

Perkütan mitral balon valvuloplasti sonrası geç asistoli

Delayed cardiac asystole after percutaneous mitral balloon valvuloplasty

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Özet- Perkütan mitral balon valvuloplasti (PMBV), kapak anatomisi uygun olan mitral darlıklı hastalarda tercih edilen bir tedavi yöntemidir. Ancak nadir de olsa aritmik komplikasyonlara neden olabilmektedir. Literatürde PMBV ile ilişkili ölüm oranı %1 olarak bildirilmiş olup işlem esnasında atriyoventriküler (AV) blok gelişen az sayıda olgu bildirilmiştir. Bu yazıda, romatizmal kaynaklı ciddi mitral darlığı olan, başarılı PMBV işleminden beş saat sonra Mobitz tip 2 AV blok ve ardından asistoli gelişen 53 yaşındaki kadın hasta sunuldu. Atropin ile sinüs ritmi sağlanan hastada gelişen aritminin, mitral kapaktaki kalsifik plaklar veya işlem esnasında balon şişirilirken yüksek basınca çıkılması nedeniyle iletim sisteminde meydana gelen hasar sonucu olabileceği düşünüldü. PMBV sonrası hastaların en az 24 saat yoğun bakım ünitesinde monitörize edilerek izlenmesi olası aritmik komplikasyonların zamanında tanınıp tedavi edilmesi için önemlidir.

Summary- Percutaneous mitral balloon valvuloplasty (PMBV) is the preferred treatment in mitral stenosis patients with appropriate valve anatomy, but it may cause arrhythmic complications rarely. In the literature, the mortality rate associated with PMBV has been reported as 1%, and a small number of patients developed atrioventricular block during the process. In this report, we describe a 53-year-old female patient with severe rheumatic mitral stenosis who developed Mobitz type 2 atrioventricular block and asystole after a successful PMBV operation. Sinus rhythm was achieved with atropine in this patient. It was thought that the arrhythmia resulted from calcified plaques on the mitral valve or from conduction system damage due to high balloon pressure during the process. For the recognition and treatment of possible arrhythmic complications, it is important to monitor patients in the intensive care unit for at least 24 hours after PMBV.

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Abbreviations:

AV Atrioventricular

MAC Mitral annulus calcification

PMBV Percutaneous mitral balloon valvuloplasty

RMD Rheumatic mitral stenosis

TTE Transthoracic echocardiography

Rheumatic mitral stenosis (RMD) retains its importance in developing countries. Nowadays, percutaneous mitral balloon valvuloplasty (PMBV) has largely replaced surgery in the treatment of RMD in symptomatic patients with suitable valvular morphology. However rarely, PMBV can induce arrhythmic complications

In this article a patient who developed Mobitz type 2 atrioventricular (AV) block, followed by asystole five hours after a successful PMBV procedure was presented so as to emphasize the importance of postprocedural monitorization.

CASE PRESENTATION

A 53-year-old female patient consulted to our clinic with gradually deteriorating shortness of breath. She had undergone surgical commissurotomy, and ligature of the left atrial appendage 12 years ago. The patient was receiving single daily doses of spironolactone-hydrochlorothiazide (25mg/25 mg) combination, and 50 mg metoprolol. On her physical examination a diastolic rumble was heard over the apex, her blood pressure, and pulse rate were 110/70 mmHg, and 70 bpm, respectively. Her breath sound were unremarkable. On EKG, sinus rhythm, and p mitrale were detected. (Figure 1a). On transthoracic examination (TTE), decreased (65 %) left ventricular ejection fraction (EF), rheumatic mitral, and aortic valve disease, serious mitral stenosis

