PERCUTANEOUS METALLIC MITRAL COMMISSUROTOMY AT NICVD

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ABSTRACT

Mitral stenosis, the commonest the sequela of rheumatic fever is still very common in our country. Previously mitral commissurotomy was only treatment available treatment, however in the last two decades percutaneous transeptal mitral valvuloplasty has become increasingly popular. We started percutaneous metallic mitral commissurotomy at National Institute of Cardiovascular diseases in June 1999 and have performed 100 cases successfully. We have found this technique safe, successful and cost effective.

INTRODUCTION

Mitral Stenosis is still very common in our country, with Rheumatic fever being the commonest cause. The other rare causes of Mitral Valve blockage are Atrial Myxoma, Ball Valve thrombus, Systamic Lapus Erythnomations, Malignancy, Large Vegetation and amyloid deposits.

There is still a high incidence of reheumatic fever in Asia and Africa and Mitral Valve disease is the commonest cause of heamoptysis, however in Europe and North America it is now very uncommon and is generally seen in immigrant population.

Closed Mitral Commissurotomy has been performed successfully as the procedure of choice for the last many decades however in selected cases open commissurotomy is performed, especially when there is history of systemic embolism and/or left atrial Clot.

Percutaneous Balloon valvuloplasty has emmerged as successful alternative to surgery and with the invention of Innoue technique this procedure has become increasingly popular. We started PTMC in 1996 at National Institute of Cardiovascular diseases. Despite the fact that Innoue Balloon is re used several time after re-sterilization, we found that cost of the procedure is still beyond the reach of majority of our patients. More over there are always potential hazards due to imperfect sterilization and decreasing performance with repeated re-use.

To overcome these limitations we started trial of the newer procedure of Percutaneous Transmitral Metallic Commissurotomy in 1999.

PROCEDURE

Patient Selection

All patients of both sexes of more than 15 years of age (Table - I) with moderate to severe mitral stenosis and no significant Mitral Regulation were selected. Majority of the patients had pliable valve, two patients had undergone close commissurotomy in the past.

Table - I

Age	30 ± 10 yrs.		
Sex	Male	:	35
	Female	:	65
Rhythm	Sinus		-78
	AF		-22

Transthoracic Echo/Doppler was performed prior to the procedure and transoesophageal echo was performed in selective cases with history of intermittent Atrial Fitrallation, TIA's and where the transthoracic echo was not optimal. (Table - II).

Table - II
ECHO / DOPPLER FINDINGS

Mean Mitral Valve Area	0.94 ± 0.2 cms
Mean Wilkin Score:	8 ± 2 (Planinetry)
Associated Valvular Lesions	
Mild AS/AR	20% of patients
Mild MR	10% of patients
Mean RV systolic pressure	65 ± 10 mmHg

None of our patients had left atrial clot, however spontaneous contrast echo was noticed in more than half of the cases.

