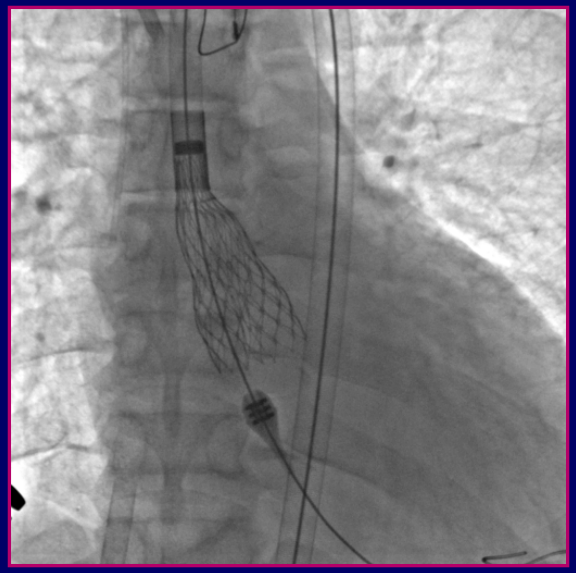
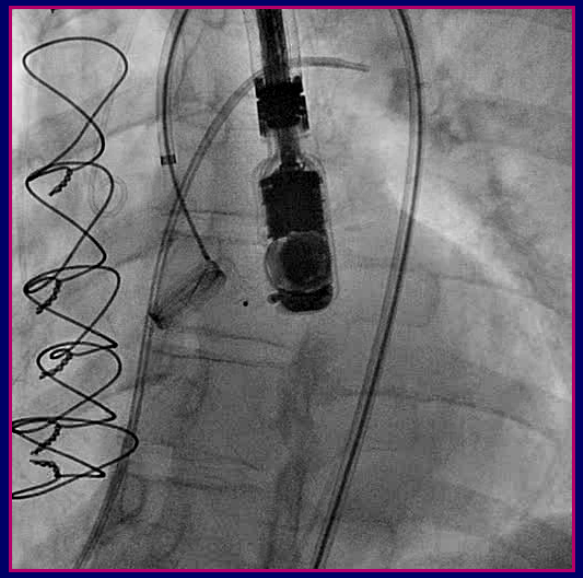
INDIANA UNIVERSITY
SCHOOL OF MEDICINE

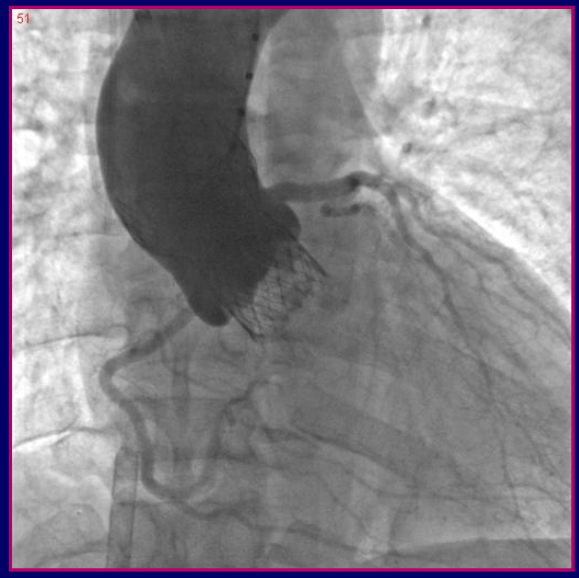
Percutaneous Valve Interventions Paradigm Shift

Anjan K Sinha, MD

Krannert Institute of Cardiology







Disclosures

- None

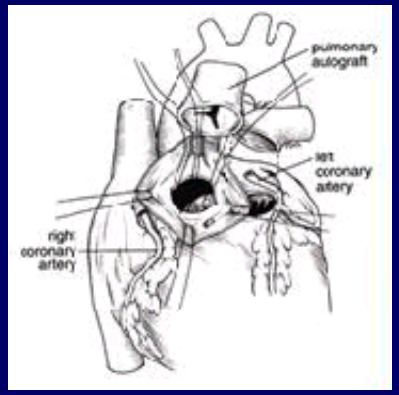
The gold standard treatment for valvular diseases had been prosthetic valves