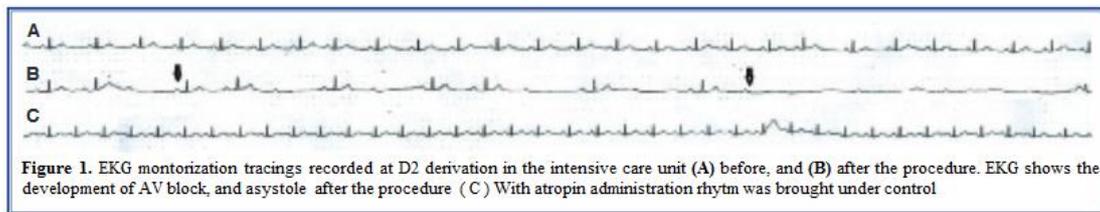
(planimetric mitral valve area, 1.0 cm², the peak, and the mean mitral valve diastolic pressure gradients (16/7 mm Hg), mild mitral annulus calcification, trace mitral regurgitation, trace aortic insufficiency, marked enlargement of the left atrium, mild degrees of tricuspid regurgitation, and systolic pulmonary artery pressure (46 mm Hg) estimated based on the tricuspid regurgitant velocity curve were detected. Transesophageal echocardiography was performed to evaluate PMBV. Wilkins echo score was found to be 9. Besides, trace mitral regurgitation, patent foramen ovale, and spontaneous echo contrast in the left atrium were detected. In the catheterization laboratory, PMBV was performed, using transseptal approach, and Inoue balloon catheter was inserted, and advanced through the right femoral vein under the guidance of TTE. Mitral regurgitation was assessed with the aid of left ventriculographic examinations before, and after the procedure. A 26 mm Inoue balloon was inflated three times successively up to 24, 26, and 28 mm. Following PMBV, a mild degree of mitral regurgitation was observed on ventriculograms, and adequate mitral valve opening on TTE. Planimetric mitral valve area was 1.9 cm², and mitral valve diastolic gradients were 4/2 mm Hg. The patient underwent a successful PMBV procedure, and she was taken into the coronary intensive care unit for further monitorization. Five hours after the procedure, Mobitz type 2 AV block, and asystole lasting for 15 seconds developed. Atropin administered at a dose of 1 mg recovered sinus rhythm (Figure 1b, c). Arrhythmia developed in the patient who received the last dose of metoprolol 48 hours before PMBV was attributed to calcific plaques on the mitral valve or higher levels of balloon pressure attained during the procedure which resulted in

impaired conduction system. Any evidence of AV block or sinus arrest was not observed on monthly EKG-Holter recordings.

DISCUSSION

In 10-30 % of the patients who underwent surgical commissurotomies, mitral stenosis recurs. Successful application of PMBV has been reported

also in the treatment of these patients as is the case with mitral patients without previous history of surgical interventions.[1,2] Herein, on the occasion of development of Mobitz type 2 AV block, and asystole in a patient five hours after PMBV applied for the second time with the indication of mitral stenosis, the importance of monitorization was emphasized.



Percutaneous mitral balloon valvuloplasty has been highly successfully performed in cases with a valve score of ≤ 8 . However in recent studies performed in patients with higher echo scores (9-11), high success rates has been reported with experienced operators. In a study performed by Palacios et al.[3], procedural success rates in patients with echo scores of ≤ 8 , and >8 were found to be 86.5, and 76.6 %, respectively. However higher complication rates have been detected in patients with echo scores of more than 8 points. In a registration report on 738 cases, PMBV related mortality rate was reported as one percent, and increased mortality rates in the early stage, were assertedly associated with higher echo scores (≥ 13), preprocedural mitral valve area of $< 0.7 \text{ cm}^2$, left atrial pressure of $> 12 \text{ mm Hg}$, and postprocedural mitral valve area of $< 1.5 \text{ cm}^2$. Decreased valve area, and higher echo scores were reported as the most strong predictive factor for 30-day mortality. In the same investigation the frequency of procedural vasovagal reaction was 6.9 %, while the rates of

ventricular tachycardia requiring shock therapy, AV block requiring transient pacemaker were 6.9, and 0.8 percent, respectively.[4] However, any case who developed AV block or asystole hours after PMBV has not been reported so far.

One of the factors influential on procedural success rates in percutaneous mitral balloon valvuloplasty is mitral annulus calcification (MAC). In an echocardiographic study where clinical significance of MAC was investigated, and increased frequency of conduction disorders have been reported in cases with MACs larger than 5 mm.[5] In a study performed by Tuzcu et al.[6] in patients without fluoroscopically detected MAC, higher PMBV success, and lower complication rates when compared with cases with MAC have been demonstrated. In our patient, mild degree of MAC was detected, and calcific plaques involving conduction system might have caused damage during the procedure. Besides, in our patient, because of morphological valvular changes caused by previous surgical commissurotomy, higher balloon

pressures attained during inflation to achieve adequate mitral opening during the procedure might lead to increased susceptibility of the conduction system to destructive changes.