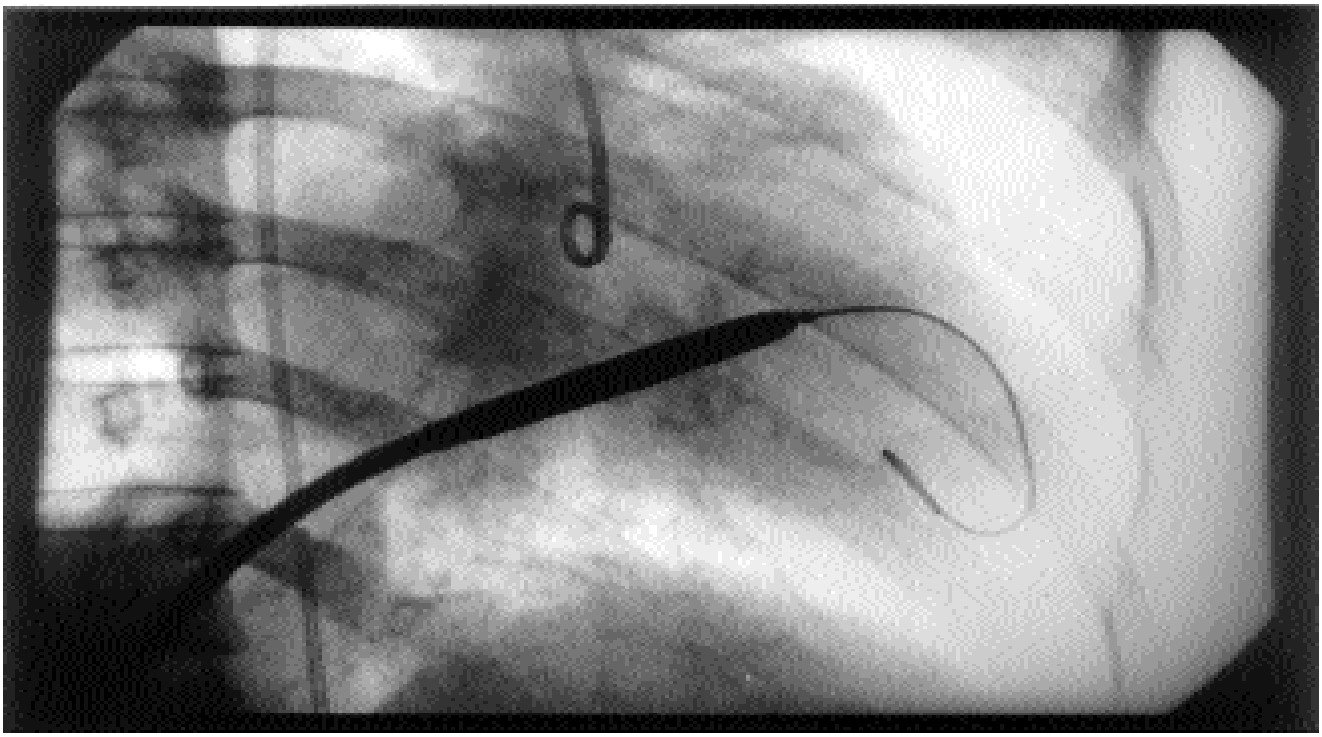

Figure-I
Metallic beaded wire placed in LV across Mitral valve. Pigtail catheter at aortic root level.

