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NYU School of Medicine

ENDOSCOPIC ROBOTIC REPAIR OF COMPLEX MITRAL LESIONS

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DISCLOSURES:

IP & ROYALTIES – EDWARDS LIFESCIENCES & MEDTRONINCS

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- **What is a complex repair?**
- **Can we perform complex repairs with robotics?**
- **What can we accomplish?**

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What makes MV repair difficult?

- **Lack of leaflet tissue**
- **Bad quality of tissue**
- **The extent of lesions (number of segments involved)**
- **Limited exposure**
- **The type of techniques we use to treat the lesions:**
  - Level I complexity
  - Level II complexity
  - Level III complexity

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History -Robotics and the Mitral Valve – late 1990s

Paris

New York

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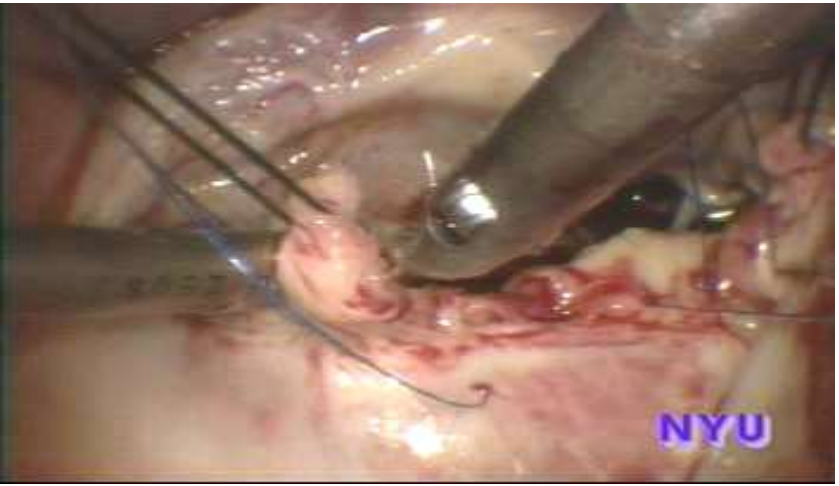
Robotics and the Mitral Valve –late 1990s



Technology not quite there
Lacking:
- exposure tools
- facilitating suture tech
- good results

Both groups stepped back from robotic mitrals
WR Chitwood – pursued with mini-thoracotomy
robotic assisted approach

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2010 @ NYU
2 surgeons became colleagues

2012 started a team TEMVR program. For 3 months we re-trained with clinical scenarios, simulations,
wet lab courses,&
'expert' observation.

We refused to compromise integral parts of operation:

- Cardioplegic arrest
- Use of annuloplasty device

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Totally endoscopic robotic mitral repair (TERMVR): could not afford a significant learning curve – practice in the competitive environment of New York

