

Long Term Follow-up of Atrial Septal Defect Closure After Percutaneous Balloon Mitral Valvuloplasty by Transesophageal Echocardiography

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- PBMV involves atrial septostomy during the procedure. One of the consequences of transeptal puncture is the creation of an ASD. Thus an atrial communication is an obligatory part of the procedure.
- TEE can detect L-R shunts too small to be detected by other methods.
- Many surgeons noticed that when they did MVR to patients who had previous PBMV, they found a significant ASD in some of them.

- The aim of this study was to evaluate the 3 years follow-up of ASD closure after PBMV by TEE.

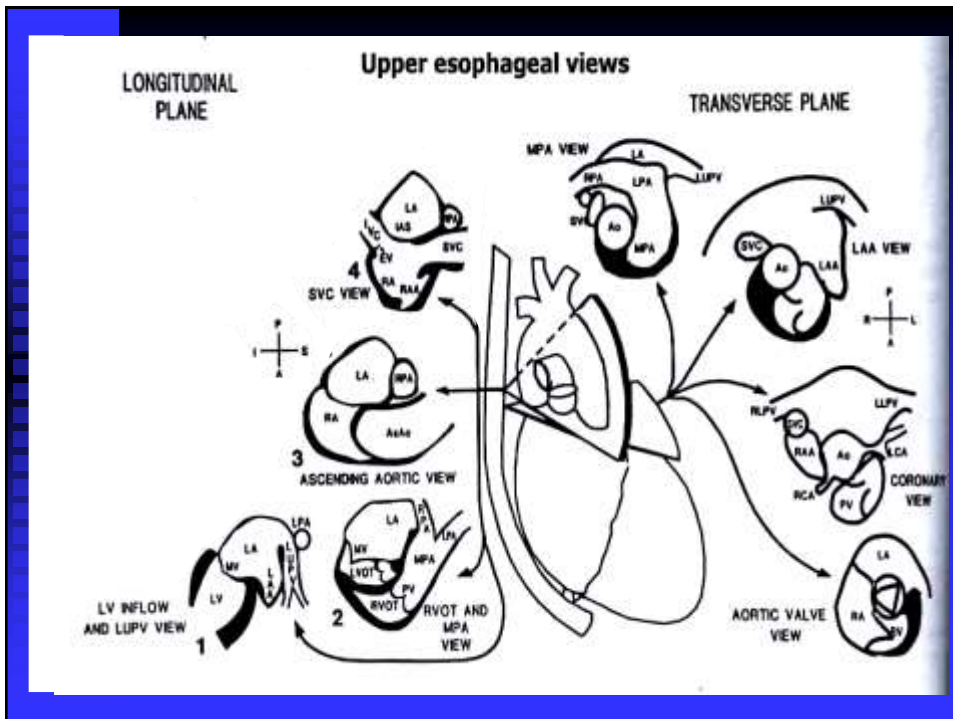
Methods

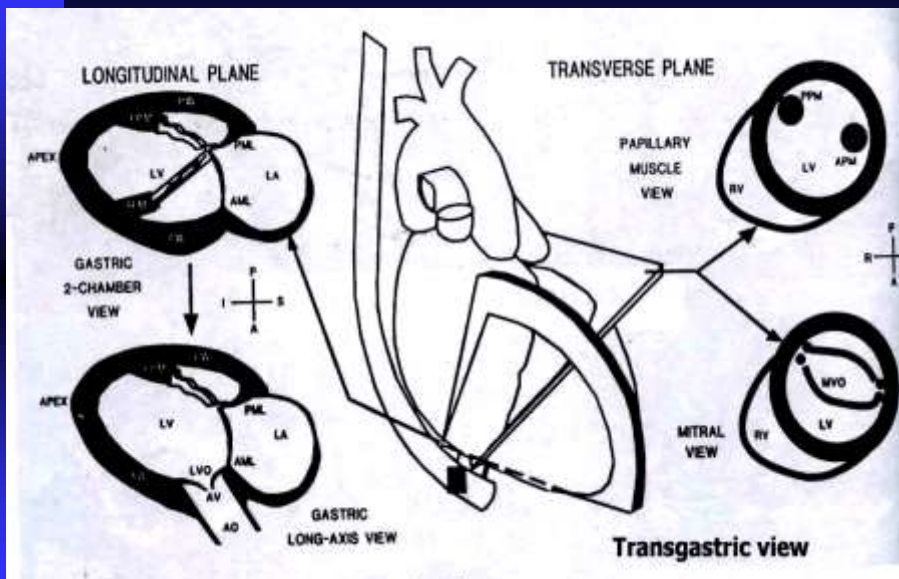
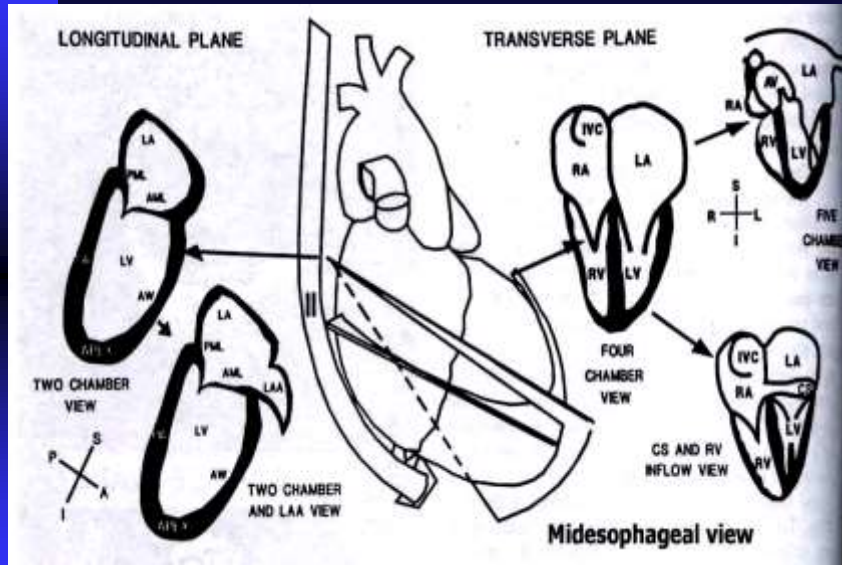
TTE

