

Redo percutaneous mitral valvuloplasty for mitral restenosis: a comparison with first procedure for *de novo* mitral stenosis

Osama Rifaie¹, Mohamed Ismail¹, Mohamed Helmy², Mohamed El-Bialy², Wail Nammas¹

¹Cardiology Department, Faculty of Medicine, Ain Shams University, Cairo, Egypt

²Cath Lab Unit, National Heart Institute, Cairo, Egypt

Abstract

Background: Percutaneous mitral valvuloplasty (PMV) has emerged as the procedure of choice in most patients with symptomatic mitral stenosis. However, very few reports have looked at redo PMV in patients with mitral restenosis.

Aim: In a retrospective study, we explored the immediate results of redo PMV compared to primary PMV.

Methods: We included 30 consecutive patients with *de novo* mitral stenosis and 40 consecutive patients with mitral restenosis after successful initial PMV. Echocardiographic assessment of the mitral valve was performed in all patients by transthoracic echocardiography (TTE), and trans-esophageal echocardiography excluded left atrial thrombosis. Percutaneous mitral valvuloplasty was performed by the antegrade trans-septal approach using either the standard Inoue technique or the multi-track technique. Patient assessment by TTE was repeated 48 hours after the procedure. Procedural success was defined as a 50% or more increase in mitral valve area, with a final mitral valve area ≥ 1.5 cm², without major complications.

Results: The mean age of the study population was 33.7 ± 6 years, 18 (25.7%) patients being male. Procedural success was achieved in 28 (93.3%) patients undergoing first PMV, and in 37 (92.5%) patients undergoing redo PMV (NS). The two groups were similar in terms of the final mitral valve area, the gain of mitral valve area, the mean pressure gradient across the mitral valve, and the complication rate (NS for all). The final mitral valve area correlated negatively with the baseline mitral valve score in both groups.

Conclusions: Redo PMV for mitral restenosis achieves immediate results that are comparable to initial PMV for *de novo* mitral stenosis.

Key words: mitral restenosis, percutaneous mitral valvuloplasty, redo

Kardiol Pol 2011; 69, 2: 125–131

INTRODUCTION

Rheumatic valvular disease continues to be prevalent in developing countries, with mitral stenosis (MS) being the most frequent valve disorder [1]. During the past two decades, percutaneous mitral valvuloplasty (PMV) has emerged as the procedure of choice in most patients with symptomatic MS [2]. Several large series have reported an excellent outcome, both

short- and long-term [3–7], as well as a low incidence of serious complications [8]. Moreover, in patients with mitral valve morphology suitable for balloon valvuloplasty, results of randomised trials comparing PMV with surgical commissurotomy (both open and closed) have demonstrated comparable clinical, echocardiographic, and haemodynamic outcomes between the two therapeutic strategies, in addition to

Address for correspondence:

Wail Nammas, MD, Cardiology Department, Ain Shams University Hospitals, Faculty of Medicine, Ain Shams University, Abbassia, Cairo, Egypt, P.O. 11381, tel: +2 012 4063718, fax: +2 02 24820416, e-mail: wnammas@hotmail.com

Received: 27.08.2010 Accepted: 03.11.2010

Copyright © Polskie Towarzystwo Kardiologiczne

a shorter hospital stay and lower morbidity and mortality rates in the setting of PMV [9–13].

The late recurrence of symptoms after PMV is chiefly related to mitral restenosis [6]. The incidence of restenosis varies widely between centres and according to which techniques are adopted, but has been reported to approach 40% at seven year follow-up [14]. Only a few reports have been published into redo PMV; however, they have demonstrated encouraging results in selected patients with favourable valve characteristics [15]. In our retrospective study, we explore the immediate results of redo PMV in patients with mitral restenosis as compared to initial PMV in patients with *de novo* MS.

