Successful treatment of rejection-related atrial tachycardia with pulse steroid after heart transplantation

Deniz Eriş*, Feyza Ayşenur Paç*, Seçil Sayın*, Doğan Emre Sert, Mustafa Paç****
Departments of *Pediatric Cardiology, and **Cardiovascular Surgery, Ankara City Hospital; Ankara-*Turkey*

Introduction

Orthotopic heart transplantation is currently the most effective long-term therapy for patients with end-stage cardiac disease. Morbidity caused by repeated rejection episodes and vasculopathy is often manifested by arrhythmias (1). After heart transplantation, patients may develop a variety of supraventricular or ventricular arrhythmias (1, 2). We report a case of a 9-year-old male patient who underwent orthotopic heart transplantation due to dilated cardiomyopathy. Atrial tachycardia occurred 6 years after transplantation because of allograft rejection and was successfully treated using pulse steroid.

Case Report

A 9-year-old boy with a history of dilated cardiomyopathy underwent orthotopic heart transplantation. After transplantation, everolimus and mycophenolate mofetil were used as immunosuppressants. However, he was hospitalized because of ventricular tachycardia with decompensation 4 years after transplantation. Cardioversion was performed, and an antiarrhythmic drug (amiodarone) was started. The patient was clinically unstable and underwent steroid therapy and plasmapheresis without cardiac biopsy. After plasmapheresis, no pathological findings, except rare, short-term atrial tachycardia, were noted. He was discharged with antiarrhythmic treatment, including amiodarone, flecainide, and propranolol. Two years after discharge, he complained of fatigue. Slow ventricular response atrial tachycardia was detected on electrocardiogram (ECG) (Fig. 1), and his echocardiographic evaluation showed deterioration of cardiac functions and moderate atrioventricular valve insufficiency with no pericardial effusion. He was hospitalized for heart failure treatment. Macroreentrant atrial tachycardia was noted on rhythm Holter (Fig. 2). Subsequently, endomyocardial biopsy was performed, and grade 1 transplant rejection was detected. Pulse steroid treatment was administered for 3 days. ECG showed normal sinus rhythm after one day of treatment (Fig. 3). Echocardiographic evaluation after pulse steroid showed that cardiac functions were normal, and valve deficiencies disappeared. Steroid therapy was gradually decreased to 2.5 mg. His symptoms resolved, and he was discharged with propranolol, everolimus and mycophenolate mofetil, and aspirin. One month after rejection treatment, 24-h rhythm Holter showed 3.6% supraventricular (SV) premature beats with rare SV pair. After 3 months of follow-up, the patient maintained sinus rhythm with no clinical findings of cardiac failure.

Discussion

Atrial tachycardia has been shown to occur in 9%–15% of orthotopic heart transplant recipients. Atrial fibrillation in the