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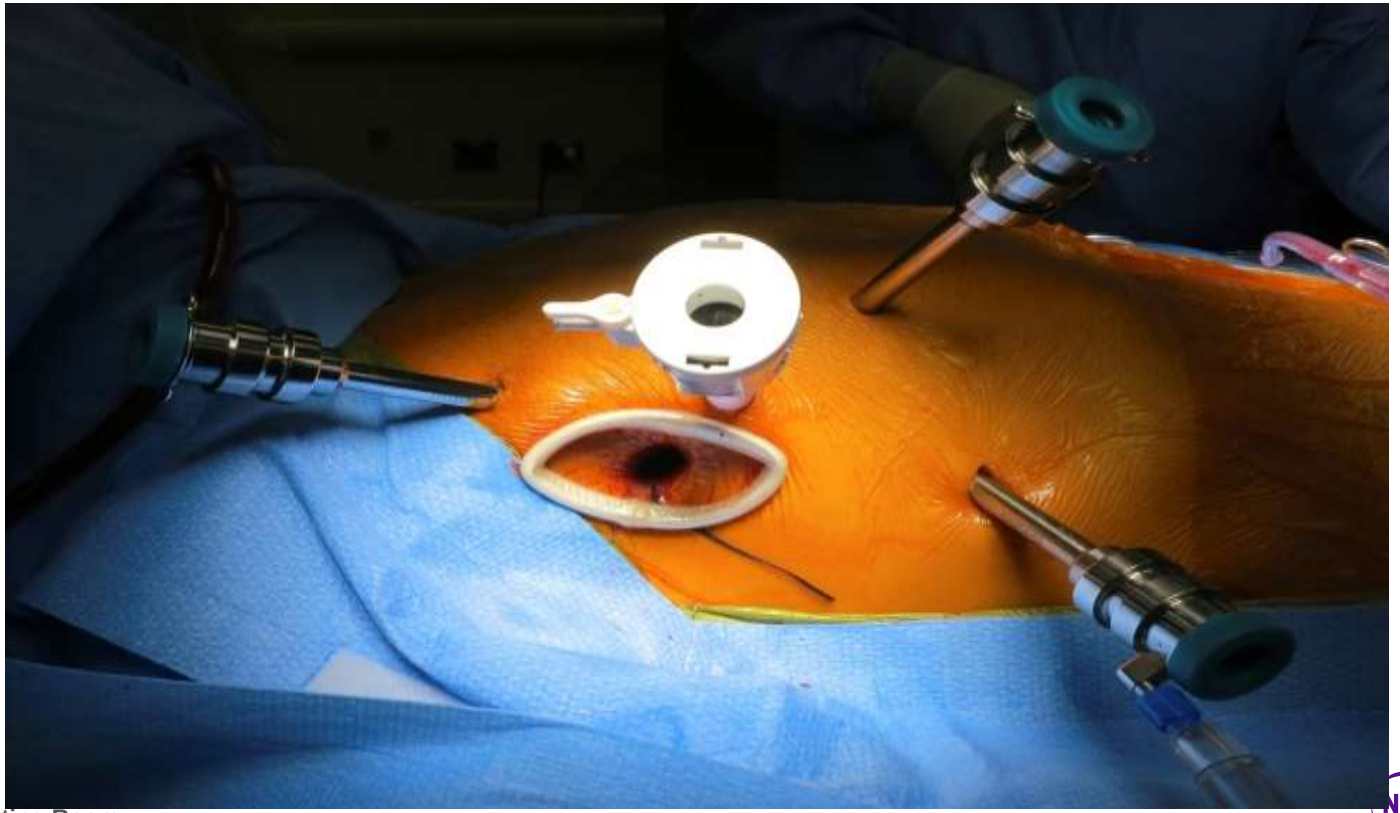
Totally Endoscopic Robotic Mitral Repair: TERMVR

- Training – Dedicated Team Commitment (Institutional)
- Team Participants – Communication – no music
- Process Control – Attention to detail
- Team Brief / Debrief Model

TERMVR: Team Competency

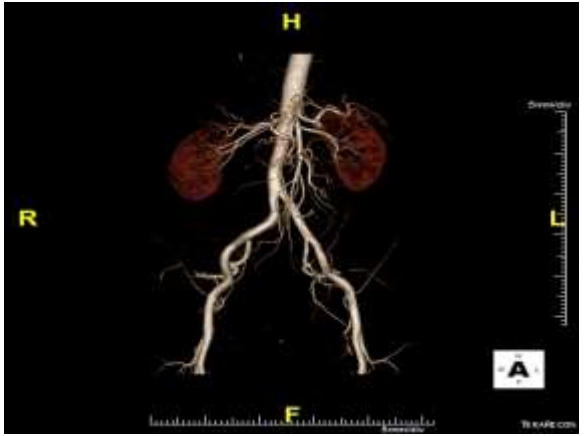
Cardiac Surgeons With
Sternotomy Access
to the Heart:
Masters of
Our Universe

