

Improvement of the pulmonary function following percutaneous transluminal mitral commissurotomy in a 39-year-old man exposed to sulfur mustard

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Abstract

Mustard gas causes damage to the skin, eyes, respiratory system, and gastrointestinal tract. Victims of sulfur mustard (SM) gas exposure experience different types of chronic pulmonary disease. In a case with severe MS, the complications are getting worse. Balloon dilatation is effective in providing sustained haemodynamic and symptomatic improvement of patients with severe mitral stenosis. Percutaneous Trans Luminal Mitral Commissurotomy (PTMC) procedure performed in a 39-year-old man with coexisting mitral stenosis (MS) and idiopathic thrombocytopenic purpura (ITP) whose platelet count was $35.8 \times 10^3/\text{mm}^3$ on admission. He was also a case known as chemical weapons victim of the Iran-Iraq war (1979-1988). He was managed with Duretics (Furosemide 20 Mg/TID/IV at first day and 40 MG/BID/Oral), Metoral 12.5Mg/BID. He was also treated with immunoglobulin G (IgG) (0.5 g/kg/d) for 4 days, resulting in a platelet count rise to $151 \times 10^3/\text{mm}^3$. He subsequently underwent a PTMC procedure with mitral valve area (MVA) about 0.9 cm^2 without a requirement of Heparin infusion. Echocardiography showed MVA rose to 2.5 cm^2 and the spirometric study revealed an improvement in the pulmonary function test.

Key words: Sulfur Mustard, PTMC, ITP.

Clinical history

Mustard gas causes damage to the skin, eyes, respiratory system, and gastrointestinal tract, as well as having a general effect on the body similar to that of radiation [1]. Victims of sulfur mustard gas exposure experience different types of chronic pulmonary disease, manifested as cough, sputum production and dyspnea [2-4]. Pulmonary complications are the main chronic complication of exposure to sulfur mustard (SM). More than half of the victims are known to show the complications [4]. Only a few studies report thrombocytopenia as one of hematological complications of sulfur mustard exposure [1]. Some studies show that PTMC, dramatically improves the pulmonary function [5-7], but we did not find any document indicating an improvement of the pulmonary function following PTMC in chemical weapons victims.

Material and methods

The patient referred to the department of cardiac catheterism & Intervention with Dyspnea On Exertion (DOE) with function class III and

Table I. The comparison of pre&post PTMC echocardiographic findings

Size & motion	Pre PTMC	Post PTMC
LV ¹ : end diastole	5.37 cm	4.5 cm
end systole	3.23 cm	2.4
EF %	60	60
LA ²	5.3 cm	5.13 cm
Aortic root	2.94 cm	3.1 cm
RV: end diastole	–	1.9 cm
MVA	0.89 cm ²	2.5-2.7 cm ²
MR	Mild (1 ⁺)	Mild (2 ⁺)
MS	Severe	Mild

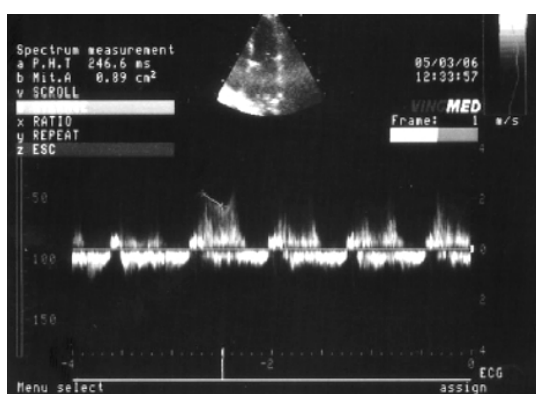
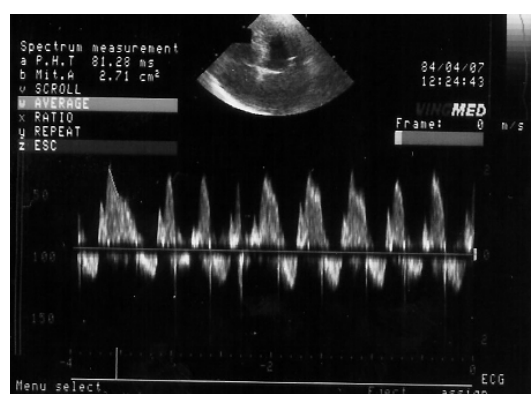
¹Left Ventricle²Left Atrium

