TEVAR, TAVR, OPCAB; IS THE PUMP (AND THE PERFUSIONIST) BECOMING OBSOLETE?

Michael Mack, M.D.
Baylor Healthcare System
Dallas, TX
April 28, 2012
Conflict of Interest Disclosure

• Uncompensated Member of the Executive Committee of the Partner Trial of Edwards Lifesciences
The Pump (and the perfusionist) will not become obsolete if they (and their cardiac surgeons) are open and adaptive to change
Surgical Innovation
CABG

- Best Thing to Happen in Cardiac Surgery
- Worst Thing to Happen in Cardiac Surgery
CABG
The “Best” Thing

• Fostered the growth of the specialty of thoracic surgery
• Promoted the expansion into other cardiac surgical procedures
• Gave growth to allied specialties-cardiology
• Financial engine that fueled the growth of especially non-academic medical centers
CABG
The “Worst” Thing

Innovation Stopped
When We Looked Up……
The surgeon waiting outside the cath lab for the next CABG case . . .
Surgical Innovation

*Surgical Innovation is to Innovation…

… as Military Music is to Music*

Anonymous Cardiologist
CABG will be gone in 10 years

Friedrich Mohr

Patrick Serruys

Vienna

1997
Cardiac surgeons must diversify or perish

Multi-skilling and collaboration with other specialties may not only keep cardio thoracic surgeons employable, but at the forefront of cardiovascular care. Cardiovascular News reports on Tech-Con, at the Society of Thoracic Surgeons’ 41st Annual Meeting.

DIVERSIFY or be left behind was the central message at Tech-Con 2005, a combined program between the Society of Thoracic Surgeons (STS) and the American Association for Thoracic Surgery (AATS) at STS’s 41st Annual

dio-surgical market. He discussed professional worth was more appropri-

about partnering with those involved in the new technologies, “even if it means collaborating with a radiologist”.

Dietrich also cited simulator technology as a useful way to get familiar with catheter-based delivery. Doctors were given a chance on the closing day of the conference to have hands-on experience of simulation training.

“The proposed result of undertaking this training would be the Hybrid Vascular Specialist, who would have intensive surgical training in CV disease, be interventional-ly trained for catheter based skills, have expertise in advance imaging and be a tissue engineer.

An optimistic and update talk on dealing with the profession’s changing landscape was also given by Dr Michael Mack from the Medical City Dallas Hospital. Mack spoke of the last 50 years of cardiac surgery and how CABG has catalysed the special-ty. In the last 40 years, because STS 2005
Figure 11. Percent Change in the Number of Active Physicians by Specialty (1995-2004)*

Source: AMA Physician Characteristics and Distribution, 1996/7 (Table B-8, pp. 56-58) and 2005 (Table 1.9, pp. 20-24)
Applications To Thoracic Surgery Resident Programs 1993-2009

Source: NRMP

*As of June 11, 2008
“The dogmas of the quiet past are inadequate for the stormy present. The occasion is piled high with difficulty and we must rise with the occasion. . . . We must think anew and act anew.”

December 1, 1862
<table>
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<tr>
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## Stanford Integrated i6 Program

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<td>Number of Applications Received</td>
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<td>43</td>
<td>103</td>
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<td>Number of Applicants Interviewed</td>
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<td>15</td>
<td>33</td>
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<td>Number of Applicants Ranked by the Division</td>
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<td>10</td>
<td>10</td>
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<td>Matched at 1 &amp; 2</td>
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<td></td>
<td>2011</td>
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<tr>
<td>Ratio of Applicants to Offered Slots</td>
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<tr>
<td>Number of Residents in Program</td>
<td>4</td>
<td>106</td>
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*Stanford CV Surgery*
Global Predictions

• The specialty will stop contracting and begin re-expanding
• Education/training is being/will be revamped
• Regionalization of cardiac surgery
• Focus on disease management and Heart Team approach
• “Big Operations” will gradually go away
• Focus on “superspecialization” and the role of the “generalist” cardiac surgeon will diminish
CABG

- The decline in CABG volume has slowed; PCI volume has plateaued and begun to contract
- Off pump CABG is flat at 20% and likely to stay so
- Public reporting of CABG outcomes is likely to shift procedure volume
- New studies will impact CABG
New Studies That Will Impact CABG

• ASCERT Trial
• SYNTAX- 5 Year Results
• CORONARY Trial
• C-PORT Trial
**Figure 2. Rates of Survival in the CABG and PCI Populations, from an Unadjusted Analysis.**

Cumulative mortality with CABG and with PCI and the relative risk of CABG as compared with PCI are shown.
Figure 3. Rates of Survival in the CABG and PCI Populations, from an Analysis Adjusted with the Use of Inverse Probability Weighting. Cumulative mortality with CABG and with PCI and the relative risk of CABG as compared with PCI are shown. The inset shows the same data on an enlarged y axis.
Optimal revascularization strategy in patients with three-vessel disease and/or left main disease

The 4-year Outcomes of the SYNTAX Trial

Patrick W. Serruys, MD PhD
Erasmus Medical Center,
Rotterdam, The Netherlands

On behalf of the SYNTAX investigators

Conflicts of Interest: None
MACCE to 4 Years

CABG (N=897) vs TAXUS (N=903)