Mechanical

Tissue

Stentless

Homograft



Ross

Paravalvular Leak

- **Predisposing factors :**
- **Infective endocarditis**
- **Nature of tissue bed**
- **Prosthetic valve sizing**
- **Surgical technique**
- **Myocardial contractility**

Paravalvular Leak

- Most PVL occur in association with mitral prosthesis.
- Although spontaneous closure of PVL has been described, it is rare and most patients go on to develop heart failure , pulmonary HTN , transfusion dependent hemolytic anemia , and infective endocarditis.
- Large PVL are commonly associated with a murmur but occasionally, an eccentric jet may be relatively inaudible.

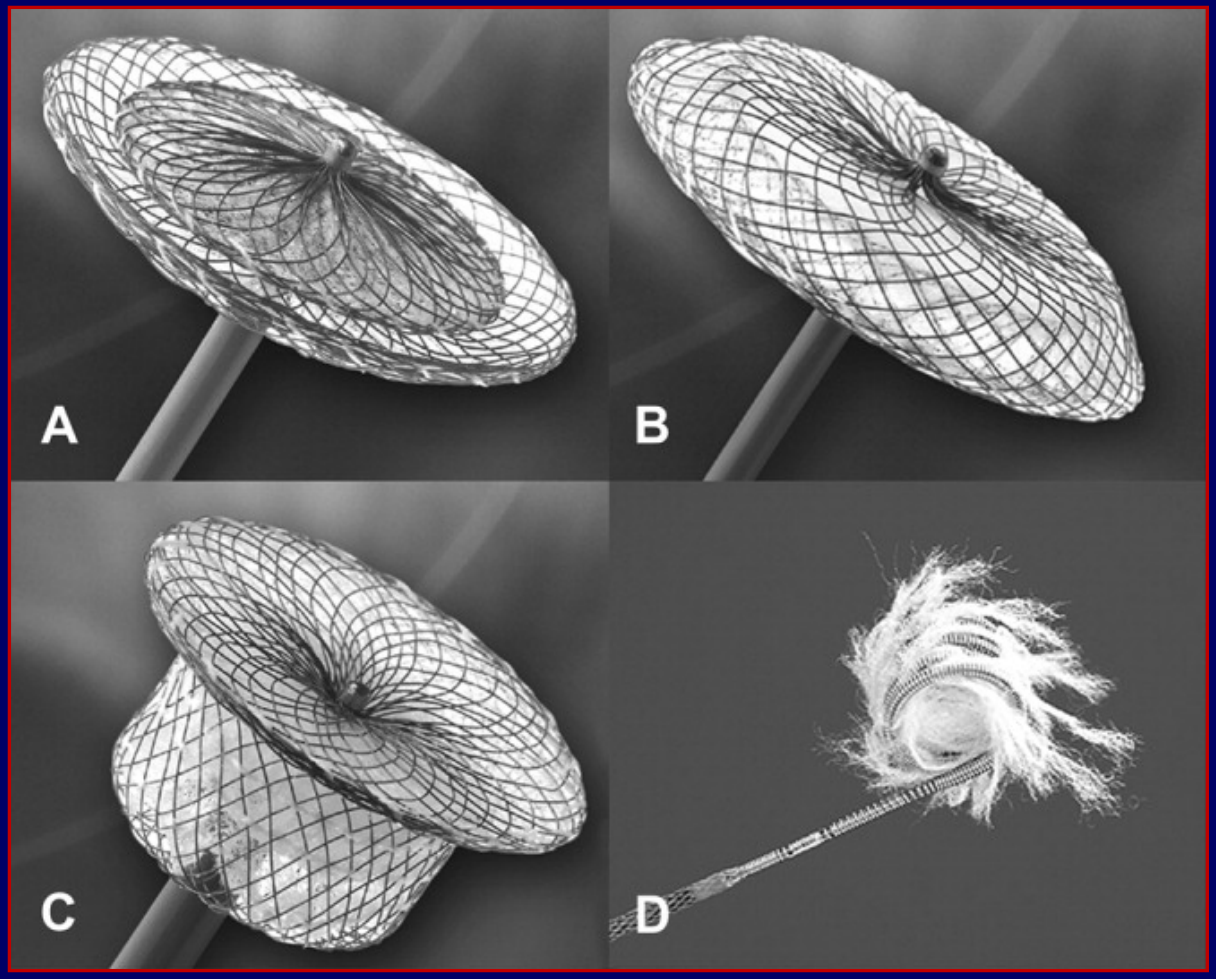
Paravalvular Leak

- Surgical reoperation is the gold standard of therapy for PVL but is associated with high perioperative mortality risk .
- Reoperation is also associated with an increased risk of PVL.
- Reported 6 months freedom from PVL recurrence is 85% , 78% and 65% for 1st, 2nd and 3rd reoperation respectively.

Percutaneous Closure of PVL

- Percutanous repair of PVL has been proposed as an alternative to surgical reoperation .

- There are few reported cases of percutaneous closure of prosthetic PVL and most are on mitral valves.



