



## Atrioventricular (AV) block and sinus arrest associated with dipyridamole infusion

Mahdi Khalili MD<sup>(1)</sup> , Mehrdad Jahani<sup>(2)</sup> 

### Case Report

#### Abstract

**BACKGROUND:** The use of dipyridamole for thallium-201 imaging has proved very successful in demonstrating coronary arterial disease, and a combination of dipyridamole and dynamic exercise is becoming widely used. Dipyridamole is safe when given intravenously, although transient noncardiac side effects are common; side effects such as chest pain, headache, and dizziness. These side effects are mostly mild, and can be treated with aminophylline.

**CASE REPORT:** We describe a 45-year-old woman with normal baseline electrocardiography (ECG) and unremarkable physical examination, referred for myocardial thallium scan with dipyridamole. A few seconds after infusion of dipyridamole, her ECG developed first-degree atrioventricular (AV) block, then, 2:1 AV block, complete heart block (CHB), and sinus arrest. After aminophylline infusion, junctional escape rhythm was seen, and a few seconds later, rhythm changed to sinus rhythm. Thallium scan was negative for ischemia.

**CONCLUSION:** High-grade AV block after dipyridamole has been described in few case reports, and mostly was associated with transient myocardial ischemia; it seems that the presence of conduction abnormalities at baseline is a risk factor. But in our case, the sinus arrest and AV block occurred without evidence of ischemia in myocardial perfusion imaging, and we think it can be an unwanted complication of dipyridamole; clinicians should be aware of bradyarrhythmia as a possible complication of dipyridamole. An alternative explanation is that this arrhythmia can be caused by vagal activity; and another possibility is that the imaging study was false negative.

**Keywords:** Dipyridamole; Cardiac sinus arrest; Myocardial perfusion imaging

*Date of submission:* 16 Feb. 2021, *Date of acceptance:* 10 May 2021

#### Introduction

The use of dipyridamole for thallium-201 imaging has proved very successful in demonstrating coronary arterial disease (CAD), and a combination of dipyridamole and dynamic exercise is becoming widely used.<sup>1</sup> Dipyridamole causes coronary arteriolar vasodilation by increasing interstitial adenosine levels by inhibition of both adenosine deaminase and facilitated cellular adenosine uptake. Differential flow changes occur in coronary arteries if a significant luminal stenosis exists. Dipyridamole is safe when given intravenously although transient noncardiac side effects are common.<sup>2</sup> Side effects such as chest pain, headache, and dizziness are mostly mild, and can be treated with aminophylline.<sup>3</sup>

Cases of atrioventricular (AV) block and sinus arrest following the dipyridamole infusion have been previously reported. In a large-scale study of 10451 patients underwent high-dose dipyridamole echocardiography, only 1 patient developed short-

lasting asystole that was resolved with aminophylline.<sup>4</sup> High-grade AV block after dipyridamole has been described in a few case reports, and mostly was associated with transient myocardial ischemia;<sup>2,5,6</sup> but in only one case report, sinus arrest occurred in absence of ischemia.<sup>3</sup>

We describe a rare case of AV block and long-lasting sinus arrest following dipyridamole infusion in context of normal baseline electrocardiography (ECG) and myocardial perfusion study.

#### Case Report

A 45-year-old woman with past history of hypertension and dyslipidemia referred to us

**How to cite this article:** Khalili M, Jahani M. Atrioventricular (AV) block and sinus arrest associated with dipyridamole infusion. *ARYA Atheroscler* 2022; 18: 2381.

1- Cardiologist, Rajaie Cardiovascular Medical and Research Center, Iran University of Medical Sciences, Tehran, Iran

2- Baharan Nuclear Medicine Center, Tehran University of Medical Sciences, Tehran, Iran

Address for correspondence: Mahdi Khalili; Cardiologist, Rajaie Cardiovascular Medical and Research Center, Iran University of Medical Sciences, Tehran, Iran; Email: [dr.ma.khalili@gmail.com](mailto:dr.ma.khalili@gmail.com)

because of atypical chest pain for myocardial thallium scan with dipyridamole. The baseline ECG was normal sinus rhythm without conduction abnormality or ST-T change (Figure 1). Physical examination was unremarkable.



**Figure 1.** Baseline electrocardiography (ECG) of the patient

She lay on the bed. Blood pressure and ECG monitoring was established. An angiocatheter was inserted in her dorsal right hand. The procedure was explained to her, and no sign of anxiety or stress was observed. The blood pressure was 85/145 mmHg, and pulse rate was 89 per minute. She had no signs of chest pain, shortness of breath, or neurological symptoms (such as dizziness or vertigo...).