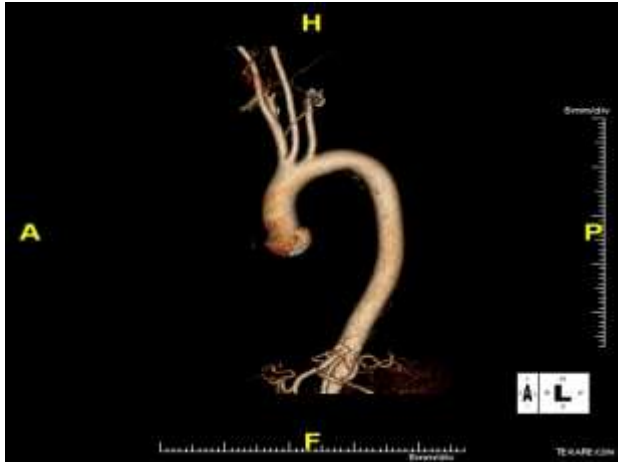
TERMVR: Team Competency

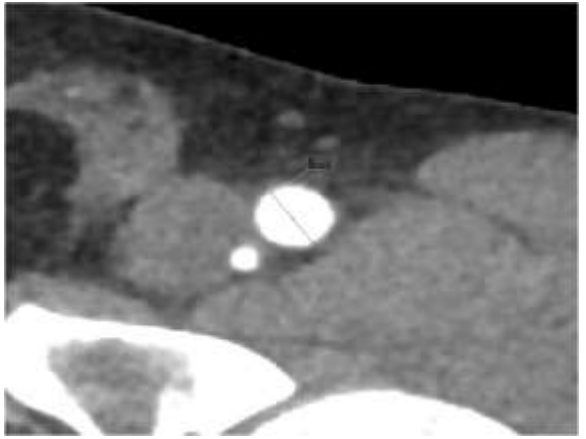


Preop Evaluation

- Preop eval CTA C-A-P
- 8-12% change (minor / major) in monitoring / operative strategy







Current OR Plan

- Single lumen endotracheal tube (except reoperations, prior right chest surgery)
- Bilateral radial a-lines
- Right arm dropped below bed on floating board
- 2-3” egg crate foam under right hemithorax
- RIJ Triple lumen; if >1+AI – coronary sinus cardioplegia catheter; or at least 1x week

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Standard Perfusion Approach

- Preop eval CTA C-A-P
- 2.5 cm incision groin
- Seldinger technique and echocardiographic guidance for cannula and endo-balloon placement
- No flouroscopy/x-ray used
- If occlusive aortic disease – axillary perfusion

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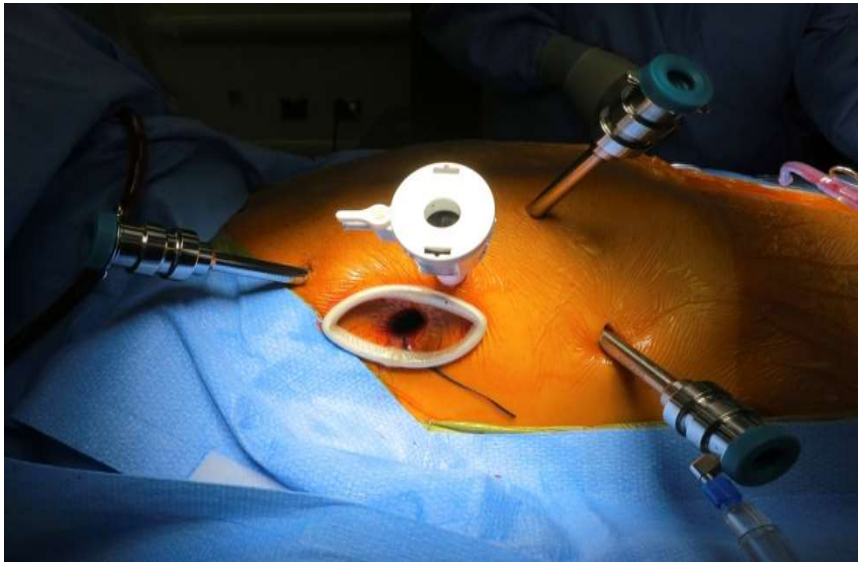
Port Placement