A: Amplatzer® patent foramen ovale (PFO) occluder. B: Amplatzer® septal occluder. C: Amplatzer® duct occluder. D: Flipper™ detachable embolization coil delivery system.

- 69 M h/o CAD s/p PCI in 1990s , underwent MV repair 2004 and mechanical MVR 2007 presenting with dyspnea and angina on exertion.

- Refuses 3rd open heart surgery.

Procedural Results of PVL Closure

	Age	Valve-type	Approach	Device	Outcome	Repeat procedure	Approach	Device	Outcome
1	75	MVR-bio	Antegrade	ASO	Residual leak	Yes	Antegrade	Coil	Occluded
2	64	MVR-mech	Antegrade		Unable to cross	No			
3	87	AVR-bio	Retrograde	PDA	Residual leak	Yes	Retrograde	Coil	Occluded
4	78	MVR-bio	Antegrade	PDA	Occluded				
5	77	MVR-bio	Antegrade	PDA	Small residual leak	No			
6	76	MVR-mech	Antegrade	PDA	Residual leak	Yes	Antegrade	Coil	Urgent surgery
7	76	MVR-mech	Antegrade	ASO	Occluded				
8	50	MVR-mech	Antegrade		Unable to cross	No			
9	74	MVR-mech	Antegrade		Unable to deploy	Yes	Retrograde	PDA	Residual leak
10	42	MVR-mech	Antegrade	PDA	Occluded				

Catheter Cardiovasc Interv. 2006 Oct;68(4):528-33.

Successful Percutaneous Repair of Perivalvular Prosthetic Regurgitation

- 16 pts with heart failure of hemolytic anemia
- 14 mitral and 2 aortic.
- Successful percutaneous closure with mild or no residual PVL achieved in 17/21 attempts.
- Mean f/up 3.1 months.