Before 1 year*
12.4% vs 17.8%
P=0.002

1–2 years*
5.7% vs 8.3%
P=0.03

2–3 years*
4.8% vs 6.7%
P=0.10

3–4 years*
4.2% vs 7.9%
P=0.002

 cumulative KM Event Rate ± 1.5 SE; log–rank P value; * Binary rates

SYNTAX 4-year Outcomes • EACTS 2011 • Serruys • October 2011 • Slide 25
All-Cause Death to 4 Years

ITT population

<table>
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<tr>
<th>Time Period</th>
<th>CABG (N=897)</th>
<th>TAXUS (N=903)</th>
<th>P-value</th>
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<tbody>
<tr>
<td>Before 1 year*</td>
<td>3.5% vs 4.4%</td>
<td>1.5% vs 1.9%</td>
<td>P=0.37</td>
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<td>1-2 years*</td>
<td>1.5% vs 1.9%</td>
<td>1.9% vs 2.6%</td>
<td>P=0.53</td>
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<td>2-3 years*</td>
<td>1.9% vs 2.6%</td>
<td>2.2% vs 3.2%</td>
<td>P=0.32</td>
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<tr>
<td>3-4 years*</td>
<td>2.2% vs 3.2%</td>
<td></td>
<td>P=0.22</td>
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</table>

Cumulative KM Event Rate ± 1.5 SE; log-rank P-value; *Binary rates
Cardiac Death to 4 Years

**ITT population**

<table>
<thead>
<tr>
<th>Duration</th>
<th>CABG (N=897)</th>
<th>TAXUS (N=903)</th>
<th>P-value</th>
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</thead>
<tbody>
<tr>
<td>Before 1 year*</td>
<td>2.1% vs 3.7%</td>
<td>P=0.0503</td>
<td></td>
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<tr>
<td>1–2 years*</td>
<td>0.6% vs 0.8%</td>
<td>P=0.62</td>
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<tr>
<td>2–3 years*</td>
<td>0.9% vs 1.6%</td>
<td>P=0.22</td>
<td></td>
</tr>
<tr>
<td>3–4 years*</td>
<td>0.8% vs 1.6%</td>
<td>P=0.13</td>
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</table>

Cumulative KM Event Rate ± 1.5 SE; log–rank $P$-value; *Binary rates
CABG

% Off Pump

- 1997
- 2002
- 2010
- 2012
CONCLUSIONS

There was no significant difference between off-pump and on-pump CABG with respect to the 30-day rate of death, myocardial infarction, stroke, or renal failure requiring dialysis. The use of off-pump CABG resulted in reduced rates of transfusion, reoperation for perioperative bleeding, respiratory complications, and acute kidney injury but also resulted in an increased risk of early revascularization. (Funded by the Canadian Institutes of Health Research; CORONARY ClinicalTrials.gov number, NCT00463294.)
Hybrid Coronary Revascularization Versus Off-Pump Coronary Artery Bypass Grafting for the Treatment of Multivessel Coronary Artery Disease

Michael E. Halkos, MD, Thomas A. Vassiliades, MD, MBA, John S. Douglas, MD, Douglas C. Morris, MD, S. Tanveer Rab, MD, Henry A. Liberman, MD, Habib Samady, MD, Patrick D. Kilgo, MS, Robert A. Guyton, MD, and John D. Puskas, MD

Division of Cardiothoracic Surgery and the Division of Cardiology, Emory University School of Medicine, Atlanta, Georgia
HCR- Revascularization Strategy

N = 202

PCI first, then MICS
N = 45
22.5%

Simultaneous
N = 33
16.2%

MICS first, then PCI
N = 108
54.0%

* 16 patients missing
MECC
Public Reporting of CABG Outcomes

Voluntary Participation
332/1,029 Programs Participate
What's behind the heart bypass surgery ratings?

Last reviewed: August 2011

These ratings of surgical groups that perform coronary artery bypass (CABG) surgery are based on data from The Society of Thoracic Surgeons (STS). It’s a not-for-profit organization that represents some 5,400 surgeons worldwide who operate on the chest (or thorax), including the heart, lungs, and esophagus.

STS has maintained the Adult Cardiac Surgery Database since 1989. It’s now the largest such registry in the world, including more than 4 million surgical records and representing more than 90 percent of adult cardiac surgery groups in the U.S. Surgeons add new data to the registry four times a year, providing an up-to-date picture of cardiac surgical practice. Much of the information is collected at the point of care, making it more valid than data collected for administrative or insurance reasons or doctor ratings based on professional reputation.

STS contracts with an independent organization, the Duke Clinical Research Institute, to analyze the data and prepare reports for participating surgical groups, comparing their performance with national benchmarks for surgical quality. STS and surgeons from each group have agreed to share the reports on heart bypass surgery with Consumer Reports as part of their ongoing commitment to improving care and helping patients make informed decisions.
Heart Bypass Surgery Ratings

There are more than 1,000 surgical groups in the U.S. that perform heart bypass surgery. About 90 percent of them provide performance data to the Society of Thoracic Surgeons, a nonprofit organization that represents doctors who operate on the chest. The groups in these ratings are those that agreed to share data with us. If a group you are interested in is not listed here, ask the heart surgeons if they would show you their results, and if they plan to share them publicly in the future. Read more about the heart bypass ratings and treating heart disease.