METHODS

Patient selection

We included 30 consecutive patients with symptomatic moderate to severe MS (first PMV group) (defined as mitral valve area [MVA] < 1.5 cm²) and 40 consecutive patients with symptomatic moderate to severe mitral restenosis after successful initial PMV (redo PMV group) (defined as MVA < 1.5 cm² with loss of > 50% of the initial gain of valve area by the first PMV), admitted to our cath labs to undergo PMV between May 2006 and April 2007. Patients were considered eligible for enrolment if they had no more than grade 2/4 mitral regurgitation (MR) by echocardiography. We excluded patients with unfavourable mitral valve morphology (defined as a Massachusetts General Hospital [MGH] score \geq 12), patients with previous surgical mitral commissurotomy, patients with concomitant valve disease that needed surgical intervention, patients scheduled for coronary artery bypass surgery, and patients with limited life expectancy due to coexistent disease (e.g. malignancy). The study protocol was reviewed and approved by our local institutional human research committee and conforms to the ethical guidelines of the 1975 Declaration of Helsinki as revised in 2002.

Echocardiographic assessment

Assessment of the mitral valve was performed in all patients by transthoracic echocardiography within 24 hours of admission. Doppler echocardiography was performed using a General Electric Vivid 7 Pro cardiac ultrasound machine (General Electric, Norway). A 2.5 MHz phased array probe was used to obtain standard 2D and Doppler images. Patients were examined in the left lateral recumbent position using standard parasternal and apical views. The MVA was assessed by the planimetry method in the parasternal short axis view. Mean diastolic pressure gradient across the mitral valve was measured from Doppler spectral analysis of diastolic mitral flow in apical four-chamber view. Semi-quantification of MR grade was obtained by colour flow mapping of MR jet using Helmcke classification [16].

Scoring of the mitral valve was done using the MGH scoring system [17]. Left atrial diameter was measured in para-

sternal long- and short-axis views. Other chamber sizes were also assessed, as well as other valve abnormalities.

Immediately before the procedure, all patients underwent trans-esophageal echocardiographic assessment using the same cardiac ultrasound machine (General Electric, Norway). Images were acquired with a trans-esophageal 5 MHz multi-plane phased array probe at mid-esophageal level. Assessment was performed in the standard way to exclude the presence of thrombi in the left atrium or left atrial appendage, to measure mitral annular diameter and interatrial septal thickness.

Percutaneous mitral valvuloplasty

Percutaneous mitral valvuloplasty was performed by the antegrade trans-septal approach using either the standard single balloon technique described by Inoue et al. [18] or the multi-track technique described by Benhoffer et al. [19]. Balloon size was chosen according to the usual method for the Inoue technique; for the multi-track technique, it was based on the mitral annular diameter (measured by echocardiography) as follows: sum of diameters of the two balloons equals mitral annular diameter. Right and left heart haemodynamical data were recorded before and after the procedure. The results were assessed in the cath lab by invasive measurement of the mean diastolic pressure gradient across the mitral valve.

Patient assessment by transthoracic echocardiography was repeated 48 hours following the procedure to evaluate the final MVA (by planimetry method), the mean diastolic pressure gradient across the mitral valve, and the presence and grade of MR, if any.

Definitions

Procedural success was defined as an increase of 50% or more of MVA, with a final MVA \geq 1.5 cm², without major complications. Major complications were defined as any of: more than grade 2/4 MR, cerebrovascular stroke, cardiac tamponade or periprocedural death. Restenosis was defined as loss of > 50% of the initial gain of valve area achieved by the preceding PMV with a final MVA < 1.5 cm².

Statistical analysis

All normally distributed continuous variables are presented as mean \pm SD. Data were tested for normal distribution using the Kolmogorov-Smirnov test. Categorical variables are shown as absolute and relative (percentage) frequencies. The χ^2 and unpaired *t*-tests were used to compare the distribution of categorical and continuous variables, respectively, between the two individual study groups. Pearson's correlation coefficient was used to study the relationship between the final MVA and the initial MGH score of the mitral valve in either group. All tests were two-sided and a value of $p < 0.05$ was considered statistically significant. Analyses were performed with SPSS version 12.0 statistical package (SPSS Inc., Chicago, IL, USA).