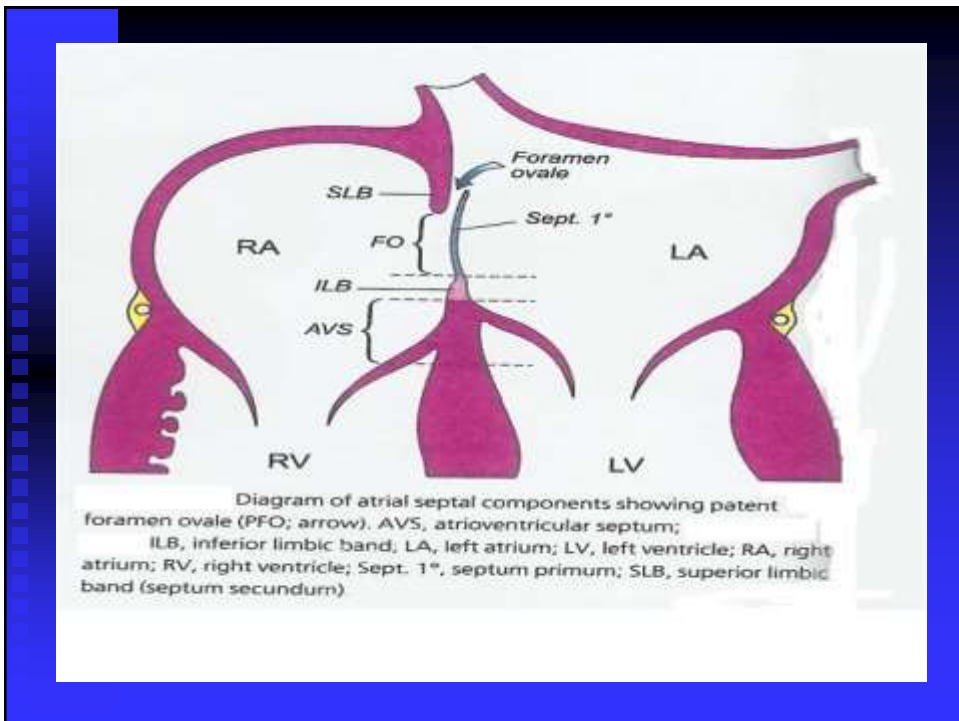
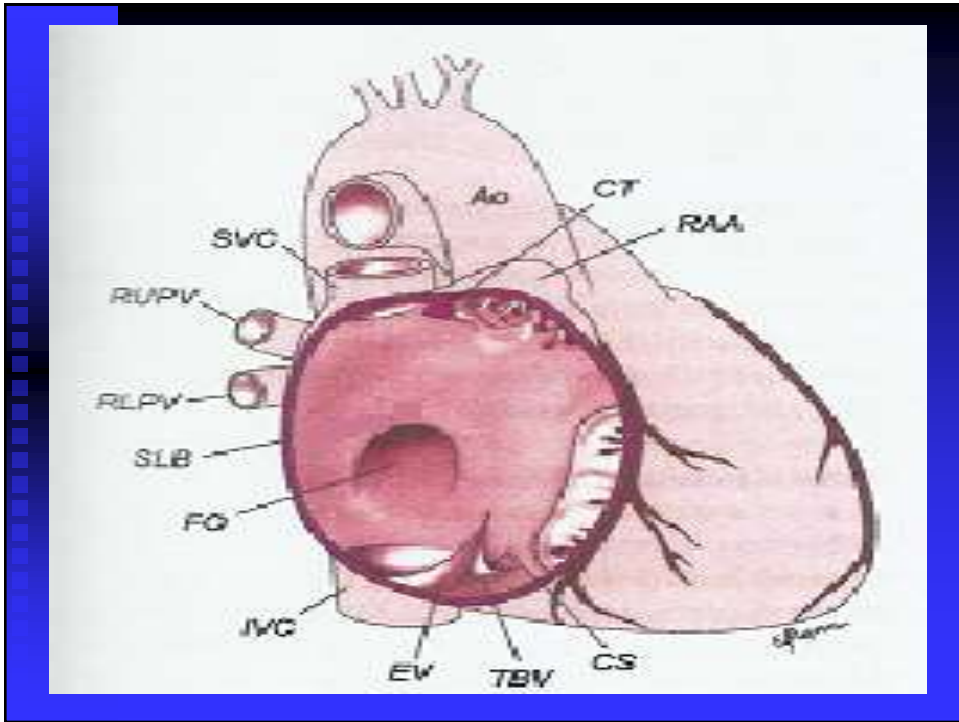
- The MV was scored by using the criteria described by Wilkins et al.
- Restenosis of the MV: was defined at follow-up as a loss of 50% of the initial gain and value area <1.5 cm.

