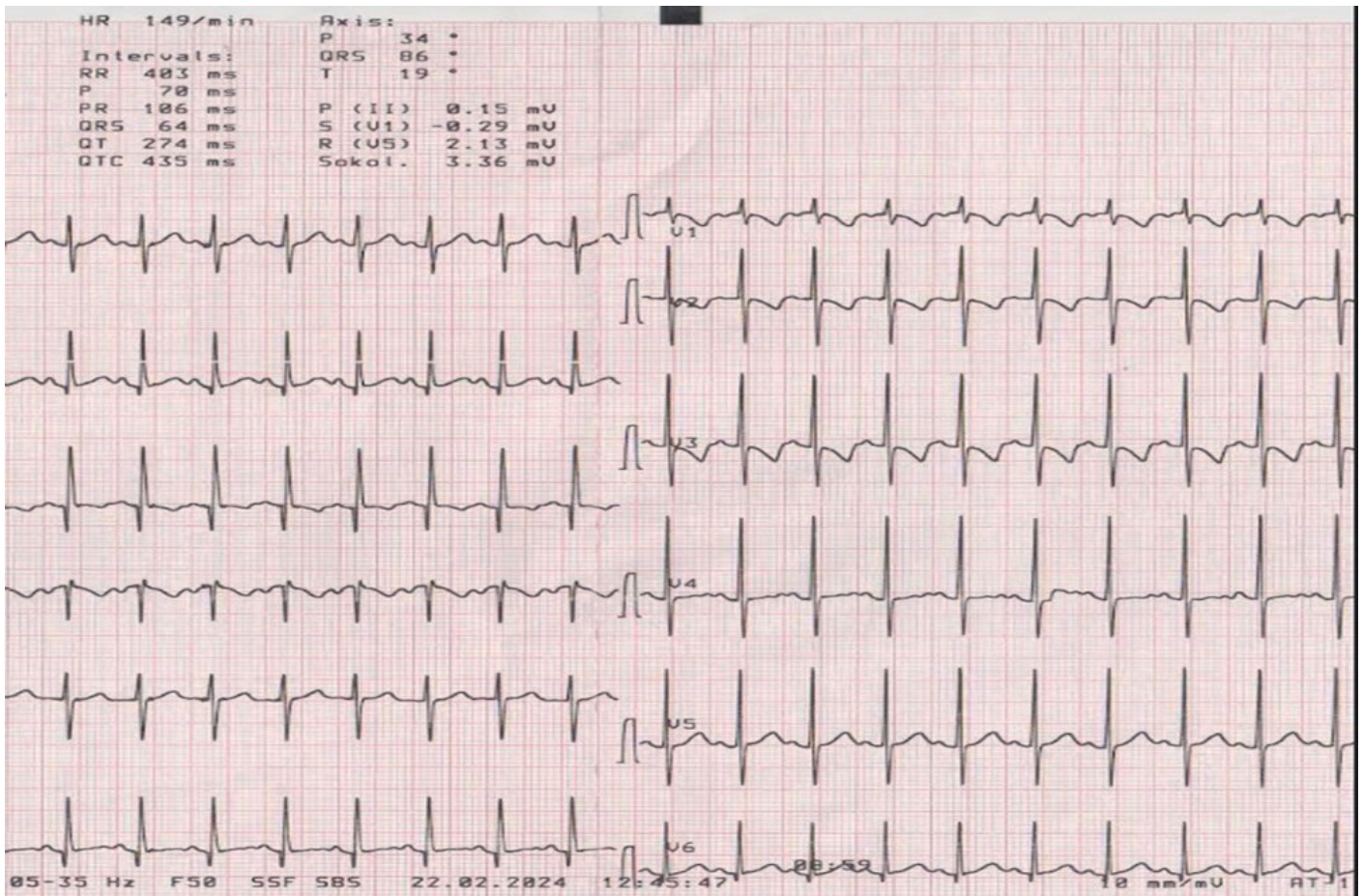


Figure 4. ECG of the newborn at one month of age demonstrating normal sinus rhythm and QTC-interval

At the end of the first and third months of age the baby was in good condition, with normal weight gain, regular heart rate of 120-149 bpm, normal ECG (Figure 4) and echocardiogram.