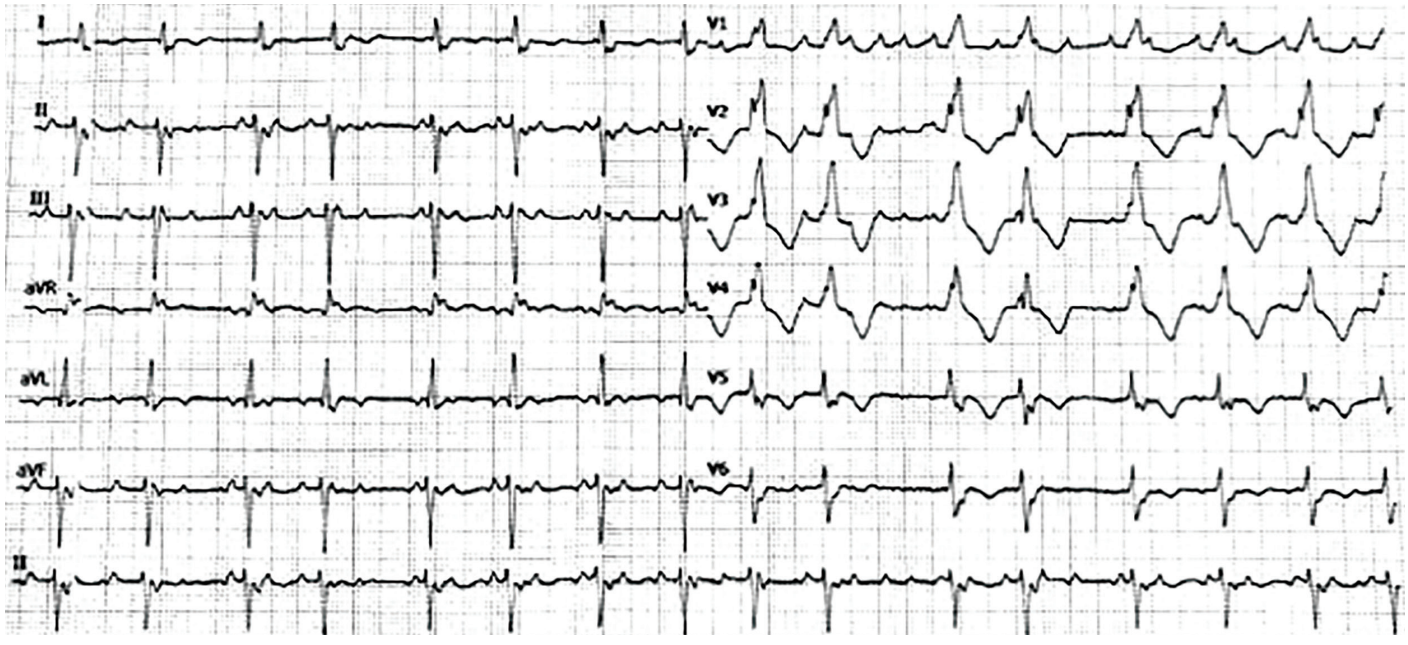

Figure 1. The patient's first electrocardiogram with atrial tachycardia

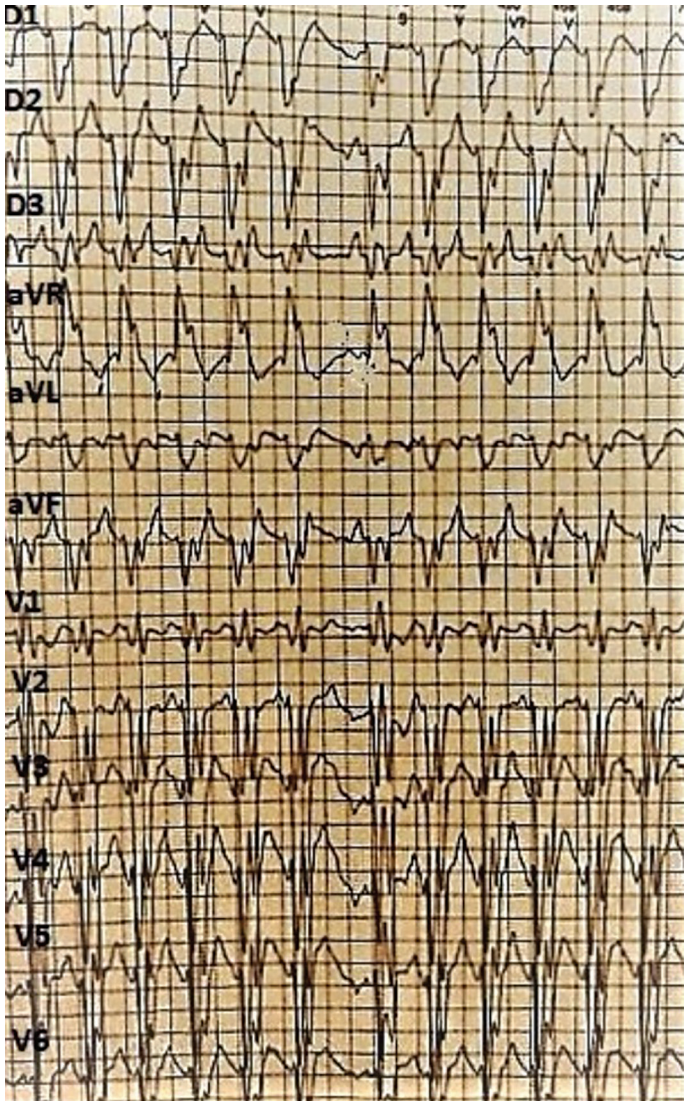

Figure 2. Rhythm Holter shows atrial tachycardia

donor is rare and usually associated with acute graft rejection or allograft vasculopathy (3). Predisposing factors for atrial tachycardia are graft ischemia time, biatrial anastomosis, lack of parasympathetic activity, cardiac allograft vasculopathy, nonspecific late graft failure, and rejection (2).

The timing of atrial tachycardia after transplantation (early or late) shows the differences in prognosis and mechanism. Atrial fibrillation occurring one month postoperatively is rare but associated with poor prognosis. Atrial fibrillation in this group was mostly associated with allograft rejection in half of the cases and transplant coronary artery disease in almost a quarter. Atrial tachycardia is an uncommon finding after orthotopic heart transplantation and is highly associated with acute rejection (1).

Determining the cause of arrhythmia is important for treatment strategy. In the late period (after the first month), patients with atrial tachycardia should be screened for allograft rejection and transplant coronary artery disease. Endomyocardial biopsy and coronary artery angiography should be performed (1). Coronary angiography was not performed to avoid coronary angiography and arterial intervention complications. Thus, only biopsy from the right ventricular wall was performed. The current situation was considered secondary to rejection with the detection of grade 1 rejection as a result of biopsy. The patient clinically improved within the first 3 days after pulse steroid treatment. Coronary computed tomography angiography (CTA) was planned if there were no findings suggesting rejection due to biopsy. Some studies support that the diagnostic properties of coronary CTA for allograft vasculopathy are similar to coronary angiography, and CTA is safer and provides more anatomical information (4, 5).