RESULTS

The mean age of the study population was 33.7 ± 6 years, 18 (25.7%) patients being male. Eighteen (25.7%) patients were in atrial fibrillation (AF). In the subgroup with repeated procedure, the mean time from the initial PMV to redo PMV was 5.8 ± 2.2 years. No patient had any signs of rheumatic activity between the initial and redo procedure. Table 1 shows baseline clinical characteristics and initial echocardiographic findings of the two individual study groups. No significant difference was found between the two groups concerning any of the baseline clinical or baseline echocardiographic characteristics, except for AF which was found more frequently in the redo PMV group.

In the first PMV group, the procedure was performed by the multi-track technique in 23 (76.7%) and by the Inoue

technique in seven (23.3%) patients. In the redo PMV group, the procedure was performed by the multi-track technique in 25 (62.5%) and by the Inoue technique in 15 (37.5%) patients (NS). According to our definition, procedural success was achieved in 28 (93.3%) and 37 (92.5%) patients; respectively (NS). Table 2 shows the post-procedural haemodynamic and echocardiographic data of the two individual study groups. No statistically significant difference was found between the two groups concerning any of the parameters of immediate procedural outcome.

In the first PMV group, one (3.3%) patient developed cerebrovascular stroke immediately following the procedure and died two days later. This patient had AF, but had no thrombi shown by trans-esophageal echocardiography the day before the procedure. He received the usual dose of heparin after

Table 1. Baseline clinical characteristics and initial echocardiographic findings of the two individual study groups

	First PMV (n = 30)	Redo PMV (n = 40)	P
Age (years)	32.7 ± 6.7	34.5 ± 7.2	NS
Males	7 (23.3%)	11 (27.5%)	NS
Atrial fibrillation	3 (10%)	15 (37.5%)	NS
NYHA class:			NS
I	2 (6.7%)	0 (0%)	NS
II	21 (70%)	33 (82.5%)	NS
III	7 (23.3%)	7 (17.5%)	NS
IV	0 (0%)	0 (0%)	NS
Initial MVA [cm ²]	1.2 ± 0.1	1.0 ± 0.1	NS
Mean DPG [mm Hg]	16 ± 6	16 ± 5	NS
Peak DPG [mm Hg]	23 ± 8	22 ± 9	NS
Total MGH score	7.7 ± 1.2	7.7 ± 1.7	NS
Thickness	2.0 ± 0.2	2.0 ± 0.5	NS
Motion restriction	2.0 ± 0.5	1.9 ± 0.4	NS
Calcification	1.9 ± 0.3	2.0 ± 0.5	NS
Subvalvular involvement	1.8 ± 0.3	1.8 ± 0.4	NS

All continuous variables are presented as mean \pm SD, while categorical variables are presented as numbers (percentage); NYHA — New York Heart Association; MVA — mitral valve area; DPG — diastolic pressure gradient; MGH — Massachusetts General Hospital; NS — non-significant

Table 2. Post-procedural haemodynamic and echocardiographic data of the two individual study groups

	First PMV (n = 30)	Redo PMV (n = 40)	P
Doppler measurements:			
Final MVA [cm ²]	1.9 ± 0.4	1.7 ± 0.3	NS
Gain of MVA [cm ²]	0.7 ± 0.3	0.7 ± 0.2	NS
Mean DPG [mm Hg]	6 ± 2	6 ± 3	NS
Peak DPG [mm Hg]	10 ± 3	11 ± 3	NS
Invasive measurements:			
Mean DPG [mm Hg]	6 ± 3	7 ± 3	NS
Peak DPG [mm Hg]	12 ± 3	12 ± 4	NS

All variables are presented as mean \pm SD; abbreviations as in Table 1

trans-septal puncture (5,000 IU), and had a normal procedure duration (45 min). One (3.3%) patient had a suboptimal final MVA after the procedure. Another patient developed a puncture site haematoma, and another developed rapid AF that required electrical cardioversion.