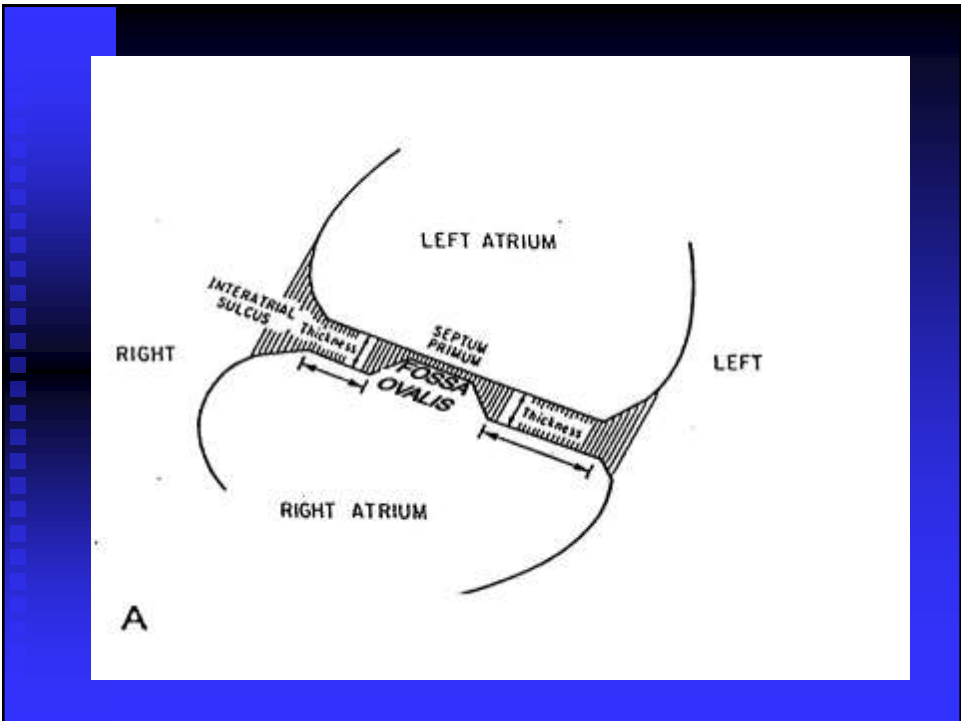
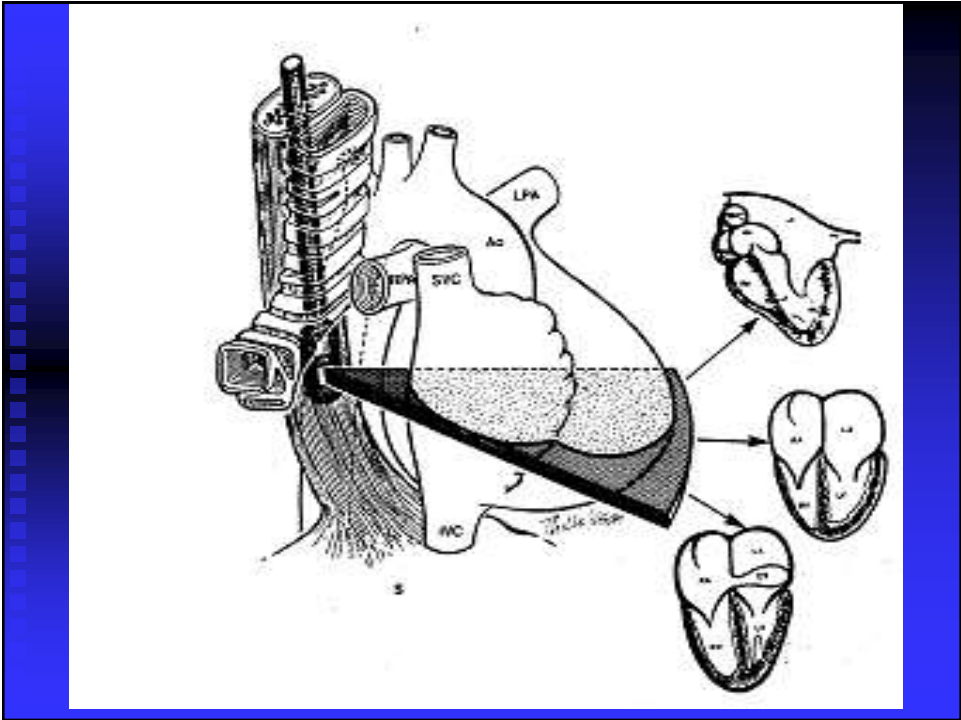
TEE:

- Was done before the procedure, within 24 hours after the procedure, at 6 month follow-up and at 3 years follow-up.
- The interatrial septum (IAS) thickness was measured at its thinnest part which is the fossa ovalis (Fo. Ov.) and at the superior and the inferior limbi of the IAS.









