How Far to Push: Procedural Imaging for MitraClip Outside of A2/P2 and Beyond

G. Burkhard Mackensen, MD, PhD, FASE
Professor & Chief, Division of Cardiothoracic Anesthesiology
Department of Anesthesiology & Pain Medicine
UW Medicine Regional Heart Center
University of Washington

DISCLOSURE

NONE

THE EDGE-TO-EDGE TECHNIQUE FOR BARLOW'S DISEASE

Ottavio Alfieri et al. Department of Cardiac Surgery, San Raffaele University Hospital, Milan, Italy
PATIENT SELECTION?

• 32/300 patients unsuccessfully treated

LET’S REVIEW A FIRST CASE...

1. 79 yo F, tow truck driver & farmer presented with shortness of breath and symptoms of heart failure, on home oxygen
2. History was significant for breast cancer in remission from 2004-2014 after chemotherapy and radiation, now recurrent breast cancer, requiring repeated thoracocentesis for pleural effusion, started on experimental chemotherapy agent
3. Recently admitted for bacteremia and acute decompensated congestive heart failure (CHF), treated for endocarditis
4. Further workup revealed severe mitral regurgitation (MR) and patient was diagnosed with bileaflet prolapse and flail, scheduled for percutaneous mitral valve repair with the MitraClip®.

PRE-PROCEDURE
TEE IMAGING/VIDEO

ME mitral commissural view  2D color ME mitral commissural view
Multiplane view based on 3D image of mitral valve

ME 3D 4CH

CW MV
PROCEDURE UPDATE

- Standard transeptal approach
- The overall procedural strategy was to enhance coaptation in the anterolateral commissure (ALC).
- Given the extensive bileaflet prolapse, we opted to position the first MitraClip medial of the ACL

CHALLENGES WITH MOVING THE MITRALCLIP INTO THE COMMISSURES

- Excessive mobility in degenerative MR
- Complexity of MV apparatus (chordal apparatus) leads to increased risk of injury
- Clip orientation (perpendicularity) - requires to adjust TEE imaging planes (multiplane)
- Reduced opportunity to move the MitraClip system
- Contact with myocardial wall (arrhythmia, injury)
- Mechanical forces might be very different compared to midline (A2/P2) position

EXCESSIVE MOBILITY IN PRIMARY MR
Mitral valve apparatus from LV

PROCEDURAL TEE: INITIAL GRASP

3D enface view of MV Initial grasp
2D color ME mitral commissural view shows unchanged MR, 1st clip likely too medial

PROCEDURAL TEE: 2ND GRASP

3D enface view of MV 2nd grasp, 1st clip, more lateral
2D color ME mitral commissural view shows MR changed but still significant
PROCEDURAL TEE: 1ST CLIP DEPLOYED: UTILITY OF CROPPING TOOLS

- 3D image of MV cropped from medially showing 1st clip and A1/P1 prolapse
- 3D image of MV cropped from lateral showing A1/P1 prolapse and 1st clip behind

PROCEDURAL TEE: 2ND CLIP MOVING INTO THE ALC

- Approach for 2nd clip (lateral to 1st clip) - lowered gain to appreciate MitraClip orientation in LV
- MitraClip rotated to align perpendicular to MV leaflets

PROCEDURAL TEE: 2ND CLIP

- 3D enface view after 2 clips
PROCEDURAL TEE IMAGING/VIDEO

2D color suggest further reduction in MR but still moderate severity, consider 3rd clip in AL commissure.

CASE DISCUSSION - AUDIENCE

After the placement of 2 MitraClips, the severity of MR has been reduced significantly. 
A) 3rd Mitraclip will increase the gradient even further
B) Attempting to maneuver a clip into the ALC is too risky and should not be attempted.
C) MitraClip therapy is all about reducing the severity of MR, which has already been achieved.
D) Although technically challenging, adding a 3rd MitraClip to the ALC might completely “exclude” the ACL and result in further reduction of MR

PROCEDURAL TEE: 3RD CLIP

3D enface showing approach for 3rd clip
Using adenosine to reduce heart rate to permit capture of dynamic bileaflet prolapse and flail
PROCEDURAL TEE: 3RD CLIP

Stable clip position
Simultaneous biplane view
Stable clip position on 3D as seen from AL commissure

PROCEDURAL TEE: FINAL ASSESSMENT

ME 2D color mitral commissural view after 3rd clip
Mean gradient = 4 mmHg
Improvement in PV flow

FINAL RESULT: “NEO” MITRAL VALVE

Fluoroscopy after 3rd clip
3D enface of the MV after the placement of 3 MitraClips.
TEACHABLE POINTS FOR FIRST CASE

1. Complex percutaneous repair of mitral valve with bileaflet prolapse in anterolateral commissure
2. 3D helped in delineating complex anatomy
3. Slowing the heart rate can assist with difficult MitraClip placement

CASE#2: ADULT CONGENITAL PATIENT

- 54-year-old gentleman born with complex congenital heart disease including transposition of the great vessels with VSD and pulmonary stenosis
- Palliation: left Blalock-Taussig shunt at 1 year of age
- Complete repair using the Rastelli procedure in 1979 including 25 mm composite RVOT conduit
- Progressive and ultimately severe bioprosthetic PV regurgitation, he underwent successful Melody valve implantation UW Washington in 2012
- Longstanding history of severe MV regurgitation

Pre-procedure TEE

P2 cleft
Procedural TEE: 2nd clip released

Zoom: lateral ostium (in ALC)

AFTER 2ND CLIP - PUSHING FURTHER...

Lateral ostium:
10 mm x 10 mm
Clip #3 approaching

Residual MR jet in P2 cleft

PROCEDURAL TEE: 3RD CLIP RELEASED
HOW FAR TO “PUSH IT” IN COMPLEX MITRACLIP CASES?

• Follow the INDICATION FOR USE (significant symptomatic mitral regurgitation (MR ≥ 3+) due to primary abnormality of the mitral apparatus [degenerative MR] in patients who have been determined to be at prohibitive risk for MV surgery by a heart valve team....
• Depends on your team’s skill & comfort level
• Real-time 3D navigation of anatomical and functional challenges for device delivery is essential
• Team communication is key
• Consider backup plan

Thank you and see you in Seattle at ASE Scientific Sessions 2016

gbmac@uw.edu