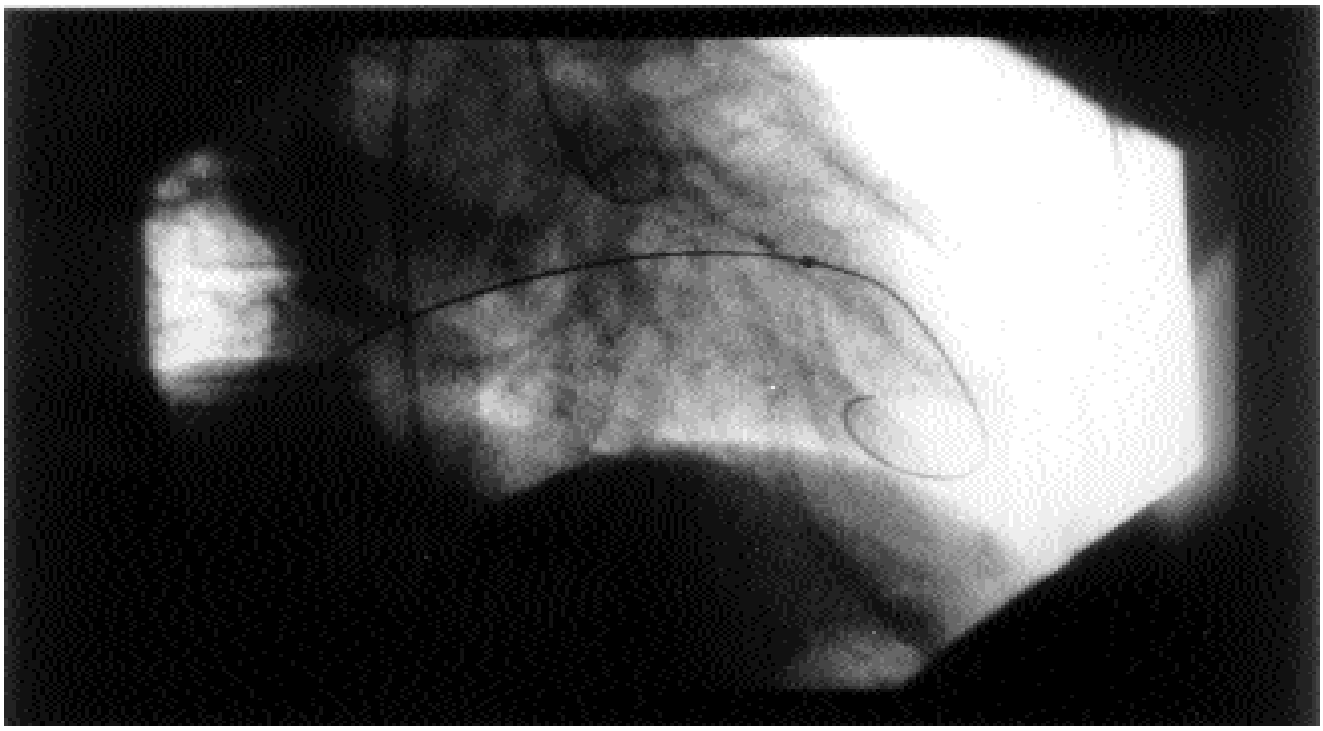

Figure-II
Close Mitral Metallic Commissurtome overthe beaded metallic wire, in LV across Mitral Valve.

