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Percutaneous transvenous mitral commissurotomy in mitral stenosis and left atrial appendage clot patients in special conditions: Hospital-based study

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ABSTRACT

Background: The percutaneous transvenous mitral commissurotomy is an important procedure for the treatment of mitral stenosis. A lot of mitral stenosis cases have left atrial appendage clot which precludes the patient from the benefit of this procedure.

The aim of the study was to study the feasibility and safety of the procedure in a patient with appendage clot in the setup of certain urgent conditions.

Method: All cases of mitral stenosis with significant dyspnea and mitral valve area $<1.5 \text{ cm}^2$ with left atrial appendage clot and a condition which would preclude the patient from continuing on anticoagulation and needed urgent intervention were included in the study. From January 2011 to December 2013, twenty patients coming to Shahid Gangalal National Heart Centre, Kathmandu were selected for the procedure with conventional sampling technique. Informed written consent was taken from the patients explaining all possible complications. The approval of the study was taken from the ethical committee of the hospital.

Result: Mean mitral valve area increased from 0.90 cm^2 (SD ± 0.14) to 1.5 cm^2 (SD ± 0.21) ($p = 0.02$). Left atrial mean pressure decreased from mean of 20 to 10 mmHg. Subjective improvement was reported in all. All of the patients had fulfilled criteria for successful PTMC. There was no mortality during hospital stay or in one-week follow-up period. There were no neurological complications or any need for emergency surgery.

Conclusion: The immediate result of percutaneous transvenous mitral commissurotomy in selected cases of mitral stenosis with left atrial appendage clot is safe and acceptable in certain urgent situations in experienced hands.

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1. Introduction

The incidence of rheumatic heart disease has not declined in our region. About one-third of admissions to our hospital is due to rheumatic heart disease; among them, one-third consists of isolated mitral stenosis. The treatment of choice in these setup is now established to be percutaneous transvenous mitral commissurotomy (PTMC).^{1–3} After the beginning of intervention program in our hospital about 15 years back, all suitable cases of mitral stenosis without left atrial clot are taken for PTMC. But left atrial (LA) clot is present in nearly 15% of severe mitral stenosis

according to hospital registry; 90% of them are inside LA appendage and only 10% are placed in the left atrial body. Textbooks consider PTMC to be risky in the presence of the clot, and this precludes many patients from the benefit of this procedure. LA appendage clot is regarded as contra-indication to PTMC in standard practice and usually treated with anticoagulation for a long time or referred for surgery. But in some conditions, either mode of treatment may not be appropriate. There are no strong data which say that these procedures are safe. So the operators feel some hesitation doing the procedure. The present study aimed to find out the feasibility and safety of PTMC procedure in a patient with LA appendage clot in the setup of emergency condition or have no other reasonable option. This is a first study of this kind in our region and no such data are available.

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2. Methods

All cases of mitral stenosis attending our hospital with significant symptoms dyspnea of NYHA class II or more and mitral valve area (MVA) $< 1.5 \text{ cm}^2$ with LA appendage clot (Type Ia) and a condition which would preclude the patient from continuing on medical treatment, especially continuation of anticoagulation, were selected. These included mitral stenosis patients with LA appendage clot not protruding out of LA appendage and any of the following: pregnancy, or patient in pulmonary edema, or patients who recently had bleeding disorder or patient with stroke, or patients whose clot did not get dissolved despite adequate anticoagulation with warfarin for more than nine months and still had significant symptoms and who are unable to go for surgery.

Exclusion criteria were left atrial body thrombus, LA appendage clot extending into LA, mitral regurgitation with >3 grade, bicommissural calcification or severe grade 4 calcification, and severe aortic valve disease. From January 2011 to December 2013, twenty patients were selected for the procedure. Echo was done to diagnose and classify the mitral valve according to Wilkins scoring system. Routine investigations were sent which consisted of total leukocyte count differential count, hemoglobin, X-ray chest, ECG, and urea creatinine sodium potassium. Transthoracic and transesophageal echocardiography was done to observe for left atrial (LA) and left atrial appendage (LAA) clot. GE Vivid S6 pediatric (TEE) and adult (TTE) probe was used for the purpose. Right femoral artery and right femoral vein was accessed with 5 and 8 French sheath. Pigtail catheters in non-coronary cusp of ascending aorta served as land mark.⁴⁻⁷ Puncturing of inter-atrial septum was done through right femoral vein by Mulins sheath and Brokenborough needle.