Working port and scope in same interspace (3rd)
XX-Small Alexis soft tissue retractor – have to force index finger thru to check interspaces

Left arm - 2nd
Right arm – 6th
Retractor arm - medial



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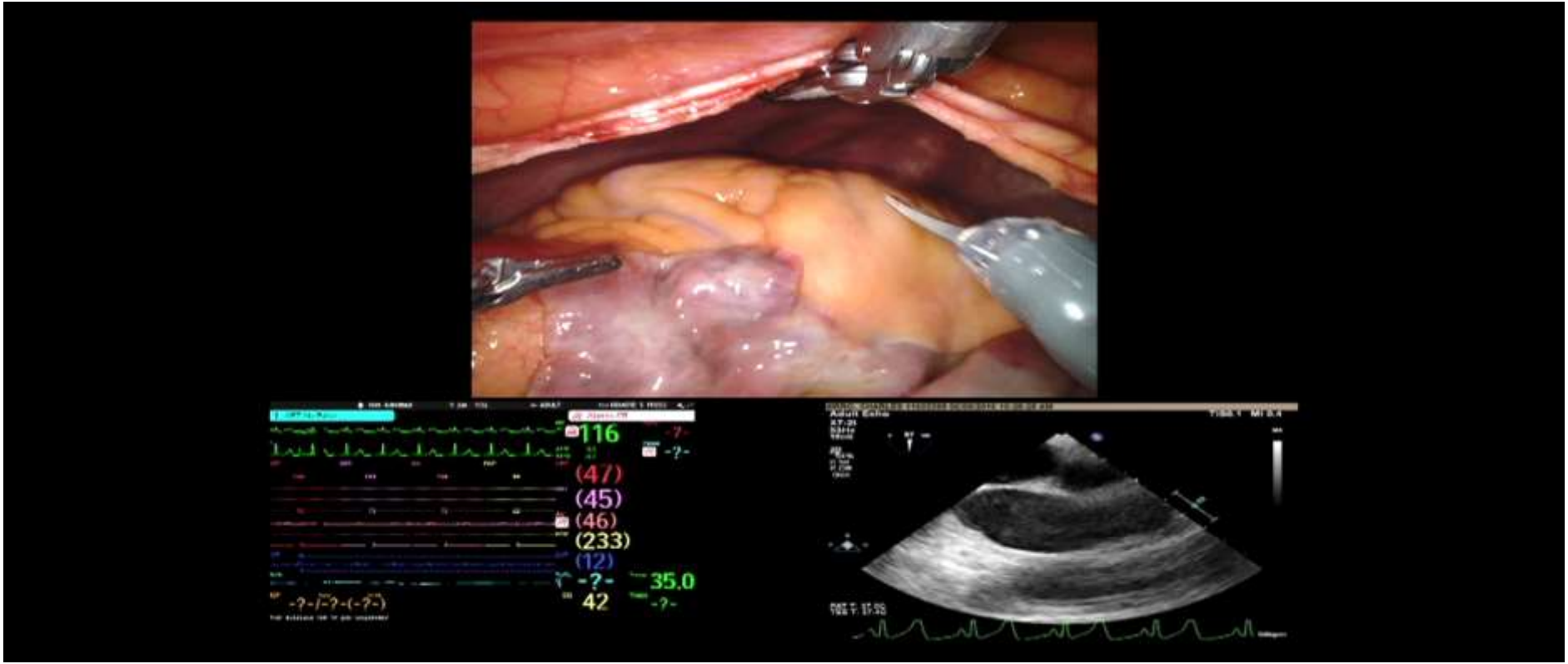
Fluorescence endoballoon guidance