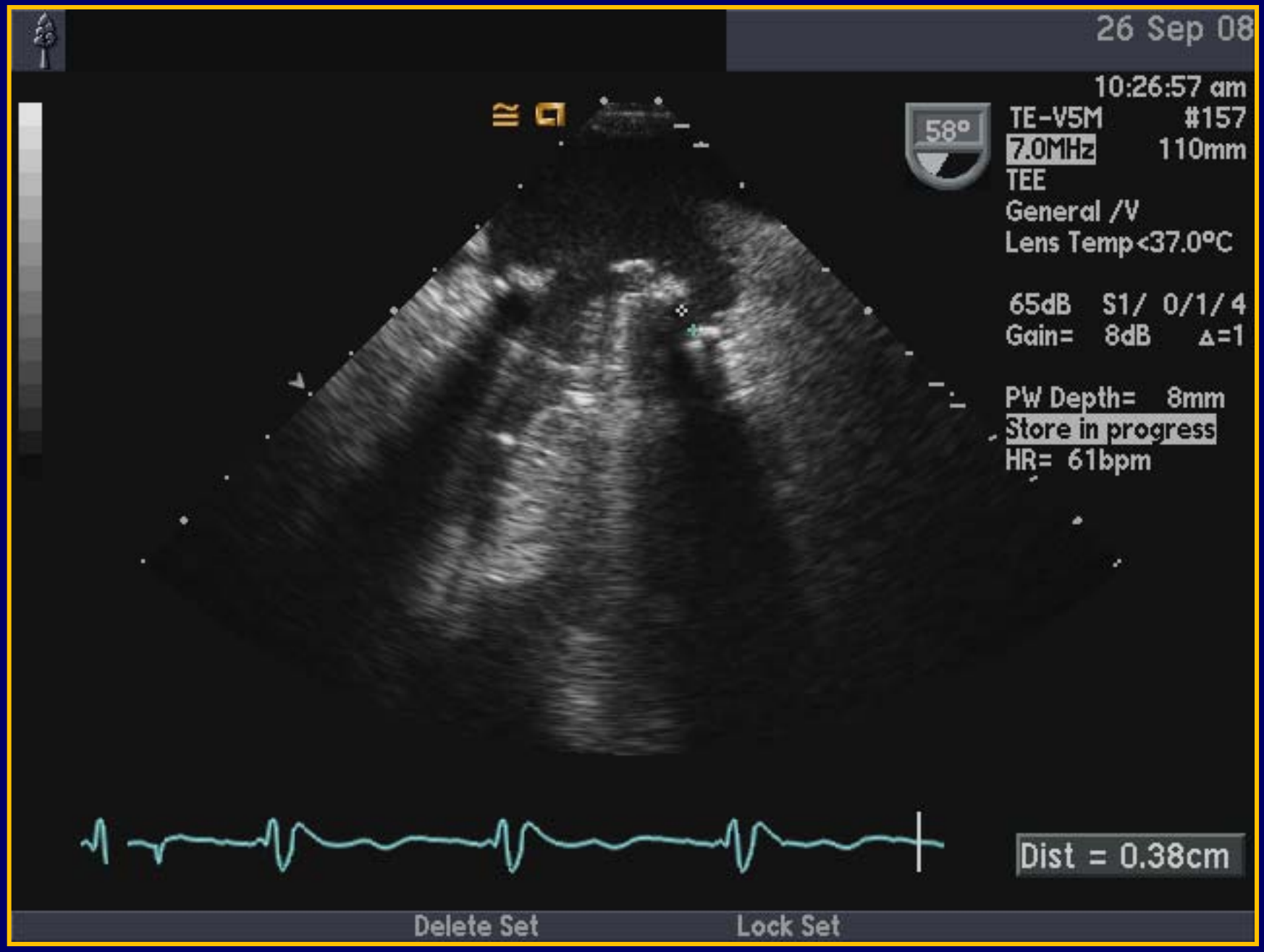
Catheterization and Cardiovascular Interventions 70:815–823 (2007)