In the redo PMV group, two (5%) patients developed severe MR: one of them had grade 4/4 MR and consequently required emergency mitral valve replacement, while the other had grade 3/4 MR and was treated conservatively. Similar to the other group, one (2.5%) patient had a suboptimal final MVA after the procedure. One patient developed ventricular tachycardia treated by electrical cardioversion, one developed allergic drug reaction and another developed vasovagal reaction. There were no cases of cardiac tamponade, and no subjects required blood transfusion or peripheral vascular repair.

There was a significant negative correlation between the final MVA following the procedure and the initial MGH score of the mitral valve in both groups (correlation coefficient $r = -0.441$ and -0.397 , respectively, $p < 0.05$ for both).

DISCUSSION

The current retrospective study is the first to directly compare the outcome of redo PMV for patients with mitral restenosis after successful initial PMV, against that of first PMV in patients with *de novo* mitral stenosis. We demonstrated that redo PMV can be safely performed in selected patients, with an immediate procedural success of 92.5%, an adequate final MVA comparable to that of first PMV (with a gain of MVA similar to that of first PMV), and a relatively low complication profile, quite comparable to that of first PMV.

Treatment strategies for mitral restenosis

The chief cause of functional deterioration after successful percutaneous or surgical mitral commissurotomy is valve restenosis [20–24]. The reported rate of restenosis varies widely among series; however, approximately 7–21% of patients develop recurrent symptoms after a successful percutaneous procedure [9, 25–28]. Owing to the extensive valve deformity commonly found in these patients, mitral valve replacement is often performed [29]. However, it carries a higher risk of morbidity and mortality than does surgical commissurotomy. Moreover, the problems related to the valve prosthesis worsen the long-term outcome. Still, little data is available about open mitral commissurotomy for mitral restenosis [15]. Closed mitral commissurotomy has been shown to be an effective option for the treatment of restenosis following an initial closed commissurotomy, particularly in young patients with pliable valves [20]. Recently, PMV has emerged as a therapeutic option for symptomatic mitral restenosis, with promising mid-term outcomes, especially in patients with favourable valve characteristics [15].

Immediate outcome of redo PMV

The immediate procedural success rate in the group of restenosis compared favourably with that of the group of *de novo* mitral stenosis (92.5% vs 93.3% respectively). Additionally, it compares well with that previously reported by lung et al. [15] and is far better than that of Pathan et al. [30] (91% and 75%, respectively). In fact, the lower success rate in the latter series could be attributed to a greater extent of valve pathology (higher MGH score and more calcification) and less favourable patient characteristics (older age, more AF and history of surgical commissurotomy) [30]. Young age (in our series 33.7 ± 6 years) is a known strong predictor of good immediate outcome of PMV [5, 7]. In contrast, patients with AF are at a higher risk of poor outcome [24, 31]. In our series, AF was significantly more prevalent in the redo PMV group ($p < 0.05$). This may have contributed to the higher rate of severe MR (5%) after the redo procedure; nevertheless, the overall success rate was similar in both groups. The outcome of redo PMV would have been better if the two groups had had similar patient characteristics.

The safety of PMV has been demonstrated in several large series [5, 7, 25]. In our series, severe MR occurred in 5% of redo PMV group, while no patient undergoing first PMV had severe MR. Although it is difficult to compare the results of redo PMV with those of initial PMV due to obvious patient heterogeneity, repeated valve injury and the healing process due to multiple interventions may be an additional factor here [30]. The occurrence of stroke in one patient (3.3%) may express the unpredictable nature of this complication. This patient had AF; however, he had no thrombi by trans-esophageal echocardiography. Yet, among the individual components of his MGH score, mitral valve calcification score was 3/4. This may justify the view that redo PMV should be performed only in symptomatic patients [15].