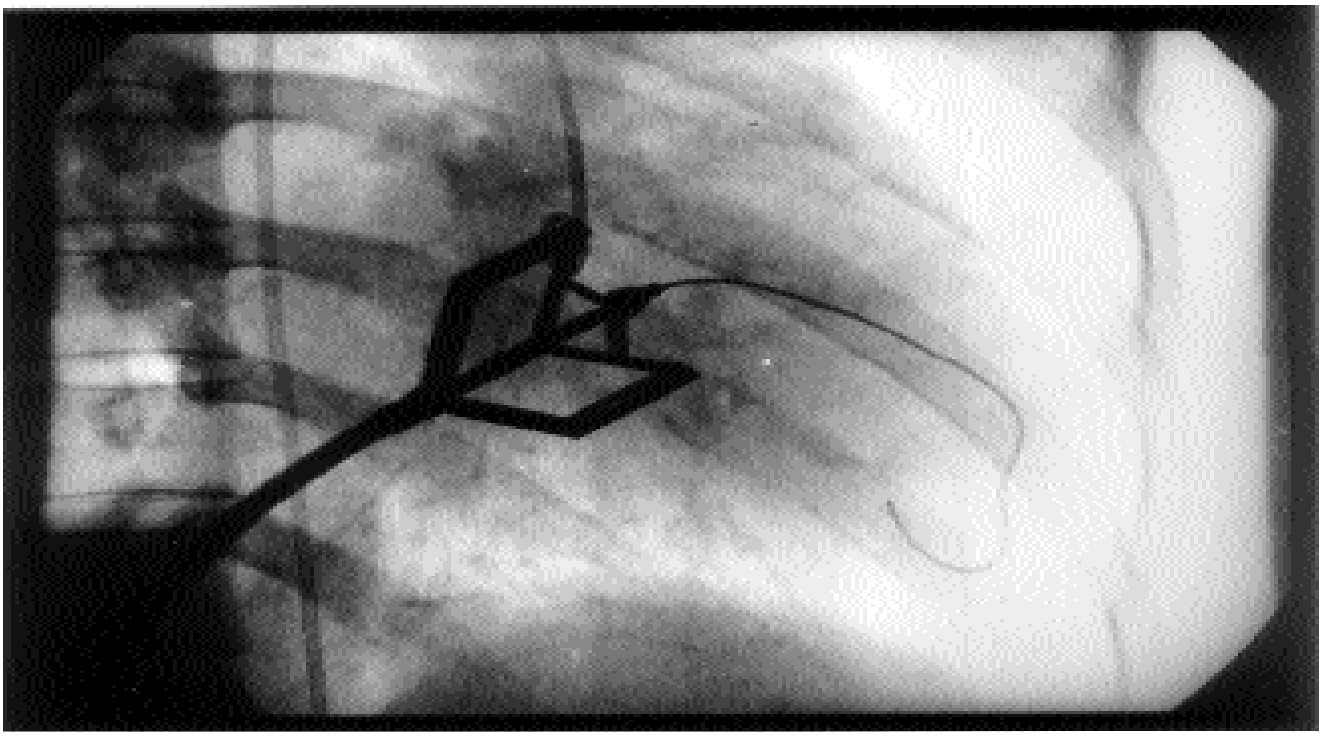

Figure-III
Partially opened Mitral Valvotome

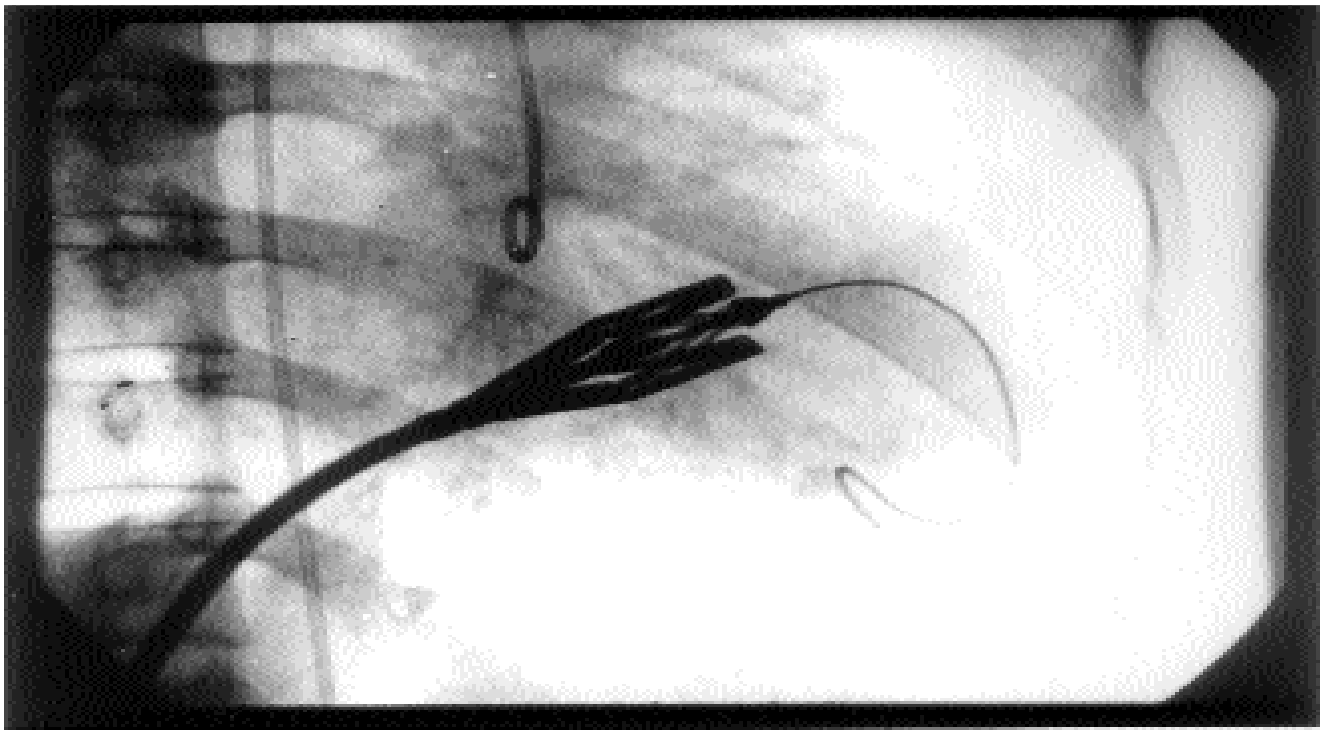

Figure-IV
Completely opened Mitral Valvotome

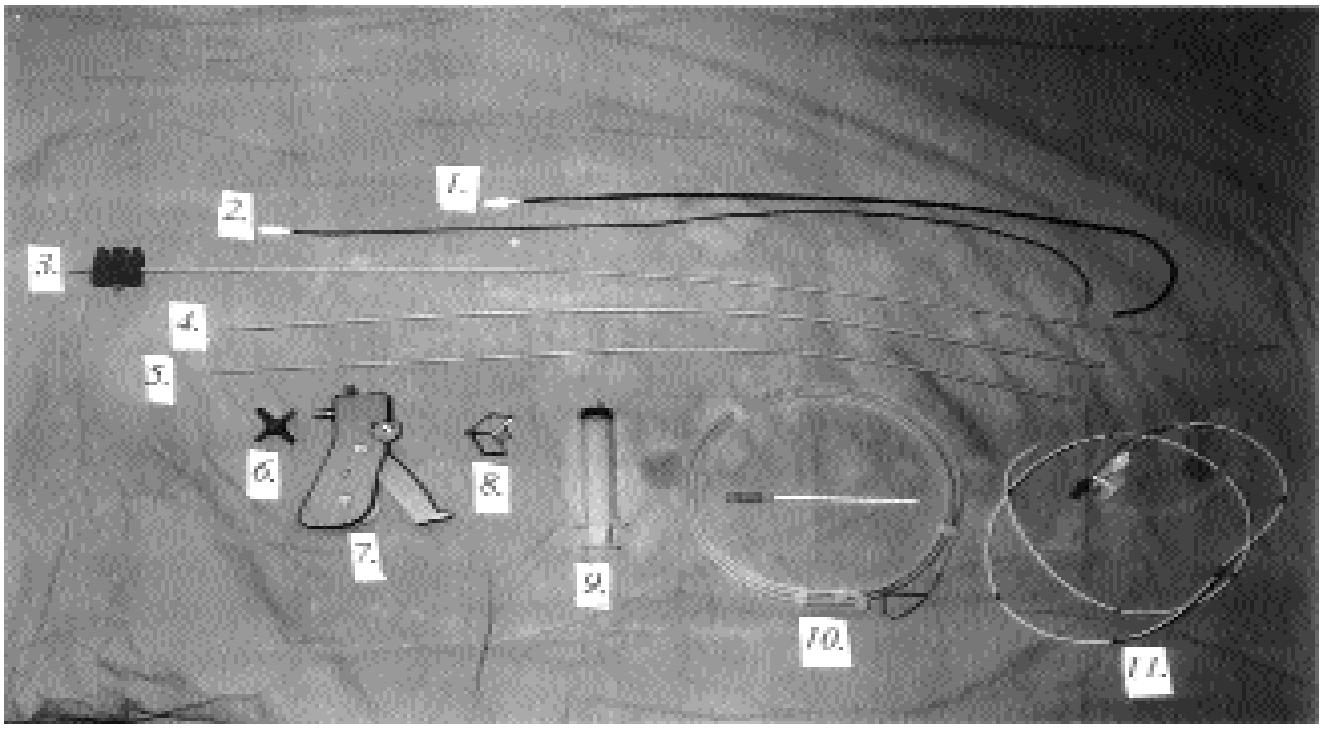

Figure-V

Different components of device: (1) Mullin Sheath (2) Mullin CAtheter (3) VAlvotony Catheter 13F, (4) & (5) 18F & 14F dilators, (6) Threaded FAstener (7) Pliezs (8) Metallic valvotome (9) Syringe (10) Beaded Metallic wire (11) Berman Catheter