Exclusion Criteria

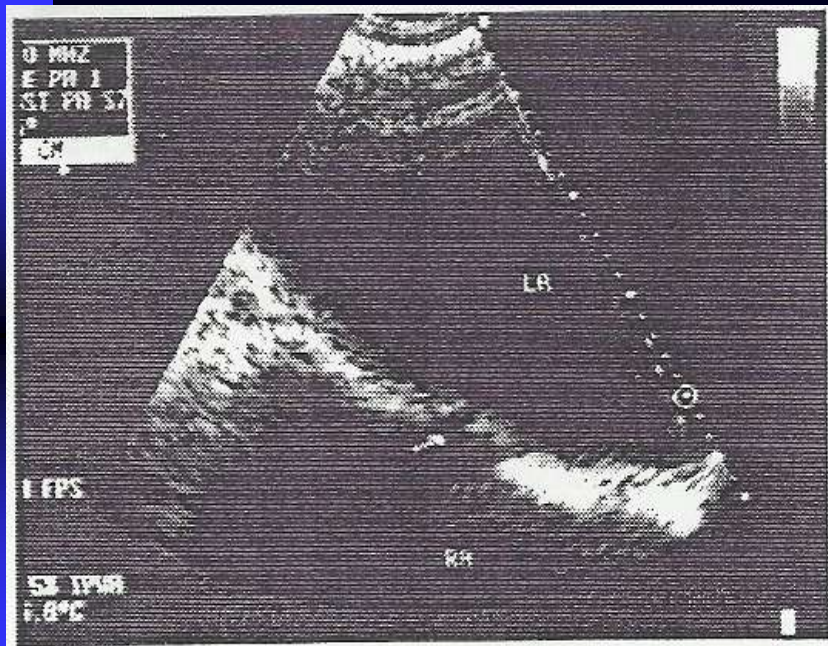
1. Pts with intracardiac masses or thrombi.
2. Pts with significant MR (moderate or severe MR).
3. Pts with ASD, PFO or interatrial septal aneurysm.
4. Pts with previous PBMV or surgical mitral commissurotomy.
5. Pts with multiple atrial septal punctures during the procedure.
6. Pts who developed restenosis at 6 months follow-up after the procedure.

