Putting the future of MICS in your hands today
This presentation is based on a compilation of the surgical techniques and protocols of:

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Coronary Heart Disease

- CHD is the leading cause of death in the United States for both men and women
- CAD (Coronary Artery Disease) is the most common type of heart disease
- Lifestyle changes, drug therapy, and/or medical procedures can effectively prevent or treat CAD in most people
- Most patients are first managed with drug therapy – if that doesn’t work…

What is the next step?

Source - American Heart Association – Heart Disease and Stroke Statistics Update - 2006
CABG Surgery: Standard of Care

- Clearly, invasive cardiac surgery is not a first-line treatment for patients where less invasive options, such as angioplasty and stenting, are feasible. Nevertheless, for many patients with advanced or diffuse disease, surgery remains the best option. While the advent of DES has cannibalized certain segments of the revascularization caseload, current research suggests that chronic total occlusions, patients with left main disease, diabetics and those with diffuse multi-vessel disease are best served by surgical intervention.\(^1\)

- CABG surgery is the standard of care, and when the left internal mammary artery (LIMA) is grafted to the left anterior descending artery (LAD), patency rates are higher than 95% at 10 years, setting an extremely high benchmark for stenting to match.\(^2\)


CABG or Stents for Multi-vessel Disease?

New England Journal of Medicine shared the following conclusion:

“For patients with multivessel disease, CABG continues to be associated with lower mortality rates than does treatment with drug-eluting stents and is also associated with lower rates of death or myocardial infarction and repeat revascularization.”
Convergence of Technology and Specialties

- Utilizing multiple technologies to decide what is right for the patient
- What is the best outcome for the patient? How do the cardiovascular specialties get there together?
- Disease management and patient management – not procedure oriented
- It does not matter to the patient which specialty treats them – they just want the best treatment
- Getting all the specialists on the same page to deliver the right care to the patient
Hybrid Operating Room

• Definition:
  – A melding of the cardiac cath lab and cardiac surgery operating room

• Potential:
  – Allows select patients to undergo intravascular interventions and cardiac surgery simultaneously to treat coronary artery disease, minimize recovery time and postoperative pain
  – Hospital-Physician Drivers
    • Attract top surgeons and staff
    • Increase procedural volumes
    • Provide efficiencies that generate revenue
    • Allows expanded use of technology, fosters advances in techniques and enables expansion of coronary artery disease treatment
Hybrid Operating Room

• **Therapies:**
  – Suitable for treating a wide variety of conditions
    • Diseases of the coronary artery, valve, congenital heart, thoracic aorta
    • Heart failure/cardiac rhythm disturbances

• **Considerations:**
  – Suitable Specialties and technologies converge
    • Multiple technologies can be leveraged to determine what is right for the patient.
    • What is the best outcome for the patient? How do the cardiovascular specialties get there together?
    • Patient management and disease management come first, not the procedure.
    • Specialists need to be on the same page to deliver the right care to the patient.
Overall MICS Technologies Trends

Goal

MICS: Technique Improvement

Sternotomy Surgery

Invasiveness

Technology Improvement

Efficacy

MICS CABG

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MICS CABG Evolution

- Sternotomy: 20cm
- MICS CABG: 5-7cm
- Robotic: 2-4cm + ports

Graph showing incision size (cm) vs. OR time, training challenge, and start-up and ongoing costs.
I’ve Seen This All Before….

- Not the old Minimally Invasive Direct CABG (MIDCAB)
- Disadvantages of MIDCAB\(^1\)
  - Poor early results in the mid-late 90’s
  - Rib-spreading and parasternal incision is painful to patients
  - Primarily for single vessel disease (LIMA-LAD)
  - Less access and ability to harvest the length of the LIMA
  - Poor target visibility and access due to medial incision

# MICS CABG vs. MIDCAB

<table>
<thead>
<tr>
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<th>MICS CABG</th>
<th>MIDCAB</th>
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<tbody>
<tr>
<td>Complete IMA Harvest</td>
<td>✔️</td>
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<tr>
<td>Access to ascending aorta for Proximal Attachment</td>
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<td>Multi-vessel Revascularization</td>
<td>✔️</td>
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<td>Ability to bypass inferior &amp; lateral coronaries, i.e. PDA, PL</td>
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Patient Selection/Inclusion Criteria

• Coronary Anatomy
  – Left main coronary artery disease (CAD) with normal right coronary artery (RCA)
  – Triple vessel disease with medium to large posterior descending artery (PDA)
  – Complex proximal left sided lesions with or without large branch involvement
  – Previous unsuccessful stenting
Patient Selection/Inclusion Criteria

• Co-Morbidities: Includes patients who are at a high risk for problems with median sternotomy
  – Long-term steroid use
  – Severe chronic obstructive pulmonary disease (COPD)
  – Advanced age
  – Need for other major operative procedures
  – Severe deconditioning
  – Patients with arthritic or orthopedic problems
  – Patients who want the procedure and seek out less invasive surgical options
Contraindications

