Redo Coronary Artery Bypass Surgery

Young Tak Lee, Kay Hyun Park
Samsung Medical Center,
Sunkyunkwan University School of Medicine
Introduction

Incidence

25 %, USA and EU
1 % (25/2,325), SMC
Introduction

Choice of conduit
   ITA, RA, GEA, IEA, SV

Grafting strategy
   replacement of SV
   reuse of functioning ITA

Myocardial protection
Off-pump technique
Indications

AHA/ACC recommendations

**Class I**

1. Coronary bypass should be performed in patients with prior CABG for **disabling angina despite optimal nonsurgical therapy**. (If the angina is not typical, then objective evidence of ischemia should be obtained.) *(Level of Evidence: B)*

2. Coronary bypass should be performed in patients with prior CABG without patent bypass grafts but with **Class I indications for surgery for native-vessel coronary artery disease** *(significant left main coronary stenosis, left main equivalent, 3-vessel disease)*. *(Level of Evidence: B)*

**Class IIa**

1. Coronary bypass is reasonable in patients with prior CABG and **bypassable distal vessel(s) with a large area of threatened myocardium by noninvasive studies**. *(Level of Evidence: B)*

2. Coronary bypass is reasonable in patients with prior CABG if **atherosclerotic vein grafts with stenoses greater than 50% supplying the LAD coronary artery or large areas of myocardium are present**. *(Level of Evidence: B)*
Indications

Anatomic

1. atherosclerotic (late) stenoses in vein grafts that supply the LAD
2. multiple stenotic vein grafts that supply large areas of myocardium
3. multi-vessel disease with a proximal LAD lesion
4. abnormal LV function related to native vessel lesion or stenotic vein grafts.

Functional

1. Recurrent angina
2. CHF
3. LMD and 3 VD with LV dysfx.
Redo CABG

1. late (≥5 years) stenoses
2. multiple stenotic vein grafts
3. diffusely atherosclerotic vein grafts
4. stenotic LAD graft
5. no patent ITA graft
6. abnormal LV function

PTCA

1. Early (<5 years) stenoses
2. single stenotic vein graft
3. other patent vein graft
4. focal graft lesions
5. patent ITA-LAD graft
Preoperative Assessment

1. **complete study** of the native coronary and bypassed graft anatomy, additional cardiac defect (mitral insufficiency, aortic insufficiency, LV thrombi, pulmonary hypertension, atrial septal defect)

2. **viable myocardium** supplied by graftable coronary artery

3. evaluation of **bypass conduit planned** (ITAs, RA, GEA, SV, IEA with angiogram or Doppler study)

4. evaluation of **other vascular system** (renal, carotid, peripheral artery)
Intraoperative Factors

1. application of defibrillator pads and background lidocaine
2. exposure of femoral artery and vein before sternotommy
3. repeat sternotomy
4. remaining dissection under cardioplegia
5. single-clamp technique in all cases
Intraoperative Factors

High risk situations

- RV, or aortic enlargement
- patent vein graft to RCA
- in situ RITA to LCA
- in situ LITA curled medially
- multiple reoperations

epicardial thickening, scar—difficulty in CA identification
Intraoperative Factors

ITA harvesting

Redo CABG

Cardiac & Vascular Center
Intraoperative Factors

Grafting techniques

vein graft replacement

Timing
≥ 5 years
Intraoperative Factors

Grafting techniques

proximal arterial graft on vein graft

Redo CABG
Intraoperative Factors

Grafting techniques

Redo CABG

Reuse functioning ITA

old LITA

new RITA/RA

LITA-Dx

X-anastomosis

RITA

Dx

OM1

LAD
Intraoperative Factors

Grafting techniques

composite graft

Redo CABG
Profiles

Numbers: 25 cases (2001-2007.7.)