Robotic Mitral Repair (450 patients 2011 – 2017)

Patient characteristics

Age	60.5
Men	286 (64%)
Women	164 (36%)

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Robotic Mitral Repair (450 patients 2011 – 2017)

Etiology	n	%	
Barlow	302	67	76%
Fibroelastic deficiency	40	9	
Functional	37	8	
Rheumatic MR	18	4	
Healed endocarditis	13	3	
Others	40	9	

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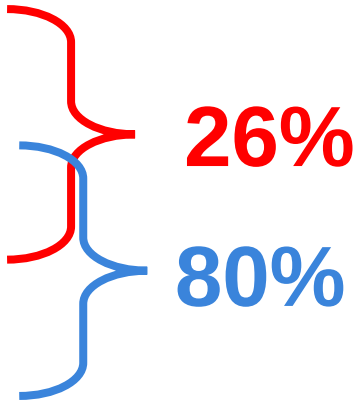
Robotic Mitral Repair (450 patients 2011 – 2017)

Leaflet prolapse	n	%
Anterior	24	6
Bileaflet	86	20
Posterior	250	60
No prolapse	60	14



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Robotic Mitral Repair (450 patients 2011 – 2017)

Etiology	Repair rate
Degenerative	99.4%
Functional	100%
Rheumatic MR	95%

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Robotic Mitral Repair (450 patients 2011 – 2017)

Posterior leaflet repair	n
Triangular excision-suture	180
Quadrangular excision	140
• Hemisliding plasty	99
• Classic sliding plasty	34
• Folding plasty	2
• Annulus plication	5
P1-P2 or P2-P3 cleft closure	116
Bovine patch augmentation	8

Posterior subvalvular repair	n
Artificial chord implant	67
PM repositioning	13
MAC excision	42
A-V groove patch repair	15

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Robotic Mitral Repair (450 patients 2011 – 2017)

Anterior leaflet	n
Triangular excision-suture	29
Alfieri	13
Closure of an aberrant cleft	9
Leaflet peeling	7
Bovine patch augmentation	5
Plication of the margin	5

Anterior subvalvular	n
Secondary chordae division	241
PM repositioning	50
Artificial chordae	32
Chordal transfer	11
Aberrant muscle band excision	10

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Robotic Mitral Repair (450 patients 2011 – 2017)

MAC	**54**	**12%**
MAC limited to the posterior annulus	**34**	**7.5%**
• 1 segment	14	
• 2 segments	16	
• 3 segments	4	
Calcified PM band	**20**	**4.5%**
• Anterior PM	16	
• Posterior PM	4	

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Robotic Mitral Repair (450 patients 2011 – 2017)

MAC	**54**	**12%**
Limited to the posterior annulus	**34**	**7.5%**
• Excision and bovine patch	15	
• Excision and mattress sutures	6	
• Excision	6	
• No excision	7	
Calcified PM band	**20**	**4.5%**
• Excision	14	
• No excision	6	