We excluded patients with MGH score ≥ 12 , and as shown in Table 1, MGH score was quite similar between the two groups. The favourable mitral valve morphology (based on MGH score in our series) may well have contributed to the relatively high procedural success rate in both groups. Recent reports have emphasised the importance of commissural morphology (chiefly commissural calcification) and subvalvular involvement in determining the immediate outcome of PMV [32–34]. More recently, a novel scoring system was suggested based only on these two parameters and better predicted immediate outcome after the procedure, as compared to the standard MGH score [35]. Excluding other parameters (i.e. leaflet thickness and mobility) not closely related to the outcome of PMV would have further improved the immediate success rate of the procedure in the current series (92.5%).

Disease progression following successful PMV

Despite successful mitral valve dilatation, progression of the underlying disease process unfortunately continues to show up as a real problem. A recently published report demonstrated a progressive increase of left atrial volume, even after successful PMV [36]. Progressive left atrial dilatation following PMV has been independently predicted by the initial presence of AF, a lower immediate post-procedural MVA, a greater immediate post-procedural left atrial volume index, and a higher MGH score [36]. In this sense, chronic pressure overload on the left atrium portends not only left atrial dilatation, but also other structural and ultra-structural changes, such as myocardial hypertrophy, myocardial cell loss, and interstitial fibrosis [37]. Data is scarce regarding the progress of post-procedural mitral regurgitation. Interestingly, however, regression of mitral regurgitation severity has been reported at long-term follow-up in two peer-reviewed articles [4, 13]. Commissural splitting is the chief mechanism by which MVA is increased during PMV. The regression of MR following PMV at long-term follow-up might be explained by gradual healing of over-split commissures, and/or recovery of papillary muscle function [13]. In the current study, the individual components of the MGH score concerning mitral valve leaflet thickness, motion, calcification, and subvalvular involvement were almost similar between the two study groups. This may have greatly contributed to the substantially similar procedural success rates in the two groups.

Long-term outcome of redo PMV

A recent report demonstrated satisfactory long-term follow-up results of redo PMV [38]. It found five-year rates of restenosis-free survival and event-free survival to be $95 \pm 1\%$ and $94.5 \pm 1.3\%$, respectively. Importantly, an immediate post-procedural MVA $> 1.8 \text{ cm}^2$ effectively predicted both restenosis- and event-free survival rates at five-year follow-up [38]. Preliminary follow-up data from the current study is promisingly concordant with these results.

Clinical implications

The feasibility of redo PMV with a relatively high procedural success rate and an acceptable complication profile — as compared to first PMV for *de novo* mitral stenosis — makes it an appealing therapeutic strategy for patients with recurrent valve stenosis. In these patients, redo PMV would be a suitable long-term alternative to surgery. This might be particularly attractive in young females of child-bearing potential, in order to defer the need for valve replacement. Over and above that, it might serve as an acceptable approach to avoid surgery in selected patients with high operative risk.

Limitations of the study

Our findings are based on a single centre study with a relatively small sample size, a fact that makes it difficult to genera-

lise our results to all patients with mitral restenosis. Multicentre studies using the same protocol and examining a larger number of patients are needed before reaching firm conclusions. Moreover, our patients underwent PMV with either the Inoue technique or the multi-track technique, and we do not know whether our data can be safely extrapolated to patients undergoing the double balloon technique and to patients undergoing percutaneous metallic valvotomy.

Additionally, success rates were defined based on echocardiographic data irrespective of haemodynamic data. Furthermore, comparative follow-up of both groups in our series is necessary to determine the intermediate and long-term outcome. Additionally, patients in our series were relatively young, with a favourable MGH score. Our data may not be applicable to older patients with less favourable valve characteristics. Finally, the selection of patients with mitral stenosis did not employ the recently ascertained determinants of outcome such as commissural calcification, a fact that may certainly influence outcome.

CONCLUSIONS

The procedure of redo PMV in patients with mitral restenosis after initial successful PMV is feasible, with a high procedural success rate, and can be accomplished with a rate of complications that compares favourably with PMV performed in patients with *de novo* mitral stenosis.