Ratings Preview Showing 323 group(s)

<table>
<thead>
<tr>
<th>Group name and location(s)</th>
<th>Surgeon(s)</th>
<th>Affiliated hospital(s)</th>
<th>Overall rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Last reviewed June 2010</td>
<td></td>
<td></td>
<td>(1 to 3 stars)</td>
</tr>
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</table>
Dallas-Ft. Worth Metroplex
6 Million People
34 Heart Surgery Programs
14 perform < 100 Cardiac Operations/Year
Outcomes of PCI at Hospitals with or without On-Site Cardiac Surgery

Thomas Aversano, M.D., Cynthia C. Lemmon, R.N., B.S.N., M.S., and Li Liu, M.D. for the Atlantic CPORT Investigators
March 25, 2012 (10.1056/NEJMoa1114540)

CONCLUSIONS

We found that PCI performed at hospitals without on-site cardiac surgery was noninferior to PCI performed at hospitals with on-site cardiac surgery with respect to mortality at 6 weeks and major adverse cardiac events at 9 months. (Funded by the Cardiovascular Patient Outcomes Research Team [C-PORT] participating sites; ClinicalTrials.gov number, NCT00549796.)
Heartflow- Non-invasive FFR
PERCUTANEOUS DILATATION
OF CORONARY ARTERY STENOSIS
Percutaneous Transcatheter Implantation of an Aortic Valve Prosthesis for Calcific Aortic Stenosis
First Human Case Description

Alain Cribier, MD; Helene Eltchaninoff, MD; Assaf Bash, PhD; Nicolas Borenstein, MD;
Helene Eltchaninoff, MD; Assaf Bash, PhD; Nicolas Borenstein, MD;
Frederic Anselme, MD; MD
Isolierte Implantation einer Aortenklappenprothese
2000 - 2010

TAVR = 23.9%

2011 - ~ 5,000
-30.8%!
Transfemoral
Transapical
Subclavian  

Transaortic
How Many Centers Should Be Performing TAVR in the Next Two Years in the U.S.?

400 Programs Perform $>1$ Surgical AVR/Week
Aortic Valve Replacement
U.S Projections
JP Morgan

JP Morgan, October 4, 2011
Thoracic Aortic Disease
VAD’s
HM I (XVE) and HM II

HM II with controller and batteries
HeartMate III*
HeartMate X*
Fully-Implantable LVAS (FILVAS) *

Implanted Controller / Battery / Internal TETS Coil

External TETS Coil (broadcasts electricity across the skin)

HM II LVAD

WiTricity
Instead of Traditional Specialties

- Non-Interventional Cardiology
- Interventional Cardiology
- Pediatric Cardiology
- Cardiac Surgery
- Pediatric Cardiac Surgery
- Radiology
- Electrophysiology
Reorganizing As

- Coronary Team
  (Primary Cardiologist, Interventional Cardiology, Cardiac Surgery, Emergency Service)
- Mitral Valve Team
  (Primary Cardiologist, Cardiac Surgery, Interventional, Echo, Heart Failure, EP)
- Aortic Valve Team
  (Primary Cardiologist, Cardiac Surgery, Interventional Cardiology, Imaging)
- Congenital Team
  (Pediatric Cardiologist, Cardiac Surgery, Interventional Cardiology)
- Aortic Team
  (Cardiac Surgery, Vascular Surgery, Interventional Cardiology, Emergency Service)
- Heart Failure Team
  (Heart Failure Cardiologist, EP, Cardiac Surgery, Emergency Service)
- Arrhythmia Team
  (Primary Cardiologist, EP, Cardiac Surgery)
Internal Medicine Intern-1973

- Acute MI- one month hospital stay
- Surgical hip operations- 6 weeks recovery
- No knee replacements
- Acute leukemia-no cure
- Cholecystitis-6 week return to work
- Heart transplants- headlines to abandonment
- No interventional cardiology
What’s Happened Since Then?

- Mortality from heart disease declined by 50%
- Total hip replacements routine
- Bilateral total knee replacements outpatient procedure
- Most leukemia is cured
- Lapchohy is an outpatient procedure
- Heart transplant and VAD’s now routine
- Interventional cardiology
TEVAR, TAVR, OPCAB; 
Is the Pump (and the Perfusionist) Becoming Obsolete?

Conclusions

• Not obsolete, but must be adaptive to change
• CABG will not decline much further
• Off pump CABG will not increase much further
• Hybrid revascularization is having a rebirth
• The percent of AVR performed percutaneously will increase to 20% over next 4 years
• Mitral valve surgery will increase over next few years
• There will be a consolidation of smaller programs
• More thoracic aortic disease will be treated by an endovascular approach
• VAD’s is the major growth area
Walk a Fine Line
The Future of Cardiac Surgery