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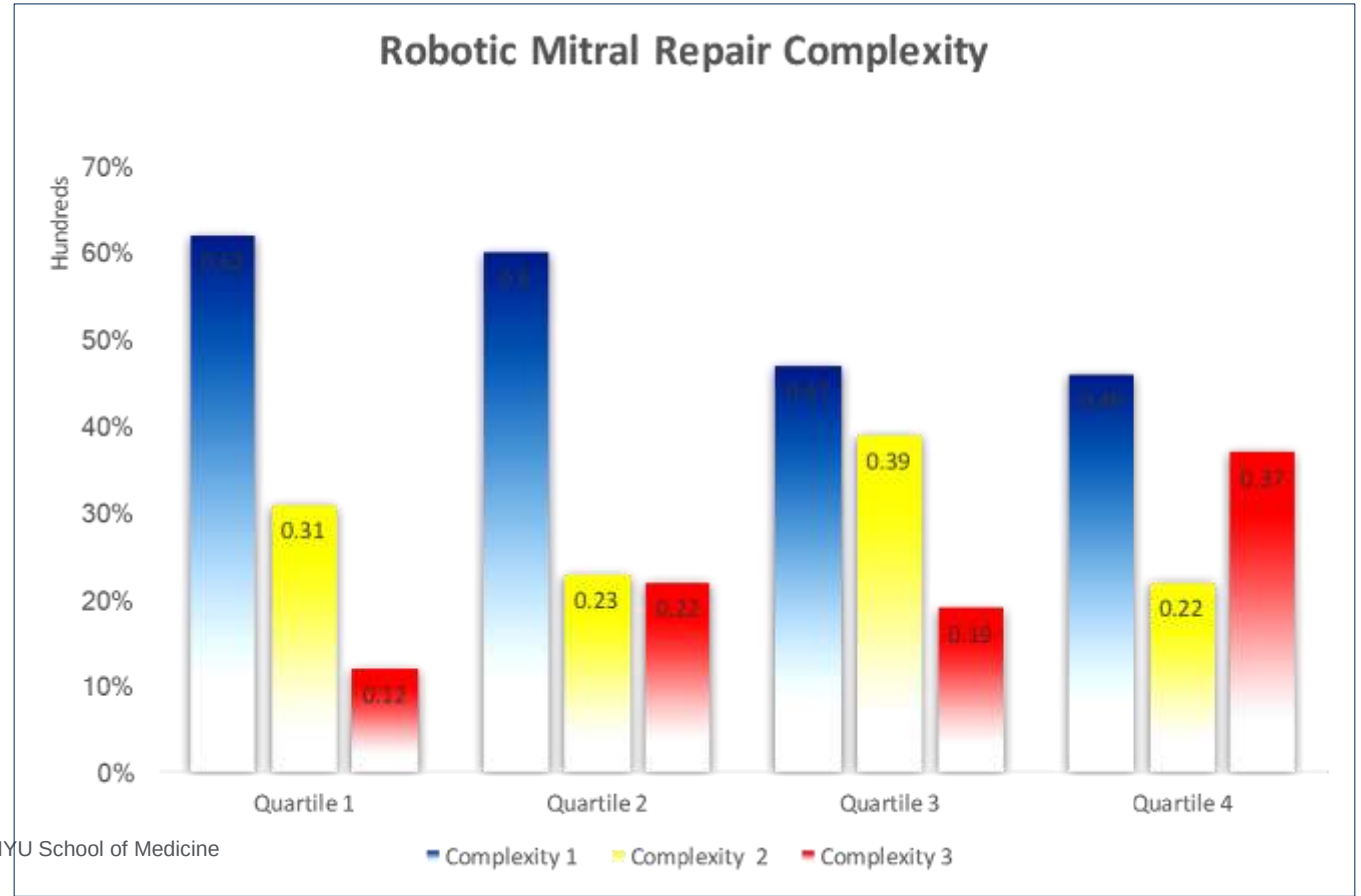
Robotic Mitral Repair (450 patients 2011 – 2017)

Combined procedures	n	%
LA appendage closure	424	94
PFO or ASD closure	90	20
CryoMaze	87	19
Hybrid revascularization	32	7
Tricuspid annuloplasty	25	6

Robotic Mitral Repair (450 patients 2011 – 2017)



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Robotic Mitral Repair (450 patients 2011 – 2017)

Intraoperative complications	n	
Going back on bypass:	25	6%
• MV repair revision	18	
• Aortic dissection	3	
• Epicardial bleeding	2	
• MV replacement	1	
• RV dysfunction	1	
Conversion to sternotomy:	7	1.7%
• Aortic dissection	3	
• MV repair revision	1	
• MV replacement	1	
• Epicardial bleeding	1	
• MAC	1	
IABP or LVAD	0	0%

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Robotic Mitral Repair (450 patients 2011 – 2017)