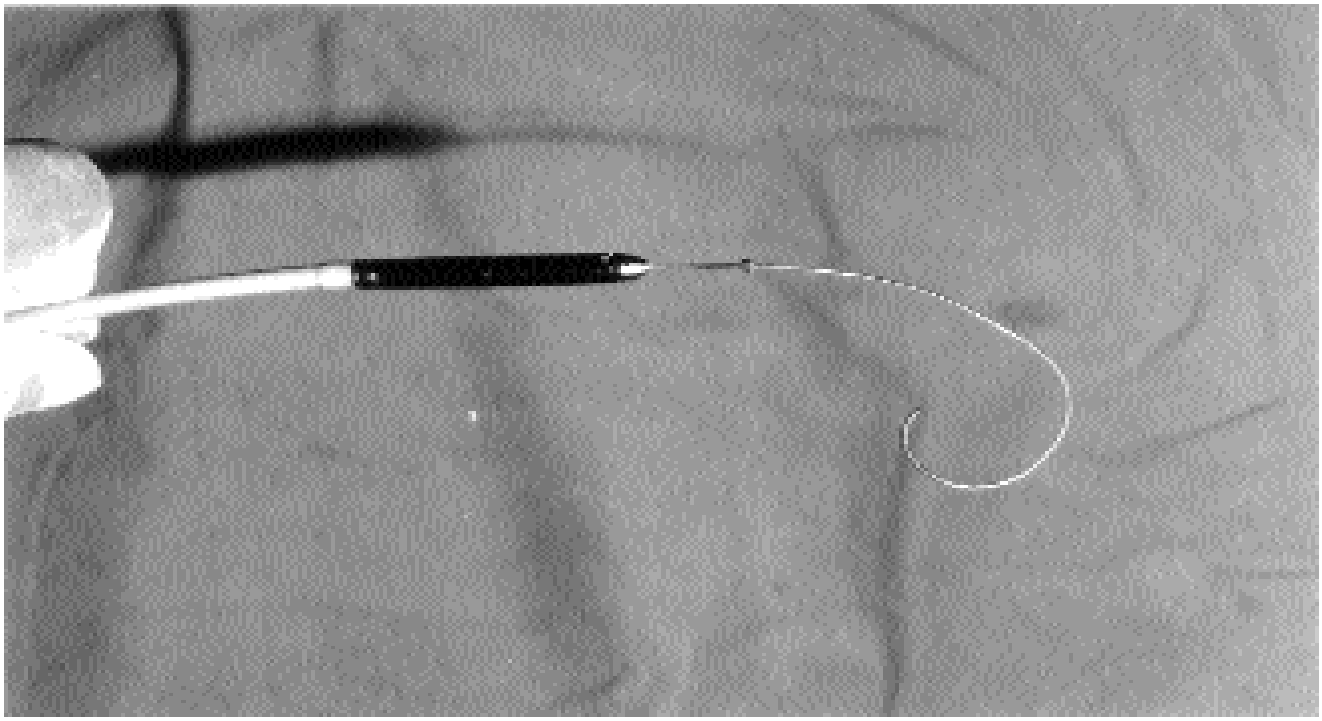

Figure-VI

Metallic Device, mounted on CAtheter Shaft with beaded metallic wire in place

TECHNIQUE

Right heart study was performed in all cases and both Right Ventricle and Preliminary Artery pressures and saturation were recorded. L.V. angiogram was performed prior to the procedure in selected cases where there was doubt about the severity of Mitral Regulation, left ventricular end dinstrilic pressure LVEDP is measured in all cases and finally pigtail catheter is positioned at aortic root level.

8F Mullins Catheter was used for transeptal puncture, later both Brockenborough needle and dilator are removed and Mullin's Sheath is advanced in left atrium. Left atrial Saturation and pressure is recorded and Inj Heparin 100 U/Kg is administered. Floating end hole balloon catheter is advanced through Mullin's Sheath into the left atrium, and once it has crossed the Mitral Valve in to left Venticle, Mullin's Sheath is advanced over it into the Left Ventricle and balloon catheter is removed; leaving the Mullin's Sheath in left ventricular. Cavity. At this point the Stainless Steel guide wire is introduced through the Mullin's Sheath and is positioned in left ventricular Cavity (Fig-I), Subsequently Mullin Sheath is removed. Both puncture site in groin and interatrial septum are dilated by 14F & 18F dilators. Than Commissurotome is advanced over the wire and is positioned across the Mitral Valve (Fig-II), now the guide wire is pulled back so that the bead on the guide wire is firmly held against the tip of Valvotome. (Fig-III). Opening of the Valvotome is controlled by the plier attached to the distal end of the Catheter. Desired dilation can be performed by squeezing the arms of activating pliers. Valvotome can be opened to 30, 35, 37 and 40mms and this opening is controlled by the clipers attached to plier.

Once the dilation is achieved (Fig-IV) Valvotome is with drawn, and Mullin Sheath is passed over the wire in left ventricular Cavity, wire is removed and transmitral pressure is recorded. We usually perform two dilation before recording the pressure. Finally left ventricular angiogram is performed and Pulmary artery pressure is recorded.

RESULTS

Procedure is successful in 96 cases. In majority of patients two dilation were required at 37mms. In few cases initial dilation was 37mms and latter 40mms dilation was given. There was no increase in Mitral Regulation in those cases where trivial Mitral Regulation was present prior to procedure. Substantial immediate drop of both transmitral gradient and mean left atrium pressure was recorded. Preliminary Artery presure reduced significantly in majority of Patients. (Table-III).

Table-III

	Before Procedure	After Procedure
Mean Diastolic Mitral Gradient	18.5 ± 5.1mmHg	5.4 ± 3.1mmHg
Mean LA Pressure	36.2 ± 7.6mmHg	11.6 ± 6.1mmHg
RV Systolic Pressure	70 ± 10mmHg	30 ± 10mmHg

COMPLICATIONS

We were unable to cross the mitral valve in one case and in two cases severe acute MR developed and they had MVR subsequently.

DISCUSSION

Percutaneous Transmitral Mitral Commissurotomy is now a recognized standard treatment procedure for Mitral Stenosis. Several muticenter studies have confirmed that the valve area achieved after PTMC is comparable to that achieved by closed and open mitral valvotomy. Reyes et al compared Open and Closed Mitral Surgical Commissurotomy Open Mitral Valuality and Percutaneous Transmitral Mitral Commissurotomy and found that all three techinques have similar results.