Percutaneous mitral balloon valvuloplasty rarely causes arrhythmic complications. During the procedure ventricular premature beats, and ventricular tachycardia might occur due to irritation of the left ventricle by pigtail catheter. In a study on 35 patients who had undergone PMBV, two patients (6 %) developed complete heart block during the procedure, and the procedure was continued after implantation of a transient pacemaker. In one of these patients, AV conduction returned to normal sinus rhythm eight hours later, and the other required implantation of a permanent pacemaker.[7] Besides, a case who developed Mobitz type 2 AV block after one-time inflation of the Inoue balloon was reported in the literature. This patient did not recover despite steroid therapy which necessitated implantation of a permanent pacemaker.[8] In another case report, preexisting accessory pathway detected in a patient disappeared following PMBV, and AV block developed at the level of AV node. This phenomenon was explained by traumatic injury caused by transseptal manipulation during PMBV which affected AV node or paraseptal AV pathway.[9]

In another study which included 19 patients who had undergone percutaneous mitral balloon valvuloplasty, electrophysiological recordings were made during the procedure, and any change in the postprocedural mean effective refractory period of the AV node was not detected. In the above study, newly onset postprocedural intraventricular conduction defect was detected in 38 % of the patients, and as a mechanism of

conduction disorder, mechanical impact on His bundle, and Purkinje fibers, and potential ischemic damage induced during inflation of the balloon catheter, and destructive changes incurred during transeptal cauterization have been suggested. In this study, temporary prolongation of HV interval during inflation of the balloon catheter was reported. However any correlation between transient prolongation of HIV interval, and infra-His conduction block was not found. In the study, AV nodal conduction did not change following PMBV, and complete AV block was not detected in any patient.[10]

In conclusion, PMBV is a preferred mode of treatment in suitable patients with moderate –severe mitral stenosis. However as is the case with all invasive procedures, a risk of complication exists. Monitorization of the patients for at least 24 hours in the intensive care unit conveys utmost importance as for the timely recognition, and treatment of potential arrhythmic complications.

Conflict of Interest: None declared.

REFERENCES

1. Gross RI, Cunningham JN Jr, Snively SL, Catinella FP, Nathan IM, Adams PX, et al. Long-term results of open radical mitral commissurotomy: ten year follow-up study of 202 patients. *Am J Cardiol* 1981;47:821-5.
2. Gupta S, Vora A, Lokhandwalla Y, Kerkar P, Gupta S, Kulkarni H, et al. Percutaneous balloon mitral valvotomy in mitral restenosis. *Eur Heart J* 1996;17:1560-4.
3. Palacios IF, Sanchez PL, Harrell LC, Weyman AE, Block PC. Which patients benefit from percutaneous mitral balloon valvuloplasty? Prevalvuloplasty and postvalvuloplasty variables that predict long-term outcome. *Circulation* 2002;105:1465-71.
4. Complications and mortality of percutaneous balloon mitral commissurotomy. A report from the National Heart, Lung, and Blood Institute Balloon Valvuloplasty Registry. *Circulation* 1992;85:2014-24.
5. Nair CK, Runco V, Everson GT, Boghairi A, Mooss AN, Mohiuddin SM, et al.

Conduction defects and mitral annulus calcification. *Br Heart J* 1980;44:162-7.

6. Tuzcu EM, Block PC, Griffin B, Dinsmore R, Newell JB, Palacios IF. Percutaneous mitral balloon valvotomy in patients with calcific mitral stenosis: immediate and long-term outcome. *J Am Coll Cardiol* 1994;23:1604-9.

7. Palacios I, Block PC, Brandi S, Blanco P, Casal H, Pulido JJ, et al. Percutaneous balloon valvotomy for patients with severe mitral stenosis. *Circulation* 1987;75:778-84.

8. Evora PR, Finzi LP, Haddad J, Secches AL, Ribeiro PJ, Vicente WV. Complete heart block after percutaneous mitral valvotomy with Inoue balloon. [Article in Portuguese] *Arq Bras Cardiol* 1996;66:149-52. [Abstract]

9. Maté I, Sobrino JA, Calvo L, Rico J, Oliver JM, Sobrino N, et al. Atrioventricular block at the nodal level and block of an

accessory pathway during percutaneous mitral valvuloplasty. [Article in Spanish] *Rev Esp Cardiol* 1990;43:56-8. [Abstract]

10. Carlson MD, Palacios I, Thomas JD, Rottman JN, Freeman CS, Block PC, et al. Cardiac conduction abnormalities during percutaneous balloon mitral or aortic valvotomy. *Circulation* 1989;79:1197-203.

Anahtar sözcükler: Asistoli; atriyoventriküler blok; balon valvuloplasti; kalp kateterizasyonu/yöntem; mitral kapak stenozu/televi.

Key words: Asystole; atrioventricular block; balloon valvuloplasty; cardiac catheterization/method; mitral valve stenosis/therapy.