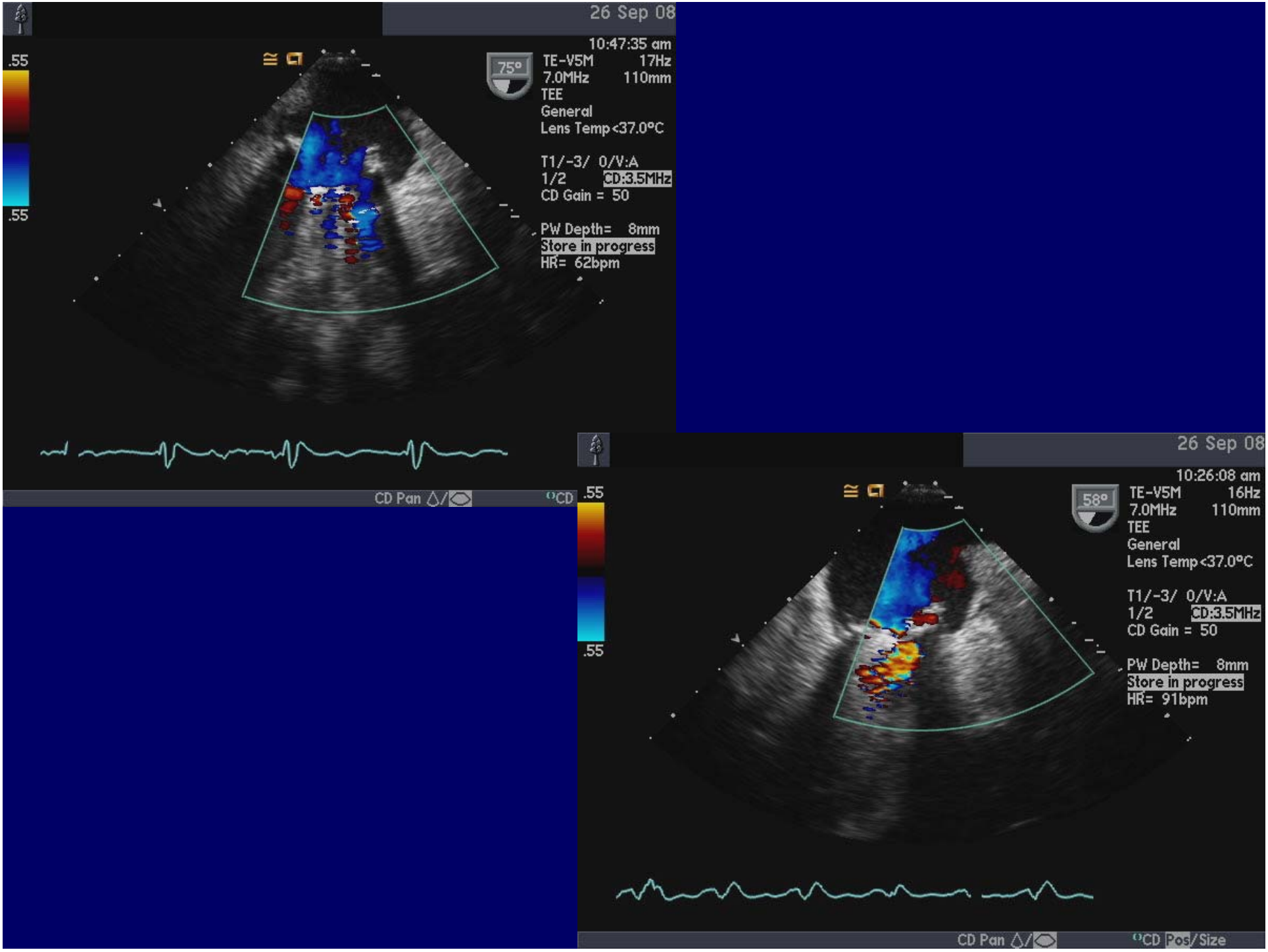
Successful Percutaneous Repair of Perivalvular Prosthetic Regurgitation

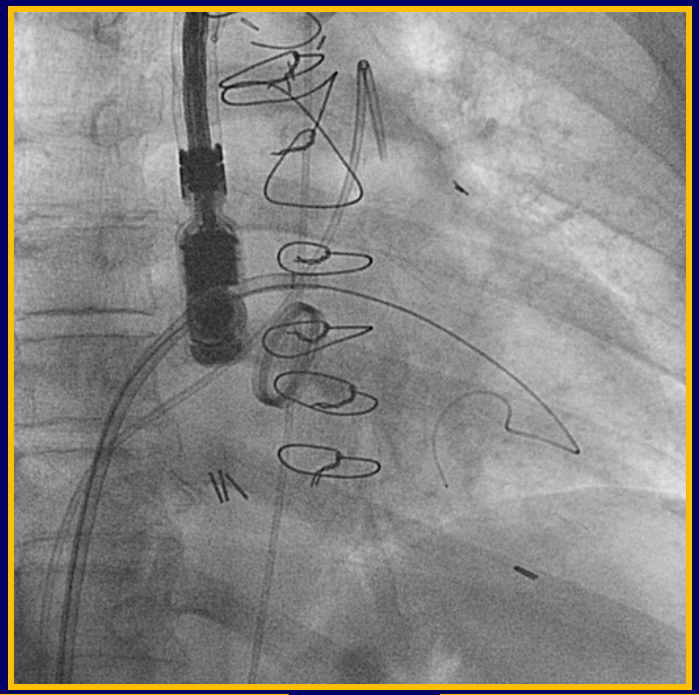
- No periprocedural deaths , MI , strokes , valve dehiscence or device embolization.
- 4 deaths.
- 4/5 pts who were transfusion dependent pre-procedure were free of the need for blood transfusion post procedure.
- Overall improvement of 1 grade in functional class.

