Structural Heart Disease
From Plumber to Contractor

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Disclosures

• Speakers Bureau
  • Philips Corp
• Research:
  • Abbott Vascular
  • Novartis
Objectives

• Review current approved structural heart procedures
• Review PFO closure indications and technique
• Review TAVR indications and technique
• Review Watchman indications and technique
• Review MitraClip indications and technique
“What a long strange trip its been”- The Grateful Dead

- 1998 Interventional Cardiology
  - DCA and Roto
  - 2nd generation coronary stents
  - Balloon valvuloplasty
  - Peripheral Interventions

- 2019 Interventional Cardiology
  - Left main PCI
  - CTO and CHIP PCI
  - PE/DVT Thrombolysis
  - Peripheral Interventions
    - Carotid stents
  - Structural Heart
    - PFO
    - TAVR
    - Watchman
    - MitraClip
Structural Heart Interventions
PFO Closure
“From cleaning pipes to patching walls”

- HDE in 2004
- Highly variable use between 2004 and 2018
- Closure 1, Respect and PC showed no benefit
- CLOSE and REDUCE showed benefit, reduction in stroke from 5-6% to 0-1% after closure
- Higher rate of atrial fibrillation
PFO Closure Indication

- Cryptogenic stroke
  - No carotid stenosis >50%
  - No atrial fibrillation
  - Abnormal MRI/CT or symptoms >24 hours
- PFO with positive bubble study (TEE or TTE) with or without atrial septal aneurysm
Procedure
Recovery

- Venous access
  - Figure of 8 stitch
- Same day discharge or overnight stay
- 5% incidence of atrial fibrillation
- DAPT therapy for 6 months then ASA lifelong
TAVR
“From cleaning pipes to unclogging pump”

• First available 2011 after Partner trial with FDA approval of Sapien valve for extreme risk
• CoreValve approved in 2014
• Sapien 3 and CoreValve Evolute Pro
• Lotus valve approval 2019
Current TAVR Indications

- Severe aortic stenosis (degenerative or Bicuspid)
  - Mean gradient 40 mmHg
  - DI of 0.25 or less or 40 mmHg with dobutamine
- Intermediate or high risk for SAVR confirmed by single surgeon
- Femoral or alternative access
TAVR Access

- Transfemoral/Transapical/Transaortic initially
- Subclavian/carotid/caval access
- Transfemoral access >90% now with smaller sheaths
- Mortality < TF compared to alternative access
TAVR Work up

- Echo (confirm severe AS)
- Right and left heart cath
- CTA of chest/abd/pelvis
  - Aortic annulus size and calcification
  - Iliac/femoral size and subclavian/caval
- Surgical consult (only one needed now)
- TAVR Team approval
TAVR Valves
TAVR Procedure

Edwards SAPIEN 3 Transcatheter Heart Valve with the Edwards Commander System
TRANSFEMORAL PROCEDURE
Recovery

• 1-2 day hospital stay
• Arterial access with 16-20 Fr sheath
  • 5-10% groin complications
  • Double Perclose stitches used
• Longer LOS for non-TF access
• 30 day echo, 6 MWT and KCCQ
Left atrial appendage closure
“From cleaning pipes to remodeling the room, (atrium)”

• How does it work?
  • >90% of CVA d/t AF originate in LAA

• Why is it needed?
  • <70% of patients therapeutic with warfarin
  • >5% bleeding risk annually with OAC
  • Many patients high risk for long
Left atrial appendage closure

- Surgical ligation more often
  - Patients with pre-op AF (usually with MAZE)
  - Mitral valve surgery
  - Studies for stroke reduction not as extensive
- Lariat procedure
- Watchman
Watchman Indication

• Atrial fibrillation, chronic or paroxysmal
• Increased bleeding risk with long term oral anticoagulation
• LAA anatomy amenable to implant of device
• Ability for patient to take 6 weeks of oral anticoagulation post implant
• Ability to have TEE pre/post implant
LAA work up

- TEE
  - diameter of ostium
  - depth of lobes
- Non-implanting physician with “reasonable rationale” for LAA closure
- CHADS2Vasc score >2 with HASBLED >2
- Able to take OAC for 6 weeks post procedure
LAA anatomy

A. Wing & Hook
B. Wing & Hook
C. Wing & Hook
D. Double Wing
E. Double Wing
F. Wing & Finger
G. Wing, Hook & Knob
H. Double Hook & Wing
I. Double Knob, Hook & Arrowhead
J. Finger, Wing, Hook & Knob
Watchman

- Performed in a cardiac cath lab/EP suite
- Interventional cardiologist or EP implanter
- General anesthesia with TEE
- Transfemoral Access: Catheter advanced to the LAA via the femoral vein
Watchman Implant
Recovery

- Femoral vein access
- Overnight stay generally
- 6 weeks of anticoagulation with repeat TEE at 6 weeks (95% seal at 6 weeks; 99% at 1 yr)
MitraClip
“From cleaning pipes to fixing the leaking pump”
MitraClip

- Alfieri stitch reported in 1995 for treatment of mitral insufficiency
- 2003 First MitraClip implanted in Venezuela
- Everest I and II trials lead to approval in 2013 for degenerative MR
- COAPT trial 2018, lead to approval for functional MR
MitraClip
Limitations of Surgery

Of 396 patients with severe symptomatic MR with NYHA Class II or greater heart failure symptoms, nearly half were judged not to be candidates for mitral valve repair/replacement surgery due to age and/or comorbidity. Of these, 19 (10%) had surgery the following year. The remainder had no surgery/medical management only.

MitraClip Indication

- Moderate to severe or severe degenerative MR with high risk for surgery as deemed by single surgeon
- Moderate to severe or severe functional MR with persistent symptoms despite medical therapy with high risk for surgery as deemed by single surgeon
- Anatomy amenable to MitraClip implant
Work up

• Echocardiogram
  • Moderate or greater MR with symptoms
• TEE
  • Cause, degenerative, functional or mixed
  • Pulmonary veins
• Cardiac Catheterization and revascularization
• 6 minute walk test and KCCQ questionnaire
Transesophageal Echo

Sometimes not so obvious
Intraprocedure Echo
Post MitraClip Echo
Recovery

- Femoral venous access
- 1-2 day hospitalization
- Echo day one post
  - Assess degree of MR reduction
  - Assess mitral valve gradient
- 30 day echo, 6 MWT and KCCQ
Conclusions

• Structural heart procedures have expanded interventional cardiologist from plumbers to contractors

• 4 techniques continue to evolve and help patients with high mortality and morbidity conditions where medical therapy is limited

• Many lessons learned over last decade which are being applied to tricuspid and pulmonic valves
Wisdom from Yogi Berra

• “The future ain’t what it used to be.”
• “You can observe a lot by watching.”
• “If you ask me anything I don’t know, I’m not going to answer.”
• “If the world were perfect, it wouldn’t be.”
• “It was impossible to get a conversation going, everybody was talking too much.”