Once the inter-atrial septum is punctured and Mulins sheath entered, the LA appendage was outlined with injection of contrast material. This gives a good idea of the appendage area which is to be avoided during balloon manipulation. Special precaution was taken not to bring the coiled wire and balloon tip above the level of LA appendage. While entering the balloon into the LA through the coiled wire, the wire was kept low inside LA and the balloon was pushed slowly into LA to make a complete circle. This kept the balloon tip away from disturbing LA appendage. The reverse loop technique (balloon encircling the whole of LA in anticlockwise direction) was avoided to keep the balloon tip away from the LA appendage. Firm J wire was used instead of flexible J wire. This avoided unnecessary movement of the balloon tip. Mitral valve was dilated only once with the maximum permissible size (that is height in cm divided by ten plus ten), instead of stepwise repeated dilatation. Inoue balloon was used for the purpose. 3000 units of heparin were given during the procedure.

In pregnant ladies, the fetus was protected from radiation with pelvic and abdominal shields. The lead gown was put beneath the back extending from lower part of thorax to the buttock. Neck-guard shields were put on their abdomen. Check echo was done the next day. Successful PTMC are considered as those with final MVA $\geq 1.5 \text{ cm}^2$ or who had doubling of MVA after the procedure.^{8,9} Most patients were discharged the next day except those who presented with pulmonary edema. Discharged patients were followed up in clinic after a week.

As shown in Fig. 1, there is a small clot inside LA appendage.

3. Results

Age of the patients ranged from 20 years to 58 years. Mean age of the patient was 31.4 ± 9.3 years, mean height was 157.5 ± 4.3 cm, and mean weight was 54.6 ± 3.9 kg. Male to female ratio was 0.35. Patients were of different clinical background. Out of 20 persons,

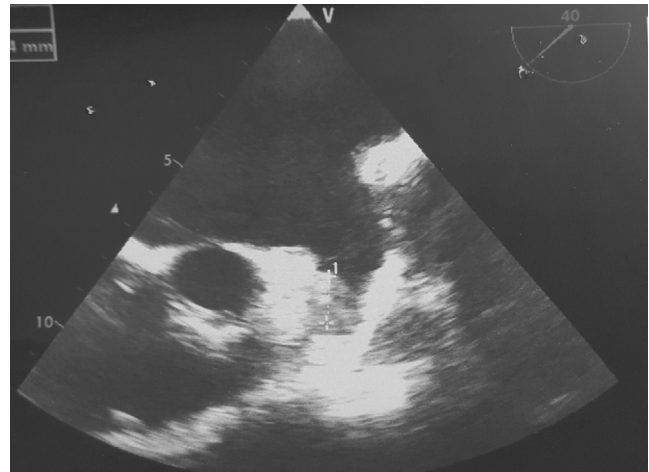


Fig. 1. Transesophageal echo showing a clot lying well inside the LA appendage.

(a) 3 persons were pregnant and could not take anticoagulation medicines because of the risk to the fetus, (b) 2 persons were in frank pulmonary edema; trans-esophageal echo could not be done on them; instead left atrial appendage clots were detected on transthoracic echo, these patients had to undergo the procedure as a rescue procedure, (c) 9 persons had received warfarinization therapy for more than 12 months with adequate INR levels and had class III symptoms, (d) 2 had attended hospital ER with supratherapeutic INR and still had clot despite prolonged warfarinization for more than 12 months, (e) 3 were in NYHA class III-IV despite medication and were attending ER in heart failure frequently, and (f) one had recent history of embolic stroke with hemorrhagic complication and NYHA class III symptoms (Table 1).

Forty percent of the study patients were in atrial fibrillation which is high in comparison to findings described in different literatures. Mean MVA increased from 0.90 cm^2 (SD + 0.14) to 1.5 cm^2 (SD + 0.21) ($p = 0.02$). Minimum pre-procedure and maximum post-procedure MVA was 0.5 cm^2 and 2.0 cm^2 respectively. The successful PTMC was defined as the doubling of MVA from the initial area or achieving the MVA of 1.5 cm^2 or dropping LA pressure to half the initial value. The repeat echo at 3 months could not be done in majority of the patients because of poor follow-up. Left atrial mean pressure decreased from mean of 20 to 10 mmHg. Subjective improvement was reported in all 20 patients. All had fulfilled criteria for successful PTMC (doubling of mitral valve area or decrease in left atrial pressure by half). There has been no mortality during hospital stay and in one-week follow-up. Five patients had mild MR and one had moderate MR. No one had cardiac tamponade or severe mitral regurgitation as was mentioned in other major studies.^{10,11} None died during the procedure or due to complication from the procedure. No one had any neurological complications or stroke. There was no need for emergency surgery in any of the cases. One of these patients developed atrial fibrillation with fast ventricular response with hemodynamic compromise which settled on its own (Fig. 2).

Table 1
Few important echo parameters of patients.

LA size in mm	43 (± 3.3)
LA pressure mmHg pre procedure	20 (± 2.7)
LA pressure mmHg Post procedure	10 (± 1.2)
MVA pre procedure cm^2	0.9 (± 0.14)
MVA post procedure cm^2	1.5 (± 0.21)
LV ejection fraction %	53 (± 4)

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