Dipyridamole was infused while the patient was in the supine position, and blood pressure and ECG were continuously monitored. A few seconds after infusion of dipyridamole, her ECG developed first-degree AV block, then, 2:1 AV block, complete heart block (CHB), and sinus arrest.

Intravenous aminophylline infused immediately after CHB. After aminophylline infusion, junctional escape rhythm was seen, and a few seconds later, rhythm changed to sinus rhythm with premature atrial beats. The patient was semiconscious. This whole scenario took 14.4 seconds, and asystole lasted about 14 seconds (Figure 2).



**Figure 2.** Continues electrocardiography (ECG) tracing of lead I, II, and III

4-hour ECC monitoring in the emergency unit showed no rhythm disturbance, and patient was fully conscious without any cardiac (such as chest pain or dyspnea...) or non-cardiac (such as dizziness or any disturbance in consciousness) symptoms. Thallium scan was negative for ischemia. Patient refused any other study and longer monitoring.

### Discussion

Transient second- or third-degree AV block or sinus arrest is very rare (with prevalence of about 0.45%) after dipyridamole infusion, and is asymptomatic in the majority of cases. Intracardiac electrophysiologic studies (EPS) have demonstrated that intravenous dipyridamole increases sinus node automaticity, reduces atrial, AV nodal and ventricular refractory periods, and prolongs intra-atrial and AV nodal conduction.<sup>5</sup>

High-grade AV block after dipyridamole has been described in few case reports, mostly associated with transient myocardial ischemia, and assumed to be intranodal. It seems that the presence of conduction abnormalities at baseline is a risk factor;<sup>3</sup> but in our case, the baseline ECG was normal with no evidence of ischemia in myocardial perfusion study.

Massalha et al. presented a similar case who had a normal baseline ECG but developed sinus arrest after dipyridamole infusion without evidence of ischemia on the myocardial perfusion study. They believed direct effect of dipyridamole on SA node may be responsible for the development of sinus arrest in part of cases.<sup>3</sup> But it is exceedingly rare. We could find only four similar case report in literature.<sup>2,3,5,6</sup> All of them was associated with ischemia except one of them.<sup>3</sup>

In our case, the sinus arrest and AV block occurred without evidence of ischemia in myocardial perfusion imaging, and we think it can be an unwanted complication of dipyridamole. Clinicians should be aware of bradyarrhythmia as a possible complication of dipyridamole. An alternative explanation is that this arrhythmia could have been

caused by vagal activity. And another possibility is that the imaging study was false negative.

### Conclusion

Although it is very rare, but dipyridamole infusions may cause bradyarrhythmia (including high-grade AV block or sinus arrest) as an unwanted side effect.

### Acknowledgments

We would like to express our great appreciation to Zahra Nematı for helping in stabilizing the patient during the test, and Mahboubeh Sadat Hoseini for her valuable help in writing the article.

### Conflict of Interests

Authors have no conflict of interests.

### Authors' Contribution

SY: Idea, study design, evaluation; FK: Data collection; SZ: Writing; MK: Data analysis and statistical analysis; IC: Editing and literature search.

### References

1. Walker PR, James MA, Wilde RP, Wood CH, Rees JR. Dipyridamole combined with exercise for thallium-201 myocardial imaging. *Br Heart J* 1986; 55(4): 321.
2. Pennell DJ, Underwood SR, Ell PJ. Symptomatic bradycardia complicating the use of intravenous dipyridamole for thallium-201 myocardial perfusion imaging. *Int J Cardiol* 1990; 27(2): 272-4.
3. Massalha S, Reizberg I, Israel O, Kapeliovich M, Sholy H, Koskosi A, et al. Conduction abnormalities during dipyridamole stress testing. *J Nucl Cardiol* 2017; 24(2): 405-9.
4. Bubinski R, Markiewicz K, Cholewa M, Gorski L, Gawor Z, Kus W. Electrophysiologic effects of intravenous dipyridamole. *Int J Cardiol* 1989; 24(3): 327-35.
5. Lo MR, Sabella FP, Enia F. Sinus arrest associated with dipyridamole infusion. *Chest* 1994; 105(2): 604-5.
6. Blumenthal MS, McCauley CS. Cardiac arrest during dipyridamole imaging. *Chest* 1988; 93(5): 1103-4.