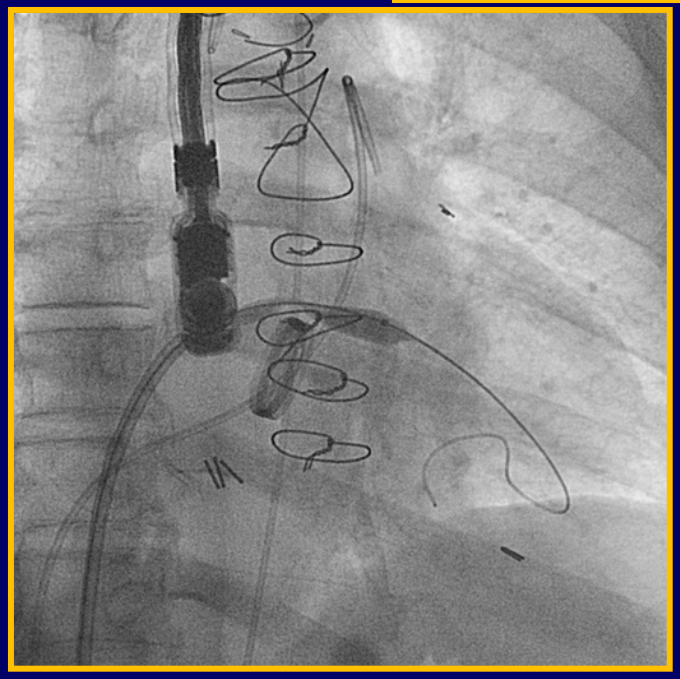
Echocardiographic Guidance of Paravalvular Leak Closure

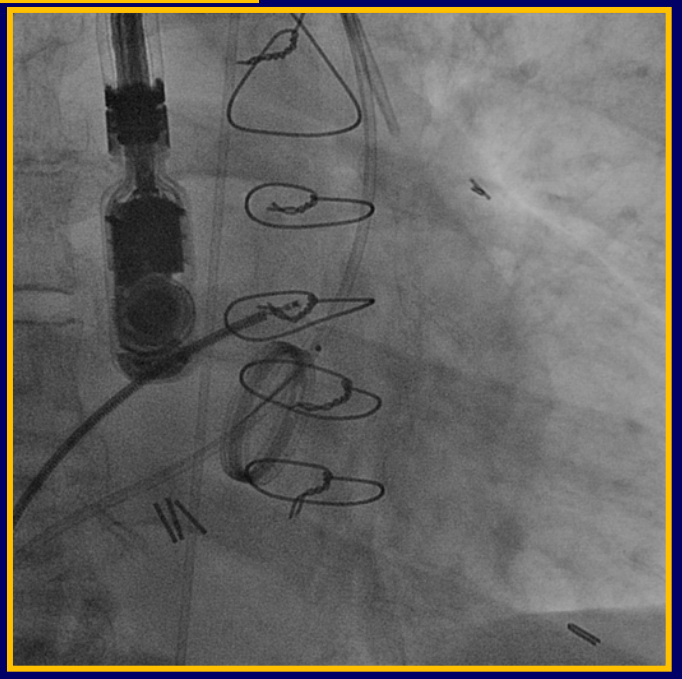
Pre-procedural	Intra-procedural
Confirm presence of PVL	Assist trans-septal puncture
Accurate definition of PVL anatomy	Recognize tamponade, air embolism
Assess prosthetic valve function	Assess proximity of catheter and leak
Exclude rocking valve	Guide and confirm wire passage across leak
Exclude active infective endocarditis	Identify entrapment in chordae or trabeculations
Identify intra-cardiac thrombus, vegetations	Recognize interference with valve leaflets
Position of PVL relative to valve hinges	Device sizing, selection, position, stability
Device selection	Assess residual leak


26 Sep 08
10:26:57 am
58°
TE-V5M #157
7.0MHz 110mm
TEE
General /V
Lens Temp<37.0°C
65dB S1/ 0/1/4
Gain= 8dB Δ=1
PW Depth= 8mm
Store in progress
HR= 61bpm
Dist = 0.38cm
Delete Set
Lock Set