Atrial flutter can occur in the setting of rejection in heart transplant patients. Repeated rejection episodes may lead to cumulative damage as a mechanism of atrial flutter. Myocardial injury due to infiltration of inflammatory cells, edema and subsequent scarring, and ventricular dysfunction may predispose the patient to arrhythmias (2).

The biopsy result of the patient showed grade 1 rejection (mild rejection, interstitial, and/or perivascular infiltrate with up to one focus of myocyte damage). Recipients with grade 1 rejection do not require treatment unless hemodynamically compromised (6). Because our patient had atrial tachycardia and left ventricular dysfunction, he was administered with rejection treatment. Treatment strategy usually involves oral or intravenous steroids, antithymocyte globulin, and murine monoclonal antibody. Selection among these options is based on the hemodynamic status of the recipient and histologic severity of rejection. Pulse dose steroids have shown a significant response in patients with hemodynamic compromise and grade 1 rejection (6). Therefore, pulse steroid was administered for rejection treatment and reduced to 0.1 mg/kg/day with close controls by echocardiographic follow-ups.

Heart transplant patients with late and stable atrial tachycardia (atrial fibrillation/atrial flutter) are eligible for ablation (1). Nevertheless, rate should be initially controlled for late-onset atrial tachycardia, and cardioversion and antiarrhythmic treatment should be considered. Late or persistent atrial arrhythmias should prompt evaluation for rejection or vasculopathy in stable transplant patients. If rejection is detected, rejection therapy should be administered, and antiarrhythmic drugs should be interrupted for 3 months after treatment. If stable atrial tachycardia is present, radiofrequency ablation should be considered (2). Because of the examinations performed in our patient, pulse steroid treatment was administered, considering rejection-related atrial tachycardia, and ablation was not considered because atrial tachycardia and heart failure were not observed during the 3-month follow-up.