Acknowledgements

We would like to express our deep gratitude to all the staff members of the cath labs in the cardiology department at Ain Shams University Hospital who have sincerely and rigorously supported the performance of this work.

Conflict of interest: none declared

References

1. Carroll JD, Feldman T. Percutaneous mitral balloon valvotomy and the new demographics of mitral stenosis. *JAMA*, 1993; 270: 1731–1736.
2. Prendergast B, Shaw T, Iung B et al. Contemporary criteria for the selection of patients for percutaneous balloon mitral valvuloplasty. *Heart*, 2002; 87: 401–404.
3. Iung B, Cormier B, Ducimetière P et al. Functional results 5 years after successful percutaneous mitral commissurotomy in a series of 528 patients and analysis of predictive factors. *J Am Coll Cardiol*, 1996; 27: 407–414.
4. Palacios IF, Tuczu ME, Weyman AE et al. Clinical follow-up of patients undergoing percutaneous mitral balloon valvotomy. *Circulation*, 1995; 91: 671–676.
5. The NHLBI balloon valvuloplasty registry participants. Multi-center experience with balloon mitral commissurotomy. *Circulation*, 1992; 85: 448–461.
6. Iung B, Garbarz E, Michaud P et al. Late results of percutaneous mitral commissurotomy in a series of 1024 patients. Analysis of late clinical deterioration: frequency, anatomic findings, and predictive factors. *Circulation*, 1999; 9: 3272–3278.
7. Iung B, Cormier B, Ducimetière P et al. Immediate results of percutaneous mitral commissurotomy. A predictive model on a series of 1514 patients. *Circulation*, 1996; 94: 2124–2130.