### 3. Discussion

We present an unusual case of transient non-immune fetal 2:1 AV block observed in the mid-trimester. Evidence suggests that second-degree AV-block can progress to complete AV block (CAVB) (1,2). Consequently, the differential diagnosis of CAVB should be thoroughly investigated in all affected cases - structural heart abnormalities (left atrial isomerism, discordant atrioventricular connections), immune-mediated AV block, and long-QT syndrome (LQTS). All these were excluded based on the findings of a normal fetal echocardiogram, negative maternal serology, and normal ECG of both parents.

There was a negative history of maternal infection throughout pregnancy in our case. Nevertheless, it can be hypothesized that the mother could have had a subclinical viral infection causing a transient impairment of the fetal AV node which spontaneously resolved later in gestation. Another presumption might be

that this transitory fetal AV block could have been the result of a relative immaturity of the fetal conduction system. This hypothesis has been suggested by other authors, as well (5,6).

To the best of our knowledge, only a few cases of transient non-immune self-resolving 2:1 fetal AV block have been described in the literature. Breur et al. report four cases of transient non-immune fetal AV-block over a 14-year observation period in a single center (5). In half of them, the AV block was complete, and in the rest - it was second-degree. The fetal heart appeared to be structurally normal and negative maternal serology was observed. In all reported cases, the fetal heart rate was 70-85 bpm and the AV block resolved spontaneously until delivery. Postnatal ECG patterns revealed regular sinus rhythm. Kikano et al. also describe four cases of transient non-immune AV block with spontaneous resolution (6).

Second-degree AV block with intermittent AV conduction can be a possible cause of fetal bradyarrhythmia. A thorough investigation for underlying pathology should be performed in all affected cases. When structural cardiac abnormalities, maternal autoimmune disease, and hereditary channelopathy



are excluded, a favorable perinatal outcome with spontaneous resolution and normal sinus rhythm is expected to occur in most patients.

#### **Author contribution**

Study conception and design: ZV; draft manuscript preparation: ZV, EP, and PR; revision and supervision: DM. All authors reviewed the results and approved the final version of the manuscript.

#### **Ethical approval**

Written and verbal consent was obtained for this case report.

#### **Funding**

The authors declare that the study received no funding.

#### **Conflict of interest**

The authors declare that there is no conflict of interest.

#### **Yazar katkısı**

Araştırma fikri ve tasarımı: ZV; araştırma metnini hazırlama: ZV, EP ve PR; gözden geçirme ve denetim: DM. Tüm yazarlar araştırma sonuçlarını gözden geçirdi ve araştırmanın son halini onayladı.

#### **Etik kurul onayı**

Bu vaka sunumu için yazılı ve sözlü onam alınmıştır.

#### **Finansal destek**

Yazarlar araştırma için finansal bir destek almadıklarını beyan etmiştir.

#### **Çıkar çatışması**

Yazarlar herhangi bir çıkar çatışması olmadığını beyan etmiştir.

## **References**

1. Berg C, Geipel A, Kohl T, et al. Atrioventricular block detected in fetal life: associated anomalies and potential prognostic markers. *Ultrasound Obstet Gynecol.* 2005;26(1):4-15. [\[Crossref\]](#)
2. Pruetz JD, Miller JC, Loeb GE, Silka MJ, Bar-Cohen Y, Chmait RH. Prenatal diagnosis and management of congenital complete heart block. *Birth Defects Res.* 2019;111(8):380-8. [\[Crossref\]](#)
3. Hunter LE, Simpson JM. Atrioventricular block during fetal life. *J Saudi Heart Assoc.* 2015;27(3):164-78. [\[Crossref\]](#)
4. Lopes LM, Tavares GMP, Damiano AP, et al. Perinatal outcome of fetal atrioventricular block: one-hundred-sixteen cases from a single institution. *Circulation.* 2008;118(12):1268-75. [\[Crossref\]](#)
5. Breur JM, Oudijk MA, Stoutenbeek P, Visser GH, Meijboom EJ. Transient non-autoimmune fetal heart block. *Fetal Diagn Ther.* 2005;20(2):81-5. [\[Crossref\]](#)
6. Kikano SD, Killen SAS. Transient fetal atrioventricular block: A series of four cases and approach to management. *J Cardiovasc Electrophysiol.* 2022;33(10):2228-32. [\[Crossref\]](#)