Endomyocardial biopsy and coronary angiography results are negative in heart transplant patients, and patients with stable paroxysmal or persistent atrial tachycardia should be considered for catheter ablation (1, 3, 7, 8). Although there

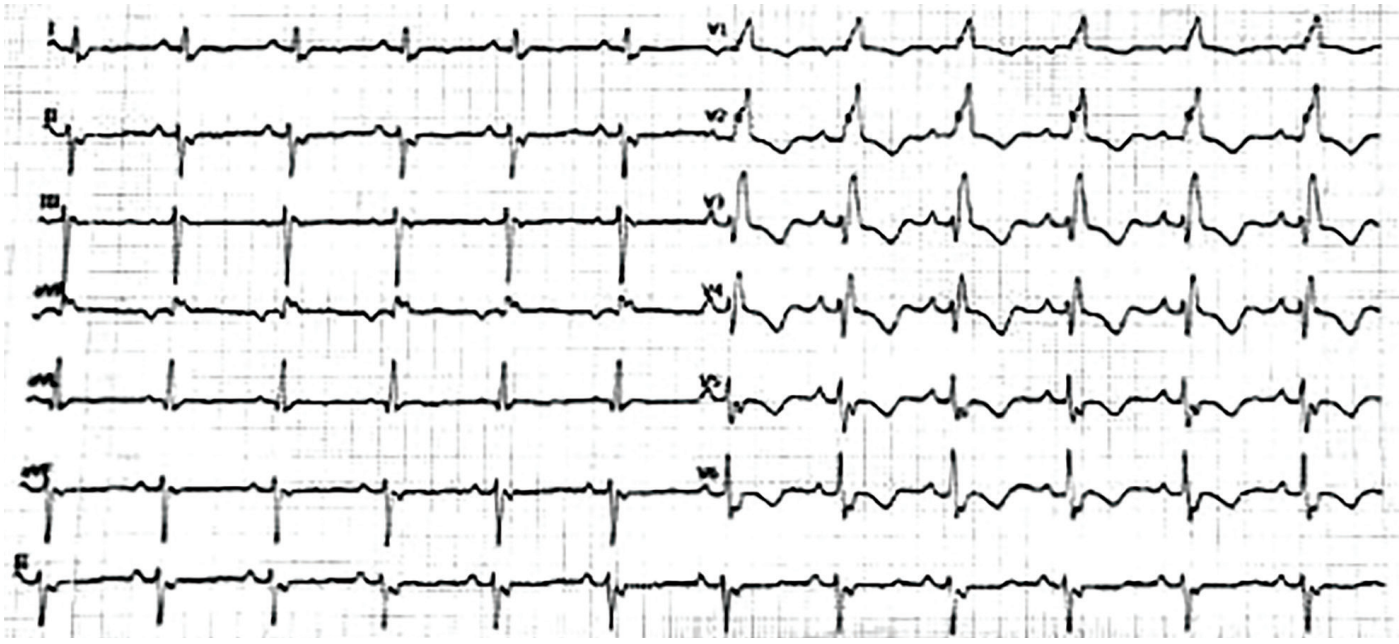

Figure 3. Electrocardiogram after pulse steroid treatment

are cases of late atrial arrhythmia in heart transplant patients treated with ablation in the literature, we did not encounter a case of atrial tachycardia that improved cardiac functions and achieved rhythm control with pulse steroid treatment (7-10).