- Contraindications
  - Emergency cases
  - Patients with hemodynamic instability

- Potential Contraindications
  - Previous CABG surgery
  - Morbid obesity
  - Patients with posterolateral branch disease
  - EF < 20%
  - Patients with peripheral vascular disease (PVD)
  - Patients with dilated cardiomyopathy
MICS CABG Overview

- Off-pump CABG procedure
- Lateral mini-thoracotomy
- LIMA takedown via direct vision, with video assistance, or robotically
- Anastomoses performed under direct vision through the thoracotomy
- Complete revascularization in multi-vessel disease, a pump-assisted beating heart or hybrid approach
Why MICS? The Patient Perspective…

- Better cosmetic outcome
  - No sternotomy scar
- Less physical restrictions
- Shorter length of stay
- Quicker return to normal activities


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MICS CABG Incisions
Why MICS CABG?

MICS CABG is the next step:

• Similar grafting strategy to sternotomy CABG
• Enduring results (LIMA-LAD)¹
• Shortened hospital stay and recovery time²
• Avoid a sternotomy and improve the cosmetic outcome
• Attractive alternative for patients and cardiologist

Why MICS? The Surgeon Perspective…

- New skill set in a competitive market
  - Get an edge with cardiologists in their respective markets
    - Increase referrals from cardiologists
    - Marketing opportunity for the practice
    - Gain patients back with hybrid that were lost to stents
    - Increase case load
- Economic benefit to the hospital
  - Hospital
    - Reduced length of stay\(^1\)
    - Can competitively market advanced cardiac procedures

Mediastinitis = Lower Reimbursement

Hospital-Acquired Conditions Reporting - 10-1-2007

The higher costs associated with a hospital-acquired MCC or CC will be included in the budget neutrality calculation but Medicare will make a lower payment to the hospital for the specific cases that include a hospital-acquired MCC or CC.

1. Serious Preventable Event - Object Left in Surgery
2. Serious Preventable Event - Air Embolism
3. Serious Preventable Event - Blood incompatibility
4. Catheter-Associated Urinary Tract Infections
5. Pressure Ulcers (Decubitus Ulcers)
6. Vascular Catheter-Associated Infection
7. Surgical Site Infection - Mediastinitis After Coronary Artery Bypass Graft (CABG) Surgery
8. Hospital-Acquired Injuries - Fractures, Dislocations, Intracranial Injury, Crushing Injury, Burn, and Other Unspecified Effects of External Causes

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Source - American Heart Association – Heart Disease and Stroke Statistics Update

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MICCS CABG – The Tools and Technology

Octopus®
Nuvo Heart
Postioner

Starfish® NS
Tissue Stabilizer

ThoraTrak®
MICS Retractor
System
MICS CABG – The Medtronic Total Package

- ThoraTrak® MICS Retractor System for access to minimally invasive cardiac surgery
  - Interchangeable blades to accommodate various cardiovascular procedures and anatomies
  - Low-profile design
- Octopus® Nuvo for tissue stabilization
  - Low profile, flexible, strong, quick connect system
- Starfish® NS for multi-vessel access
  - Ability to position for LAD, Diag, OM’s, PDA through a thoracotomy
• Bio-Medicus® Femoral Cannula Kits - Arterial and Venous
• All of the beating heart technology, with the addition of our world-class cannula, for a pump-assisted approach allows for complete revascularization through a thoracotomy
MICS CABG Product Overview

- ThoraTrak® MICS Retractor System
- Octopus® Nuvo Tissue Stabilizer
- Starfish® NS Heart Positioner
ThoraTrak® MICS Retractor System

- Modular retractor system with interchangeable blades to accommodate various procedures and patient anatomies
- Reusable, stainless steel retractor designed specifically for minimally invasive procedures
- Low-profile design

Trademarks may be registered and are the property of their respective owners.
Octopus® Nuvo Tissue Stabilizer

- Incorporation of the Octopus® Evolution headlink for minimally invasive
  - Malleable pods
  - Increased headlink flexibility and range of motion
  - Flexible suction tubing
- Three pod design
  - Smaller headlink for MICS CABG procedure
- Quick connect, detachable headlink
- New whale tail
- Improved flex arm

Trademarks may be registered and are the property of their respective owners.
Starfish® NS Heart Positioner

- Enables multi-vessel therapy through a thoracotomy
- Presents coronary artery for direct vision anastomosis
- Remote shaft insertion eliminates clutter at the incision site
- Dependable positioning technology that you are already using in your OPCAB patients
- No additional suction tube
MICS CABG Technology Overview*

- Starfish® NS Heart Positioner through a sub-xiphoid incision
- Octopus® Nuvo Tissue Stabilizer through the 6th ICS
- Positioning and stabilization of several vessels directly under the mini-thoracotomy is possible
- Active pain management with pain pump