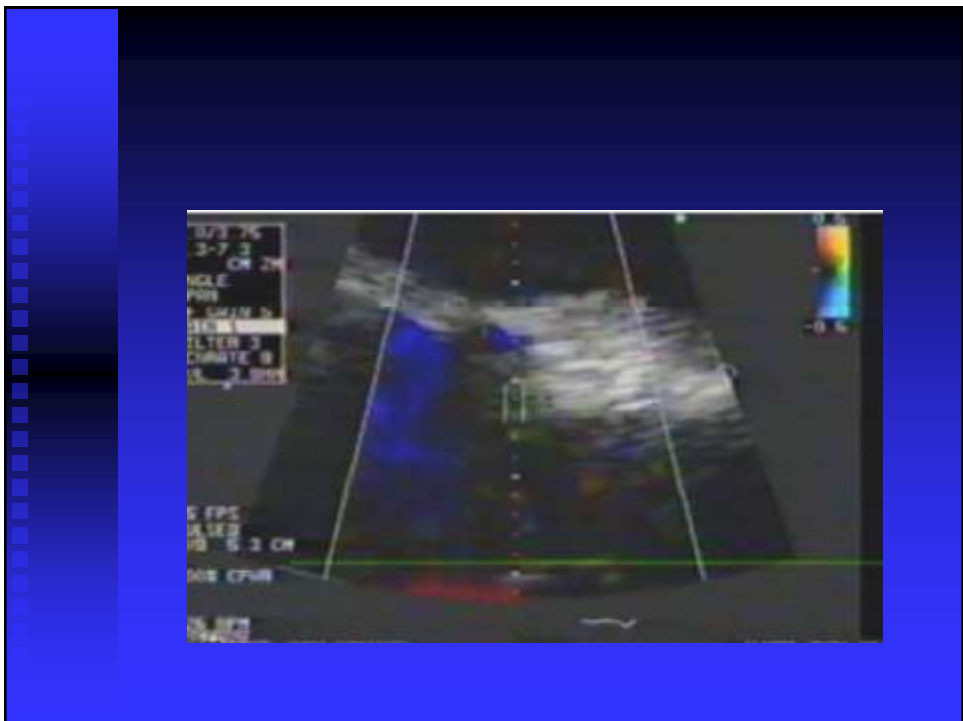
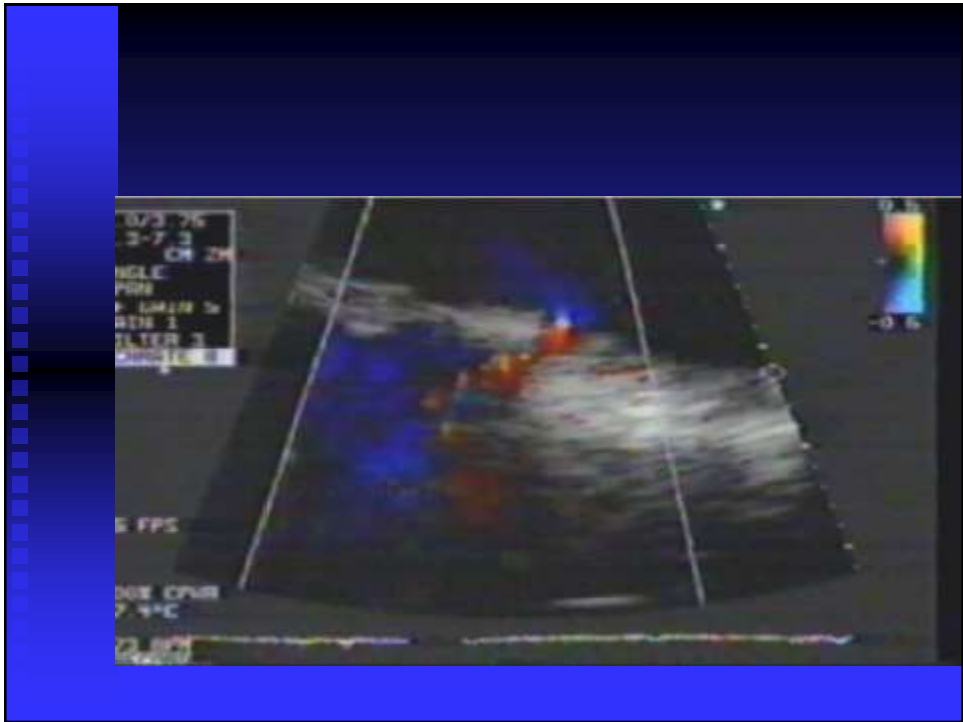
Results