Patients with atrial arrhythmias without significant contraindications should receive anticoagulation therapy (2). We started anticoagulation treatment after pulse steroid admin-istration to avoid side effects, such as bleeding. Standard an-tiarrhythmic drugs include amiodarone and, less commonly, procainamide and flecainide. Antiarrhythmic agents are rarely prescribed for >3 months, and the choice is narrow because of increased risk of drug interactions in heart transplant patients (especially amiodarone with cyclosporine and tacrolimus) (2). Our patient was on everolimus treatment, but long-term amio-darone treatment was administered for 2 years. After pulse steroid treatment, amiodarone was stopped.

Conclusion

The etiology of arrhythmia in patients with heart transplantation is important in terms of treatment plan. This case demonstrates the effectiveness of pulse steroid for the treatment of rejection-related atrial tachycardia after heart transplantation in the late period. The etiology of arrhythmia in patients with heart transplantation is important in terms of treatment plan. This case demonstrates the effectiveness of pulse steroid for the treatment of rejection-related atrial tachycardia after heart transplantation in the late period.

Arrhythmias are an indicator of pathology in transplanted hearts that requires investigation. The treatment should be based on etiology-oriented approaches. Also antiarrhythmics and electrophysiological processes are effective. Good postoperative care, reduction of rejection episodes will reduce the incidence of arrhythmia and contribute to the improvement of the patient's quality of life.

Informed consent: Written informed consent was obtained from the patient's family for publication of this case report and any accompanying images.

References

1. Hamon D, Taleski J, Vaseghi M, Shivkumar K, Boyle NG. Arrhythmias in the Heart Transplant Patient. Arrhythm Electrophysiol Rev 2014; 3: 149-55.
2. Thajudeen A, Stecker EC, Shehata M, Patel J, Wang X, McAnulty JH Jr, et al. Arrhythmias after heart transplantation: mechanisms and management. J Am Heart Assoc 2012; 1: e001461.
3. Gopinathannair R, Olshansky B. Catheter Ablation of Atrial Arrhythmias in the Transplanted Heart: A Case-Based Discussion. EP lab Digest 2015; 15: 12.
4. Foldyna B, Sandri M, Luecke C, Garbade J, Gohmann R, Hahn J, et al. Quantitative coronary computed tomography angiography for the detection of cardiac allograft vasculopathy. Eur Radiol 2020; 30: 4317-26.
5. Shah NR, Blankstein R, Villines T, Imran H, Morrison AR, Cheezum MK. Coronary CTA for Surveillance of Cardiac Allograft Vasculopathy. Curr Cardiovasc Imaging Rep 2018; 11: 26.
6. Di Toro D, Hadid C, Stewart-Harris A, Radlovachki D, Lopez C, Vidal L, et al. Atrial Flutter Following Orthotopic Heart Transplant Successfully Treated ByCatheter Ablation. The Journal of Innovations in Cardiac Rhythm Management 2010; 1: 78-81.
7. Gonsorcik J, Hunavy M, Stancak B, Gaspar P. Atrioventricular Nodal Reentrant Tachycardia in Transplanted Heart. J Clin Exp Cardiolog 2016; 7: 7.

8. Dahu MI, Hutchinson MD. What is the mechanism of the atrial arrhythmia in a patient after orthotopic heart transplantation? J Cardiovasc Electrophysiol 2012; 23: 225-7.
9. Ludhwani D, Abraham J, Kanmanthareddy A. Heart Transplantation Rejection. StatPearls 2020. [Internet]
10. Ribbing M, Mönnig G, Wasmer K, Breithardt G, Eckardt L. Catheter ablation of atrial tachycardia due to recipient-to-donor transatrial conduction after orthotopic heart transplantation. Europace 2004; 6: 215-9.

Address for Correspondence: Dr. Feyza Ayşenur Paç,
Ankara Şehir Hastanesi,
Çocuk Kardiyoloji Kliniği,
Ankara-*Türkiye*
Phone: +90 505 316 22 27
E-mail: aysepac@gmail.com
©Copyright 2021 by Turkish Society of Cardiology - Available online at www.anatoljcardiol.com
DOI:10.14744/AnatolJCardiol.2020.64859