8. Vahanian A. Percutaneous mitral commissurotomy. *Eur Heart J*, 1996; 17: 1465–1469.
9. Turi ZG, Reyes VP, Raju BS et al. Percutaneous balloon versus surgical closed valvotomy for mitral stenosis. A prospective, randomised trial. *Circulation*, 1991; 83: 1179–1185.
10. Patel JJ, Sharma D, Mitha AS et al. Balloon valvuloplasty versus closed commissurotomy for pliable mitral stenosis: a prospective haemodynamic study. *J Am Coll Cardiol*, 1991; 18: 1318–1322.
11. Reyes VP, Raju BS, Wynne J et al. Percutaneous balloon valvuloplasty compared with open surgical commissurotomy for mitral stenosis. *N Engl J Med*, 1994; 331: 961–967.
12. Farhat MB, Ayari M, Maatouk F et al. Percutaneous balloon versus surgical closed and open mitral commissurotomy. Seven year follow-up results of a randomized trial. *Circulation*, 1998; 97: 245–250.
13. Rifaie O, Abdel-Dayem MK, Ramzy A et al. Percutaneous mitral valvotomy versus closed surgical commissurotomy. Up to 15 years of follow-up of a prospective randomized study. *J Cardiol*, 2009; 53: 28–34.
14. Hernandez R, Bañuelos C, Alfonso F et al. Long-term clinical and echocardiographic follow-up after percutaneous mitral valvuloplasty with the Inoue balloon. *Circulation*, 1999; 99: 1580–1586.
15. Iung B, Garbarz E, Michaud P et al. Immediate and mid-term results of repeat percutaneous mitral commissurotomy for restenosis following earlier percutaneous mitral commissurotomy. *Eur Heart J*, 2000; 21: 1683–1690.
16. Helmcke F, Nanda NC, Hsiung MC et al. Color Doppler assessment of mitral regurgitation with orthogonal planes. *Circulation*, 1987; 75: 175–183.
17. Wilkins GT, Weyman AE, Abascal VM et al. Percutaneous balloon dilatation of the mitral valve: an analysis of echocardiographic variables related to outcome and the mechanism of dilatation. *Br Heart J*, 1988; 60: 299–308.
18. Inoue K, Owaki T, Nakamura T et al. Clinical application of transvenous mitral commissurotomy by a new balloon catheter. *J Thorac Cardiovasc Surg*, 1984; 87: 394–402.
19. Bonhoeffer P, Piéchaud JF, Sidi D et al. Mitral dilatation with the Multi-Track system: an alternative approach. *Cathet Cardiovasc Diagn*, 1995; 36: 189–193.
20. Harken DE, Black H, Taylor WJ et al. Reoperation for mitral stenosis. A discussion of postoperative deterioration and methods of improving initial and secondary operations. *Circulation*, 1961; 23: 7–12.
21. Ellis LB, Singh JB, Morales DD et al. Fifteen- to twenty-year study of one thousand patients undergoing closed mitral valvuloplasty. *Circulation*, 1973; 48: 357–364.
22. John S, Bashi VV, Jairaj PS et al. Closed mitral valvotomy: early results and long-term follow-up of 3724 consecutive patients. *Circulation*, 1983; 68: 891–896.
23. Seltzer A, Cohn KE. Natural history of mitral stenosis: a review. *Circulation*, 1972; 45: 878–890.
24. Iung B, Cormier B, Ducimetière P et al. Résultats á 5 ans de la commissurotomie mitrale percutanée á partir d'une série de 606 patients. *Arch Mal Coeur*, 1996; 89: 1591–1598.
25. Herrmann HC, Ramaswamy K, Isner JM et al. Factors influencing immediate results, complications and short-term follow-up status after Inoue balloon mitral valvotomy: a North American multicenter study. *Am Heart J*, 1992; 124: 160–166.
26. Desideri A, Vanderperren O, Serra A et al. Long term (9 to 33 months) echocardiographic follow-up after successful percutaneous mitral commissurotomy. *Am J Cardiol*, 1992; 69: 1602–1606.
27. Vahanian A, Michel PL, Cormier B et al. Results of percutaneous mitral commissurotomy in 200 patients. *Am J Cardiol*, 1989; 63: 847–852.
28. Palacios IF, Block PC, Wilkins GT et al. Follow-up of patients undergoing percutaneous mitral balloon valvotomy. *Circulation*, 1989; 79: 573–579.
29. Dean LS, Mickel M, Bonan R et al. Four-year follow-up of patients undergoing percutaneous balloon mitral commissurotomy. A report from the NHLBI balloon valvuloplasty registry. *J Am Coll Cardiol*, 1996; 28: 1452–1457.
30. Pathan AZ, Mahdi NA, Leon MN et al. Is redo percutaneous mitral balloon valvuloplasty (PMV) indicated in patients with post-PMV mitral restenosis? *J Am Coll Cardiol*, 1999; 34: 49–54.
31. Cohen DJ, Kuntz RE, Gordon SP et al. Predictors of long-term outcome after percutaneous balloon mitral valvuloplasty. *N Engl J Med*, 1992; 327: 1329–1335.
32. Post JR, Feldman T, Isner J et al. Inoue balloon mitral valvotomy in patients with severe valvular and subvalvular deformity. *J Am Coll Cardiol*, 1995; 25: 1129–1136.
33. Sutaria N, Shaw TR, Prendergast B et al. Transoesophageal echocardiographic assessment of mitral valve commissural morphology predicts outcome after balloon mitral valvotomy. *Heart*, 2006; 92: 52–57.
34. Bezdah L, Drissa MA, Kasri R et al. Echocardiographic factors determining immediate result of percutaneous mitral balloon commissurotomy. *Tunis Med*, 2007; 85: 479–484.
35. Rifaie O, Esmat I, Abdel-Rahman M et al. Can a novel echocardiographic score better predict outcome after percutaneous balloon mitral valvuloplasty? *Echocardiography*, 2009; 26: 119–127.
36. Kim KH, Kim YJ, Shin DH et al. Left atrial remodelling in patients with successful percutaneous mitral valvuloplasty: determinants and impact on long-term clinical outcome. *Heart*, 2010; 96: 1050–1055.
37. Goldsmith I, Kumar P, Carter P et al. Atrial endocardial changes in mitral valve disease: a scanning electron microscopy study. *Am Heart J*, 2000; 140: 777–784.
38. Song JK, Song JM, Kang DH et al. Restenosis and adverse clinical events after successful percutaneous mitral valvuloplasty: immediate post-procedural mitral valve area as an important prognosticator. *Eur Heart J*, 2009; 30: 1254–1262.

