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MINIMALLY INVASIVE APPROACHES IN CARDIAC SURGERY
1996
Current Environment of Cardiac Surgery
Acceptable Results

- TAVR – Mild – moderate AI
- Mitraclip – 2+ MR
- Coronary Stents – Plavix / Brilinta
  - Incomplete revascularization
Why doesn’t everyone want Open Heart Surgery?
CAN WE DO A BETTER JOB OF TREATING CORONARY ARTERY DISEASE?
Non-Sternotomy Approach

- Mini Right Thoracotomy AVR
- Robotic / MiniThoractomy MVR
- Multivessel / Robotic Assisted MIDCAB
- Hybrid Robotic MIDCAB
- TECAB
Coronary Artery Bypass Grafting Surgery
Baby Boomers
10,000 / Day
Five-year results of coronary bypass grafting for patients older than 70 years: role of internal mammary artery

M Azariades, CL Fessler, HS Floten and A Starr
Heart Institute, St. Vincent Hospital and Medical Center, Portland, Oregon.

- Benefit of LIMA and vein vs just vein
- Today – LIMA / 2 Veins On Pump STILL most common operation for Severe 3VD
LIMA vs. BIMA

Lytle BW et al. JTCVS 1999;117:855-72
Stents v. CABG

- Pts and Cardiologist are willing to accept a greater mortality to avoid the invasiveness of “open” heart surgery
Best Surgical Treatment for CAD

- Pedicled IMAs when indicated
- Free IMA / RA when pedicled IMAs not pos.
- Vein grafts utilized based on quality of conduit and competitive flow
- Off–pump approach if:
  - Graft patency could be confirmed intra-operatively
  - Complete revascularization is possible
- Minimize manipulation of aorta
- Non Sternotomy approach
Can we get rid of the “OPEN” in “OPEN HEART SURGERY”?
Enabling Technology

- Da Vinci Robot
- Stabilizers / Positioners
- Anastomotic Devices / Techniques
- Flow measurements
- Imaging
  - Hybrid suite – angiography
  - CT angiography
- Sealants / hemostatic agents
Surgical Robotics

- HD 3D Endoscope
  - no loss of depth perception
  - variable magnification to 15X
- Fully wristed Instruments
  - 6 degrees movement within minimal space
  - scaled motion for fine control
- Visual clues are used to compensate for the loss of touch
Application of the Robot to Coronary Revascularization

- IMA preparation
  - skeletonized Lima
  - skeletonized Rima
- Pericardiotomy
  - target localization
  - target stabilization
- Anastomosis
  - direct vs robotic
  - hand sewn vs U-clip vs stapled
Enabling Technology: Neurologic Events

- Stroke
- Neurologic Events
Aortic Manipulation

- Off-pump approach
- Pedicled IMAs v. Y-grafts off IMA
- Proximals with Heartstring device
The Hybrid Suite
Main Concerns About Minimally Invasive CABG

1. Compromise completeness of revascularization/long-term patency
2. Sternotomy is benign
3. Not financially viable
4. Not enough candidates

The Problem

1. How do we do a TECAB procedure utilizing a running suture technique?

   1. More likely to be adopted by surgeons
   2. Simultaneous stenting in hybrid suite more feasible
   3. Platform for multivessel procedure
ULTIMATE GOAL
Hybrid Stenting / Beating Heart Totally
Endoscopic Multivessel CABG with Primarily
Mammary / Radial Artery Grafting

How Do We Get There?
Team Support
Step by Step Approach
Outcome Monitoring
What do you **NEED** to get started?

- The Team
  - Surgeon / PA team critical
  - OR Nursing / Anesthesia
  - Cardiology
  - C suite
- Problem solving approach
- Appropriate use of new technology
Practice, Practice, Practice
The Process:

Early Stage

- Lab training – Cadaver / pig hearts
- Practice / Practice / Practice
- Left Mammary Takedown > Sternotomy
- Robotic Mammary takedown > Midcab
Don’t Start Here!
The Process:
Second Stage - Options

- Use NS Stabilizer / Positioners
- Bilateral Mammary Takedown with Da Vinci
- Proximals
Transitioning from Single Vessel to Multi-vessel MIDCAB

ARTERIAL GRAFTING

- Review with Interventional Cardiology
  - What needs grafting
  - What can be stented
- Bilateral Pedicled IMAs
  - Skeletonized IMAs
- Y-Grafting of IMAs or Radial Artery
  - Femoral-Femoral Bypass
The Process:
Third Stage: Refining

- Pain Management
- Ultra Fast-Tracking

- Multivessel CABG Through Small L. Thoracotomy
  vs
  TECAB
Hybrid Coronary Revascularization

- “Best of both worlds”: IMA + benefits of minimally invasive
- Expands minimally invasive CABG
- Expands PCI (e.g. protected LM)
- Angiographic confirmation of grafts
BH-TECAB

**BEATING HEART TOTALLY ENDOSCOPIC CORONARY ARTERY BYPASS**

- CABG performed in a totally closed chest setting with robotic assistance
- Entire surgery performed through 4 – 5 ports on the right or left side of the chest
- Use of ITAs as primary bypass conduits
- PCI for complete revascularization in complex multivessel CAD
“Perhaps because of reduced myocardial injury, inflammation and activation of coagulation, patients undergoing the hybrid procedure had better perioperative outcomes and satisfaction”
Hybrid patients:
- Shorter intubation times
- Shorter ICU times
- Overall cost the same
- Return to work greatly improved
- Patient satisfaction scores higher
- Similar patency of target vessels
Conclusions

- Step by Step Approach to Multivessel MICS
- Collaborative / Hybrid Procedure
- Position Program to take advantage of new, evolving technology
- Increased volume of cases / shorter LOS
- Initially low risk patients >> high risk pts
"Vision is the capacity to see the invisible that inspires us to do the impossible"
Thanks' for your kind attention!!!!!!
Let Us Meet Again

We welcome you all to our future conferences of OMICS International

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