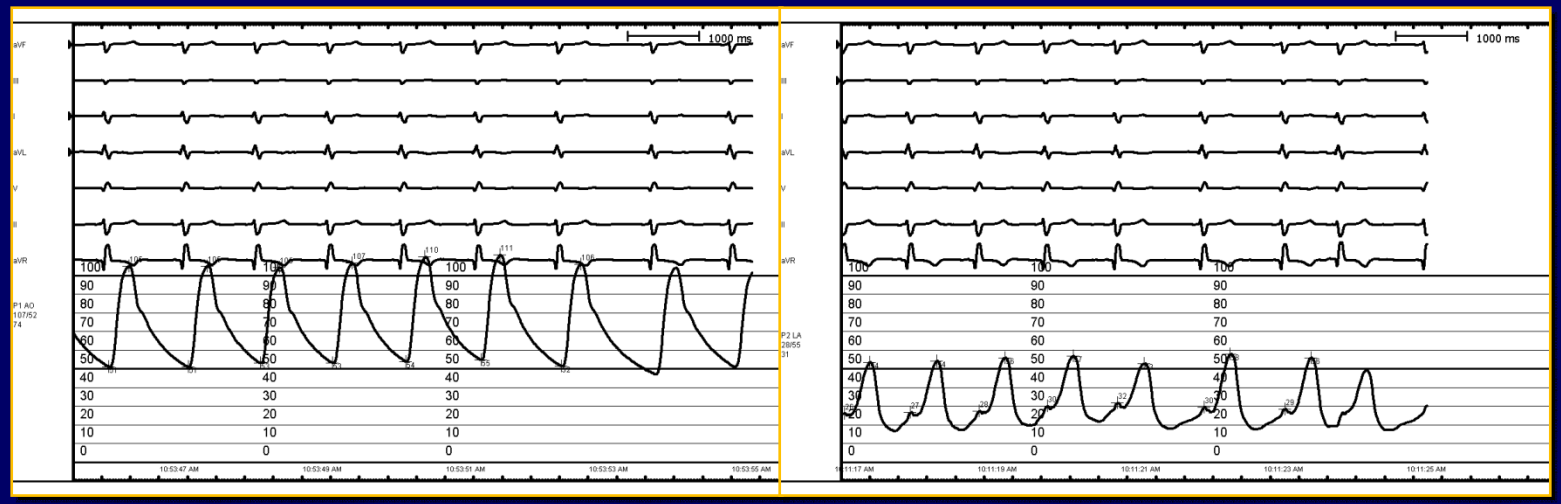

26 Sep 08
10:47:35 am
.55
.55
75°
TE-V5M 17Hz
7.0MHz 110mm
TEE
General
Lens Temp<37.0°C
T1/-3/ 0/V:A
1/2 CD:3.5MHz
CD Gain = 50
PW Depth= 8mm
Store in progress
HR= 62bpm
CD Pan
CD
.55
.55
26 Sep 08
10:26:08 am
58°
TE-V5M 16Hz
7.0MHz 110mm
TEE
General
Lens Temp<37.0°C
T1/-3/ 0/V:A
1/2 CD:3.5MHz
CD Gain = 50
PW Depth= 8mm
Store in progress
HR= 91bpm
CD Pan
CD Pos/Size







Pre


1000 ms
aVF
III
I
aVL
V
II
aVR
P1 AO
107/52
74
P2 LA
28/55
31
1000 ms

Post


1000 ms
aVF
III
I
aVL
V
II
aVR
P1 LV
P2 AO
P3 FA
1000 ms

Indiana University Experience

	Age	Sex	Valve-type	Approach	Device	Outcome
1	56	F	AVR-mech	Retrograde	PDA	Minimal leak, Class 2
2	69	M	MVR-mech	Antegrade	PDA	Mild leak, Class 2
3	58	M	MVR-stentless bio	Antegrade	PDA	Residual leak in another defect, Class 3

Major considerations in evaluating a new treatment modality

- Safety
- Burden of Treatment
- Benefit
- Patient selection
- The learning curve

Conclusion

- Percutaneous closure of PVL is a complex , time consuming procedure and may not always be successful .

- However ,is a feasible alternative to open surgical repair in highly selected patients whose symptoms are not responding to medical therapy and who are at high surgical risk.