M:F = 19:6

Age: 61.9 ± 9.7 (41~75)

Interval (months): 103.0 ± 64.6 (2-264)

EF (%): 50.0 ± 13.2 (26-78)

Risk factors

IABP (2)
CRF (7)
EF < 35% (4)
Redo CABG
2001-2007, SMC

Targets

New targets
- LAD: 18
- Dx: 12
- OM: 19
- RCA: 2
- PDA: 3
- PL: 4

Graft failure
- LAD: 12
- OM: 11
- RCA: 12

New lesions
- LAD: 2
- OM: 1
- RCA: 1

LITA: 6
SV others
Redo CABG
2001-2007,7 SMC

Operations

Grafts

<table>
<thead>
<tr>
<th>Graft</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>RITA</td>
<td>20</td>
</tr>
<tr>
<td>LITA</td>
<td>6</td>
</tr>
<tr>
<td>RA</td>
<td>10</td>
</tr>
<tr>
<td>GEA</td>
<td>10</td>
</tr>
<tr>
<td>SV</td>
<td>1</td>
</tr>
<tr>
<td>TDA</td>
<td>1</td>
</tr>
</tbody>
</table>

No of distal anastomosis; $2.8 \pm 0.9$ (1-5)

Op techniques

<table>
<thead>
<tr>
<th>Technique</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conventional CABG</td>
<td>15</td>
</tr>
<tr>
<td>On pump beating</td>
<td>6</td>
</tr>
<tr>
<td>MIDCAB</td>
<td>2</td>
</tr>
<tr>
<td>OPCAB</td>
<td>2</td>
</tr>
</tbody>
</table>

ASD 1
MAP 1
MVR 1

Cardiac & Vascular Center SMC
Redo CABG
2001-2007, SMC

Results

Operative mortality 0
Late mortality 1
Postop IABP 0
Postop LCOS 4
Af 4
Neurologic 2
Reintervention 2
Redo CABG
2001-2007,7  SMC

Variable grafting techniques

occluded pre-existing LITA-LAD

pre-existing vein graft

new graft to LAD
Redo CABG
2001-2007,7 SMC

Variable grafting techniques
Redo CABG
2001-2007,7 SMC

Variable grafting techniques
Redo CABG
2001-2007, SMC

Variable grafting techniques
Redo CABG
2001-2007,7 SMC

Variable grafting techniques

Cardiac & Vascular Center SMC
Redo CABG
2001-2007,7 SMC

Variable grafting techniques
Redo CABG
2001-2007, SMC

Variable grafting techniques
Redo CABG
2001-2007,7 SMC

Variable grafting techniques
Redo CABG
2001-2007,7 SMC

Variable grafting techniques

- pre-existing vein grafts
- pre-existing LITA-LAD
- new conduit (LITA or radial a.)
Redo CABG
2001-2007,7 SMC

Variable grafting techniques

Radial a.
RGEA
Redo CABG
2001-2007 SMC

Variable grafting techniques

Cardiac & Vascular Center SMC
Redo CABG
2001-2007, SMC

Variable grafting techniques

reuse of functioning LITA, X-graft

LITA
OM1
Dx
LAD

GEA – PDA – OM2
Variable access techniques

LAST

LITA---LAD
Redo CABG
2001-2007,7 SMC

Variable access techniques
transabdominal MIDCAB
GEA-d-RCA
Redo CABG
2001-2007, SMC

Variable access technique

*Thoracotomy*

*Desc. Ao--SV or RA --- OM*
Redo CABG
2001-2007,7 SMC

Reintervention on SV patent at reop.

F/67

redo cabg, on pump beating (7 years)
RITA extension RA to
Patent SV to LAD
--2 years later PCI in SV to LAD
Redo CABG in LV Dysfunction

Impact of mitral insufficiency on reoperative coronary artery surgery in ischemic cardiomyopathy, EF<35%

Redo/MR+  Redo/MR-  Initial/MR+  Initial/MR-
3 year survival(%)  41.7  71.8  68.5  76.2

Redo CABG in LV Dysfunction

reoperative coronary artery surgery in ischemic cardiomyopathy, EF<35%

Initial late mortality

dialysis
stroke
no angina
age>65
no hypercholesterolemia
EF<25%

Redo late mortality

CHF
MR3/4

Summary

In the current era, redo CABG is nearly as safe as the primary operation.

But, redo CABG should not be performed in patients having severe MR with poor LV function without evidence of intermittent ischemia and without evidence of significant viable myocardium.