

## THE EFFECTS OF MITRAL VALVE SURGERY ON PULMONARY HYPERTENSION

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**Summary:** One hundred and fifty seven patients with mitral valve disease and pulmonary hypertension were reviewed following operation. A significant lowering in pulmonary artery pressure and pulmonary vascular resistance (PVR) have been observed in all patients. Cardiac output (CO) and cardiac index (CI) increased concomitantly. As a result, regression in pulmonary hypertension is expected after surgical treatment of patients with mitral valve disease and pulmonary hypertension.

**Key Words:** Pulmonary hypertension, mitral valve surgery.

In most of patients with mitral valve disease, increased pulmonary artery pressure results from both elevated left atrial pressure and PVR (1,3,4,6,7,8). The increase of pulmonary artery pressure may be mild (30-50 mmHg), moderate (50-70 mmHg) or severe (90-120 mmHg) (3,5). The presence of pulmonary hypertension is a risk factor which effects operative mortality but it does not constitute a contraindication for surgery. The elevated pulmonary artery pressure may drop to normal levels after surgery (1,3,5,6,7,8).

In this investigation we aimed to evaluate the hemodynamic changes in patients with pulmonary hypertension after mitral valve surgery.

### Materials and Methods

In this study are included 157 cases whose pulmonary artery sistolic pressures shown to be above 30 mmHg on preoperative catheterisation. These cases were operated in Ankara University Medical Faculty İbni Sina Hospital Cardiovascular Surgery Department between 02.20.1984 and 11.30.1989.

6-12 weeks after operation, a Swan Ganz catheter was inserted into vena jugularis interna and pulmonary artery pressure was determined in all of the patients. In addition to pulmonary artery pressure, cardiac output (CO) and cardiac index (CI) were measured by thermodilution method.

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Statistical calculations were made on the computer by using the M-Stat PC program, the results were given as mean value  $\pm$  standart deviation. Significancy tests between mean values were carried out using the chi-squared test.

## **Results**

The youngest of the cases was 14, the oldest was 57 years old (mean age  $34.54 \pm 0.26$ ). Ninety six out of 157 patients were females, 61 were males; the woman to the man ratio was 1.57/1.

In 93 of these cases mitral valve replacement (MVR), in 27 MVR + aortic valve replacement (AVR), in 8 open mitral commissurotomy (OMC), in 4 OMC + AVR and in 25 closed mitral commissurotomy (CMC) had been performed.

Preoperatively highest pulmonary artery pressure was 106 mmHg and the lowest was 30 mmHg. Postoperatively highest pulmonary artery pressure was found to be 72 mmHg and the lowest was 15 mmHg.

Preoperatively CO was  $4.04 \pm 0.07$  L/min where postoperatively CO became  $4.75 \pm 0.07$  L/min. CI values were found to be preoperatively  $2.49 \pm 0.04$  L/min/m<sup>2</sup> and postoperatively  $2.93 \pm 0.04$  L/min/m<sup>2</sup>.

Average of PVR values were  $348.66 \pm 13.40$  dyn s cm<sup>-5</sup> preoperatively and  $173.38 \pm 6.70$  dyn s cm<sup>-5</sup> postoperatively.

Hemodynamic findings are shown in Table I.

## **Discussion**

As a result of pulmonary vascular resistance secondary to mitral stenosis, 2 areas of stenosis (one in the lung and the other on the mitral valve) develop on the pulmonary circulation (3). When the mitral stenosis is corrected during operation no direct approach is made on the pulmonary vascular obstruction. The decrease in pulmonary hypertension during the early postoperative period is the result of decreased left atrial pressure and the elimination of vasoconstriction (6). As seen in Table I, decreases in pulmonary artery pressures during the early postoperative period have been noted in our study. In our study PVR dropped, CO and CI improved even in older patients.

It has been reported that surgical treatment decreased effectively pulmonary artery pressure and resistance, increased CI and corrected functional capacities in the patients with mitral valve disease in whom pulmonary hypertension is severe (2,8). It has also been suggested that the patients benefit from surgical treatment whether or not they have important structural abnormalities in the lungs regardless of the severity of pulmonary hypertension (1,2,8). We have observed as mentioned above that pulmonary artery pressure and PVR decreased while CO and CI are increased. In 9 of the 157 patients pulmonary artery

pressure and PVR did not change, even increased in 3 patients. The patients who did not shown any improvement in pulmonary hypertansion and cardiac functions constitutes 7.6% of our study group.

It is shown that PVR might return to normal values because of the improvement of the organic changes in the pulmonary arterioles and middle sized arteries 6-12 mounths after operation (3,6). In our study, significant decrease in PVR has been detected in all age groups even in the early postoperative period.

With observations mentioned above, we concluded that elevated PAP can be reduced by surgical treatment, even in the early postoperative period. Surgical treatment must be done before irreversible pulmonary vascular disease and myocardial damage occur.

Table I. Hemodynamic values of the patients with mitral valve disease in preoperative and postoperative periods.

	Preop Mean Value	Postop Mean Value
P A S	49.95 ± 1.31 (30 - 106) *	31.13 ± 0.71 (15 - 72) *
P A D	26.08 ± 0.76 (9 - 57) *	16.30 ± 0.51 (5-38) *
P A M	35.89 ± 0.99 (16 - 42) *	22.11 ± 0.57 (5 - 49) *
P C W P	19.17 ± 0.59 (6 - 42) *	12.04 ± 0.36 (3 - 30) *
C O	4.04 ± 0.07 (2.40 - 6.60) *	4.75 ± 0.07 (2.90 - 7.00) *
C I	2.49 ± 0.04 (1.60 - 4.20)*	2.93 ± 0.04 (2.00 - 4.50) *
P V R	348.66 ± 13.40 (90 - 930) *	173.38 ± 6.70 (16 - 644) *

- P A S : Pulmonary artery sistolic pressure  
P A D : Pulmonary artery diastolic pressure  
P A M : Pulmonary artery mean pressure  
P C W P : Pulmonary capillary wedge pressure  
C O : Cardiac output  
C I : Cardiac index  
P V R : Pulmonary vascular resistance  
\* : Lowest and highest values

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