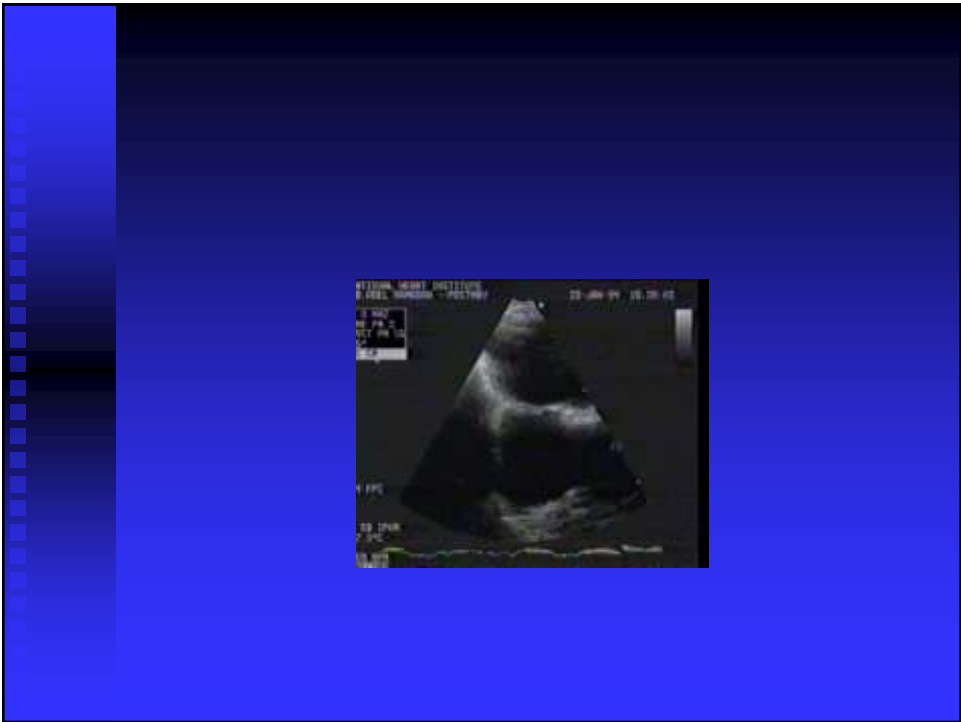
- 200 consecutive pts with rheumatic MS who underwent successful PBMV were studied prospectively at the N.H.I.

Immediate Results

- ASD occurred in all the pts (100%) after PBMV (Iatrogenic ASD), small L-R atrial shunting occurred in all the pts. All the ASDs were small in size (≤ 5 mm).
- The puncture site (ASD site) occurred in the Fo.Ov. in 120 pts (60%), while it occurred outside the Fo. Ov. In 80pts (40%). In 50 pts (62.5%) of these 80 pts, it occurred in the inferior limbus, while in the other 30 pts (37.5%), it occurred in the superior lumbus.







6 Months Follow-up Results

- 180 Pts presented at 6 months after PBMV.
- ASD was closed in 117 Pts (65%). In 88 Pts (75.2%) of these 117 Pts, ASD immediately after PBMV (before closure) was present in the Fo.Ov., while it was present outside the Fo.Ov. in 29 pts (24.8%).
- ASD persisted in 63 Pts (35%). All of them had L-R atrial shunting with the same degree as that immediately after PBMV. All the ASDs were small in size (≤ 5 mm) and with the same size as that immediately after PBMV in all the 63 Pts.
- 18 Pts (10%) developed restenosis of the MV. So, they were excluded from subsequent follow-up study.
- No Pts developed severe MR.

3 years Follow-up Results

- 95 Pts presented at 3 years after PBMV. ASD was closed in 76 pts (80%), while it was persisted in 19 pts (20%).
- The pts were classified into 2 groups.

Group I

- Included 76 Pts (80%) with closed ASD. In 74 pts (97.4%) of these 76 pts, the ASD immediately after PBMV (before closure) was present in the Fo.Ov., while it was present outside the Fo.Ov. in 2 pts (2.6%).
- 18 Pts (23.7%) developed restenosis at 3 years follow-up.
- 15 pts (19.7%) developed severe MR at 3 years follow-up.