recurrent Pulmonary Edema. Echocardiography showed severe MS, mild mitral regurgitation (MR), mild pulmonary insufficiency (PI), mild tricuspid regurgitation (TR) and mild aortic valve insufficiency (AI). His Left Ventricle Ejection Fraction (LVEF) was

more than 60-65%. Because of the history of chemical exposure of sulfur mustard and DOE, pulmonological examination including spirometric studies and deep expiratory High Resolution Computerized Tomography (HRCT) was performed and the following medications were administered: Hydrocortisone 100 mg/IV/q 8 h start at 8 hours before PTMC, Atrovent spray 4 puff/q 8 h, Salbutamol spray 3 puff/q 8 h and Ceftriaxone 2 g/IV/q 12 h. Spirometric studies revealed restriction and spiral HRCT showed grand glass and bronchial wall thickening in lower lobes of both lungs [4]. Also; as ITP, hematological consultation was done and allowed heart catheterization of the patient if the platelet count was above $160 \times 10^3/\text{mm}^3$. In such a complicated case, left heart catheterization was done via the right femoral artery (RFA) without any complication.

Results and discussion

After PTMC the following data was obtained: aortic pressure was 100/60 mmHg, left ventricular pressure was 100/0-8 mmHg (LV systolic pressure was 100 mmHg and LVEDP was 0 to 8 mmHg). Aortic

**Figure 1.** Echocardiography before PTMC**Figure 2.** Echocardiography after PTMC**Table II.** The comparison of spirometric findings of Pre&Post PTMC

TEST	Pred		Best		% (Best/ Pred)	
	Pre PTMC	Post PTMC	Pre PTMC	Post PTMC	Pre PTMC	Post PTMC
FVC	4.73	4.55	2.19	2.82#	46.3	62*
VC	4.93	4.55	2.19	2.91#	44.4	64*
FEV1	3.90	3.56	2.13	2.45	54.5	69*
FEV1%F			97.17			
PEF	9.22	504?	5.80	377	62.9	75
FEF25	7.95	–	5.80	377	72.9	–
FEF50	5.07	270	4.48	280	88.3	–
FEF75	2.21	109	1.91	72	86.1	66
VT	0.46	–	0.79	1.29	170.5	–

– Outside 95% Confidence Interval

*Outside Normal Range

root injection showed AI^{2+} . Selective left coronary artery angiography showed no epicardial coronary artery stenosis and the right coronary artery showed non-significant irregularities. Balloon dilatation produces a commissurotomy similar to that obtained by the surgery. However, it is a percutaneous procedure, using only local anaesthesia. Several studies have shown that balloon dilatation is effective in providing sustained haemodynamic and symptomatic improvement of patients with severe mitral stenosis [8]. The degree of improvement depends principally on the valve anatomy [9-11]. Also some have shown that mitral balloon valvotomy gives an excellent result equal to that obtained with open or closed surgical valvotomy and its benefits are shown to sustain during a long term follow up [12-17]. PTMC procedure performed with Inoue Balloon NO 28 (three inflation 24 up to 28) and the gradient between the left atrium & the left ventricle diastolic pressure drop from 20 mmHg to 0 mmHg (LA mean pressure was about 30 mmHg with LVEDP about 8-10 mmHg). The patient transferred to the post catheterization ward with a desirable condition: BP: 90/50 mmHg, PR: 85 bpm, RR: 20 per min and monitored for controlling any arrhythmias. MVA increased to about 2.5-2.7 cm^2 with less than 2° MR in post PTMC echocardiography. A comparison of pre and post PTMC echocardiography are shown in Table I. Also the respiratory condition alleviated as confirmed by the Pulmonary Function Test after PTMC (Table II).

Conclusions

PTMC is the established technique for severe MS patients, also the procedure will be helpful in some complicated conditions such as pulmonary edema and ITP before improving the conditions.

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