Powtórny zabieg przezskórnej walwuloplastyki mitralnej u chorych z nawrotem zwężenia zastawki — porównanie z pierwszorazowym zabiegiem u osób ze zwężeniem *de novo*

Osama Rifaie¹, Mohamed Ismail¹, Mohamed Helmy², Mohamed El-Bialy², Wail Nammas¹

¹Cardiology Department, Faculty of Medicine, Ain Shams University, Cairo, Egipt

²Cath Lab Unit, National Heart Institute, Cairo, Egipt

Streszczenie

Wstęp: Przezskórna walwuloplastyka mitralna jest obecnie leczeniem z wyboru u większości chorych z objawowym zwężeniem zastawki mitralnej. Jednak opublikowano niewiele prac dotyczących powtórnych zabiegów walwuloplastyki u chorych z nawrotem zwężenia zastawki.

Cel: W badaniu retrospektywnym oceniano bezpośrednie wyniki powtórnych zabiegów walwuloplastyki mitralnej w porównaniu z wynikami procedur pierwszorazowych.

Metody: Do badania włączono 30 chorych ze zwężeniem *de novo* zastawki mitralnej (grupa A) oraz 40 kolejnych pacjentów z nawrotem zwężenia po wcześniejszej skutecznej walwuloplastyce przezskórnej (grupa B). Ocenę echokardiograficzną przeprowadzono za pomocą badania przezklatkowego, a badanie przezprzetykowe miało na celu wykluczenie skrzepliny w lewym przedsionku. Przezskórną walwuloplastykę mitralną wykonywano poprzez nakłucie przegrody międzyprzedsionkowej z zastosowaniem standardowej techniki Inoue'go lub techniki *multi-track*. Po 48 godzinach od zabiegu powtarzano badanie przezklatkowe. Procedurę definiowano jako skuteczną, gdy zwiększenie pola powierzchni zastawki po zabiegu wynosiło $\geq 50\%$, a ostateczna wartość pola powierzchni była większa lub równa $1,5 \text{ cm}^2$, bez poważnych powikłań.

Wyniki: Średni wiek pacjentów włączonych do badania wynosił $33,7 \pm 6$ lat, 25,7% (18 osób) stanowili mężczyźni. Zabieg zakończył się powodzeniem u 28 (93,3%) pacjentów w grupie A i u 37 (92,5%) chorych w grupie B ($p = \text{NS}$). W obu grupach powierzchnia zastawki po zabiegu, przyrost powierzchni, średni gradient przez zastawkę i częstość powikłań były podobne ($p = \text{NS}$ dla wszystkich). Powierzchnia zastawki po zabiegu ujemnie korelowała z punktacją zastawki przed zabiegiem w obu grupach.

Wnioski: Bezpośrednie wyniki powtórnego zabiegu przezskórnej walwuloplastyki mitralnej u chorych z nawrotem stenozy mitralnej są porównywalne z wynikami walwuloplastyki mitralnej wykonywanej z powodu zmian *de novo*.

Słowa kluczowe: restenoza mitralna, przezskórna walwuloplastyka mitralna, powtórny zabieg

Kardiologia 2011; 69, 2: 125–131

Adres do korespondencji:

Wail Nammas, MD, Cardiology Department, Ain Shams University Hospitals, Faculty of Medicine, Ain Shams University, Abbassia, Cairo, Egypt, P.O. 11381, tel: +2 012 4063718, fax: +2 02 24820416, e-mail: wnammas@hotmail.com

Praca wpłynęła: 27.08.2010 r. Zaakceptowana do druku: 03.11.2010 r.