This technique of Percutaneous Transmitral Metallic Commissurotomy is new. The Cribier Metallic Device is similar to tubb’s dilator used by Cardiac Surgeons for Mitral Commissurotomy. It is mounted on the shaft of 13F Catheter and is placed at Mitral Valve level just as in the technique of Innoue Balloon. Unlike Innoue balloon where inflation of balloon provides a guide about the site of Mitral Valve, in metallic device the site of Mitral Valve is judged by experience or prior L.V angiogram can be helpful.

Immediate results are comparable to balloon valvuloplasty and six months follows-up in limited

number of patients did not show any loss of Mitral valve area or re-stenosis.

Cardiac perforation with subsequent tamponade is a well known life threatening complication of BMV. It can result from atrial perforation during transeptal puncture or from perforation of left-ventricle by guide wires in double balloon technique; its incidence is reported 1% to 9% in literature. Despite the necessity of placing guide wire in the left-ventricle with this new technique, the risk of ventricular perforation remains low, due to high flexibility of the distal 10 cms of the wire.

Two of our cases who developed severe Mitral Regulation and had Mitral Value Replanned subsequently, were totally unexpected, both had pliable valve, however the risk of acute Mitral Regulation reported in literature is between 1.4% and 7.5%, thus with this new technique, no added risk of this complication have been reported.

Finally, no significant transeptal shunting could be detected after Percutaneous Metallic Mitral Commissurotomy by Transthoracic color flow Doppler and the risk of this complication remains low. However regardless of the technique used, most of the transatrial shunts closed spontaneously during follow-up.

Despite the resemblance of the instrument used in closed surgical commissurotomy and in PMMC, the two techniques differs by many aspects, such as the self positioning of the dilator's bars in the commissures. Moreover, with PMMC immediate evaluation of the haemodynamic results after dilation offers the possibility of subsequent additional dilation opening to a larger size if needed.

Finally having performed both BMV and PMMC we are of the view that the PMMC results are superior, there is less risk of infection, as the metallic component are sterilized in Autoclave and non metallic components in. EO. We have performed 100 procedures with only two devices and one of them is still in working order.

REFERENCES

1. Cribier A. Rath Letac B, Percutaneous Mitral Valvatomy with a metal dilator. Lancet. 1997;349:1667-68.

2. Cribier A, Helence Eltchanin off, Rene Koning , Percutaneous Mechanical Mitral Commissurotomy with a newly designed Metallic Valvotome. Circulation 1999;99:793-799.

3. Reyes VP, Raju BS, Wynne J. Stephenson LW, Percutaneous Balloon Valvuloplasty compared with Open Surgical Commissurotomy for mitral stenosis. N. Engl J Med. 1994;331:961-967

4. Arora R, Kalra GS, Murty GSR, Trahan V, Kalilullah M. Percutaneous transatrial mitral commissurotomy: immediate and intermediate results. JAM Coll Cardiology 1994;23:1327-1332.

5. Chen CR, Cheng TO. Percutaneous balloon mitral valvuloplasty by the Innoue Technique: a multi-center study of 4832 patients in China. Am. Heart J. 1995;129:1197-1203

6. Iung B, Cornter B, Ducimetiere P, Porter J-M. Immediate results of Percutaneous mitral commisurotomy: a predictive model on a series of 1514 patients. Circulation 1996;94:2123-2130.

7. Herrnann HC, Ranvaswany K, Isner JM, Ranees. Factors influencing immediate results, complications and short term follow up status after Innoue Balloon Mitral Valvotomy; a North American multi center study. AM Heart J. 1992;124:160-166.

8. Ben Farhat M, Betbout F, Gamra H, Ayari M, Chahbani I. Results of Percutaneous double balloon mitral commissurotomy in one medical center in Tunisia. AMJ Cardiol. 1995;76:1266-1270.

9. Vahanian A, Cornier B, lung B. Percutaneous Transvenous mitral commissurotomy using the Inoue balloon: International Experience. Cathet Cardiovascular Design. 1994;2:8-15.

10. Yoshida K, Yoshikania J. Akasaka T, Yamaura Y, Fukaya T. Assessment of left-to-right atrial shunting after Percutaneous Mitral Valvoplasty by transesophageal color Doppler flow-mapping Circulation, 1989;80:1521-1526.