In-hospital complications	n	
Take back to OR:	12	2.8%
• Bleeding	5	
• MV repair revision	4	
• Stenting left iliac dissection	1	
• Hepatic hematoma	1	
• RVAD	1	
Stroke:	5	1.2%
• Without residual	4	
• With residual	1	
Pacemaker or AICD	6	1.4%
Death	1	0.2%

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Robotic Mitral Repair (450 patients 2011 – 2017)

Late complications	n	
Pericarditis	33	8%
Right pleural effusion	25	6%
Late MV repair revision	3	0.7%
Late MV replacement	1	0.2%
Transcatheter intervention	3	0.5%
Late deaths:	7	1.6%
• PE	1	
• Brain hemorrhage	1	
• Infection	1	
• Stroke	1	

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Robotic Mitral Repair (450 patients 2011 – 2017)

Postoperative ventilation	n	
OR extubation	316	70%
<24h	123	28%
>24h	11	2%

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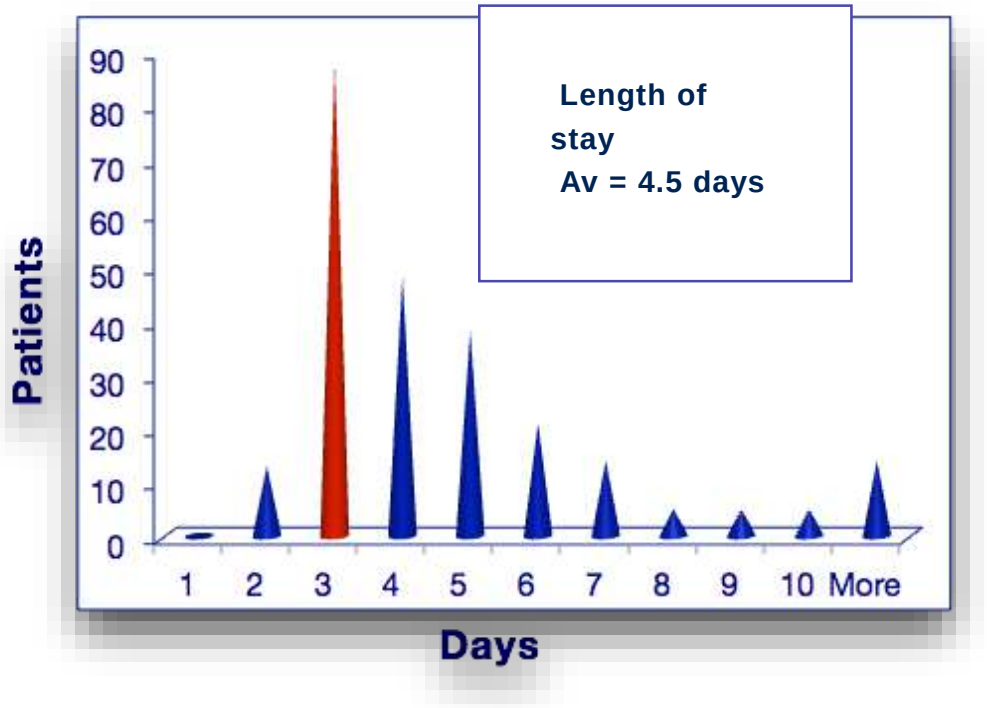
Robotic Mitral Repair (450 patients 2011 – 2017)



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Robotic Mitral Repair (450 patients 2011 – 2017)

Repair rate in degenerative diseases	**99.4%**
Conversion to sternotomy	**1.5%**
OR extubation	**70%**
Median LOS	**3 days**
In-hospital/30 Day mortality	**0.2%**

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Robotic Mitral Repair (450 patients 2011 – 2017)

- Extubated in the OR
- One night stay in the CT Recovery Room
- Discharge home on postop Day 3
- ASA 162 mg for 3 months
- Amiodarone for 3 weeks
- Steroid taper for pericarditis prevention

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THANK YOU

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