Group II

- Included 19 Pts (20%) with ASD persistence. All of them had L-R atrial shunting with the same degree as that immediately after PBMV. All the ASDs were small in size ($\leq 5\text{mm}$) and with the same size as that immediately after PBMV.
- The ASD site was outside the Fo.Ov. in all the 19 pts (100%). In 14 pts (73.7%) of these 19 pts, it was in the superior limbus, while in the other 5 Pts (26.3%), it was in the inferior limbus.

- So, in all the 74 pts who had ASD site in the Fo.Ov. Immediately after PBMV, the ASD was closed at 3 years follow-up.
- 5 pts (26.3%) developed restenosis, 4 pts (21%) developed severe MR. no significant difference was found between the two groups as regards restenosis or severe MR.

Predictors of ASD persistence

| | Group I ASD closed (76) | Group II ASD persisted (19) | P Value |
|--|----------------------------|--------------------------------|----------|
| Age | 39.30 ± 10.46 | 41.47 ± 10.88 | NS |
| Gender (F) | 49 (64.5%) | 12 (63%) | NS |
| Rhythm (AF) | 26 (34.2%) | 7 (36.8%) | NS |
| LAD | 5.31 ± 0.96 | 6.22 ± 1.19 | P< 0.01 |
| MV score | 7.16 ± 0.99 | 8.63 ± 1.67 | P< 0.001 |
| MVA before PBMV | 0.85 ± 0.19 | 0.80 ± 1.18 | NS |
| Mild MR before PBMV | 31 (40.8%) | 8 (42.1%) | NS |
| Fo .Ov. Thickness | 1.27 ± 0.19 | 1.71 ± 0.15 | P< 0.001 |
| Superior limbus thickness | 3.32 ± 1.16 | 4.26 ± 1.76 | P< 0.05 |
| Inferior limbus thickness | 3.12 ± 1.12 | 5.84 ± 1.89 | P< 0.001 |
| ASD size immediately after PBMV | 2.83 ± 0.89 | 3.05 ± 1.03 | NS |
| ASD site immediately after PBMV (outside Fo.Ov.) | 2 (2.6%) | 19 (100%) | P< 0.001 |

Patients with ASD persistence (Group II) at 3 years follow-up had:

1. A larger LAD ($P < 0.01$).
2. A higher total echo score of the MV ($P < 0.001$).
3. A thicker Fo.Ov. of the IAS ($P < 0.001$).
4. A thicker superior limbus of the IAS ($P < 0.05$).
5. A thicker inferior limbus of the IAS ($P < 0.001$).
6. ASD site immediately after PBMV outside the Fo.Ov. (100%).

ASD Persistence

- The investigators reported that the valsalva maneuver may produce R-L shunting in a pt with an iatrogenic ASD. Also a high incidence of interatrial communication is seen in pts with an unexplained CVA, therefore, realization of a persistent ASD after PBMV, however small, becomes important, especially if open heart surgery for MV disease is undertaken at a later date in these pts when these iatrogenic defects should be closed.

Conclusions

1. ASD with L-R atrial shunting occurs in all the patients after PBMV.
2. ASD after PBMV persists in 20% of the patients at 3 years follow-up.
3. Predictors of ASD persistence at 3 years follow-up are : large LAD, high total echo score of the MV, thick Fo.Ov., thick superior limbus, thick inferior limbus and ASD site immediately after PBMV outside the Fo.Ov.
4. ASD closes at 3 years follow-up in all the patients who had ASD in the Fo.Ov. immediately after PBMV.
5. All the patients with ASD persistence at 3 years follow-up had ASD outside the Fo.Ov. after PBMV.

Take Home Message

1. The operators doing transseptal puncture during PBMV should aim to do it in the Fo.Ov.
2. Serial TEE follow-up for Pts with factors predicting ASD persistence should be done.
3. For Pts requiring MV surgery who had undergone PBMV before, the surgeon should be aware of a possible ASD and should assess the IAS a the time of surgery.