Coronary artery surgery results 2008, in Japan

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Official home-page of JACAS : http://www.jacas.org
Coronary artery bypass grafting (CABG), 2008

<table>
<thead>
<tr>
<th>Total cases</th>
<th>14,035</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isolated CABG</td>
<td>11,003</td>
</tr>
<tr>
<td>Concomitant CABG</td>
<td>2,982</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Isolated CABG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial elective</td>
</tr>
<tr>
<td>Extra initial elective</td>
</tr>
<tr>
<td>Off-pump</td>
</tr>
<tr>
<td>Off-pump rate</td>
</tr>
<tr>
<td>(previous year)</td>
</tr>
<tr>
<td>On-pump</td>
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<tr>
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<tr>
<td>(previous year)</td>
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<tr>
<td>Off-pump rate</td>
</tr>
<tr>
<td>(previous year)</td>
</tr>
</tbody>
</table>
Changes in OPCAB frequency rate of initial elective CABG
Total cases of initial elective: 9,301 (100%)

<table>
<thead>
<tr>
<th>Type of Procedure</th>
<th>Cases</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>On-pump (cardiac arrest)</td>
<td>2,438</td>
<td>26.2%</td>
</tr>
<tr>
<td>On-pump (cardiac beating)</td>
<td>774</td>
<td>8.3%</td>
</tr>
<tr>
<td>Off-pump (total cases)</td>
<td>6,089</td>
<td>65.5%</td>
</tr>
<tr>
<td>Off-pump (complete)</td>
<td>5,940</td>
<td></td>
</tr>
<tr>
<td>On-pump (convert)</td>
<td>159</td>
<td></td>
</tr>
<tr>
<td>OPCAB complete rate</td>
<td>97.6%</td>
<td></td>
</tr>
<tr>
<td>Off to on-pump convert rate</td>
<td>2.4%</td>
<td></td>
</tr>
<tr>
<td>(Previous year: 2.9%)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Mortality of isolated CABG: \(1.46\%\)
(previous year: \(1.78\%\))

Mortality of initial elective CABG: \(0.89\%\)
(previous year: \(0.97\%\))

- On-pump (cardiac arrest): \(0.90\%\)
- On-pump (cardiac beating): \(1.81\%\)
- Off-pump (total cases): \(0.64\%\)
  - Off-pump (complete): \(0.62\%\)
    (previous year: \(0.65\%\))
- On to on-pump (convert): \(1.34\%\)
  (previous year: \(3.70\%\))
Changes in mortality of CABG

- Total cases:
  - 1996: 1.78%
  - 1997: 1.46%
  - 1998: 0.97%
  - 1999: 0.81%
- Initial elective cases:
  - 1996: 2.2%
  - 1997: 2.0%
  - 1998: 1.78%
  - 1999: 1.55%
  - 2000: 1.46%
  - 2001: 1.35%
  - 2002: 1.27%
  - 2003: 1.18%
  - 2004: 1.10%
  - 2005: 1.04%
  - 2006: 0.97%
  - 2007: 0.81%
  - 2008: 0.75%
Changes of mortality for procedures (Initial elective CABG)
Surgical results according to diseased vessels

(initial elective cases: 9,301, mortality: 0.81%)

Mortality (%)

1VD (0.21%)

2VD (0.70%)

3VD (0.86%)

LMT (0.49%)

LMT + 1VD (0.98%)

LMT + 2VD (0.81%)

LMT + 3VD (0.96%)
Surgical results according to diseased vessels

(Initial elective off-pump (complete): 5,940, mortality: 0.62%)

Mortality (%)

- 1VD (0.24%)
- 2VD (0.46%)
- 3VD (0.70%)
- LMT (0.74%)
- LMT + 1VD (0.95%)
- LMT + 2VD (0.94%)
- LMT + 3VD (0.51%)
Surgical results according to diseased vessels

(Initial elective on-pump (arrest): 2,483, mortality: 0.90%)
Surgical results according to diseased vessels

(Initial elective off to on-pump (conversion): 149, mortality: 1.34%)

Mortality (%)

1VD (0%)  2VD (0%)  3VD (0%)

LMT + 2VD (9.09%)

LMT + 1VD (0%)

LMT + 3VD (3.70%)
Surgical results according to diseased vessels

(Initial elective on-pump (beating): 774, mortality: 1.81%)

- 2VD (3.77%)
- 1VD (0%)
- 3VD (1.62%)
- LMT (0%)
- LMT + 1VD (0%)
- LMT + 2VD (0%)
- LMT + 3VD (2.47%)
Surgical results according to diseased vessels
(Extra initial elective cases: 1,752, mortality: 4.91%)

Mortality (%)

LMT (19.40%)
LMT + 1VD (1.64%)
LMT + 2VD (2.34%)
LMT + 3VD (5.79%)

1VD (4.10%)
2VD (5.05%)
3VD (4.50%)
Surgical results according to procedures
(Except initial elective cases: 1,752, mortality: 4.91%)

- Off pump (total): 2.55%
- On pump (beating): 10.76%
- On pump (arrest): 5.23%
Number of grafts according to surgical procedures

<table>
<thead>
<tr>
<th>Total cases</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4 ≤</th>
</tr>
</thead>
<tbody>
<tr>
<td>On-pump (arrest)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4 ≤</td>
</tr>
<tr>
<td>On-pump (beating)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4 ≤</td>
</tr>
<tr>
<td>Off to on (conversion)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4 ≤</td>
</tr>
<tr>
<td>Off-pump (complete)</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4 ≤</td>
</tr>
</tbody>
</table>

Mean grafts (previous):
- Total cases: 2.95 (2.94)
- On-pump (arrest): 3.19 (3.17)
- On-pump (beating): 3.04 (2.98)
- Off to on (conversion): 3.05 (3.00)
- Off-pump (complete): 2.84 (2.84)
Surgical procedures according to number of grafts

- **1 graft**
  - Off-pump
  - Off to on-pump (conversion)
  - On-pump (beating)

- **2 grafts**
  - Off-pump
  - On-pump (arrest)

- **3 grafts**
  - Off-pump
  - On-pump (arrest)

- **4 or more grafts**
  - Off-pump
  - On-pump (arrest)
Surgical procedures according to diseased vessels

1 vessel

- Off-pump
- Off-pump (arrest)

2 vessels

- Off-pump
- Off-pump (arrest)
- On-pump (arrest)

3 vessels

- Off-pump
- Off-pump (arrest)
- On-pump (arrest)

LMT

- Off-pump
- Off-pump (arrest)
- On-pump (arrest)

LMT + 1

- Off-pump
- Off-pump (arrest)
- On-pump (arrest)

LMT + 2

- Off-pump
- Off-pump (arrest)
- On-pump (arrest)

LMT + 3

- Off-pump
- Off-pump (arrest)
- On-pump (arrest)

Off to on-pump (conversion)

On-pump (beating)
Surgical results of off-pump (complete) vs. on-pump (arrest) according to diseased vessels

Mortality (%)

- Off-pump (complete)
- On-pump (arrest)

<table>
<thead>
<tr>
<th>Vessels</th>
<th>Off-pump (complete)</th>
<th>On-pump (arrest)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 vessel</td>
<td>0.24</td>
<td>0.00</td>
</tr>
<tr>
<td>2 vessels</td>
<td>0.46</td>
<td>0.55</td>
</tr>
<tr>
<td>3 vessels</td>
<td>0.70</td>
<td>1.03</td>
</tr>
<tr>
<td>LMT</td>
<td>0.74</td>
<td>0.95</td>
</tr>
<tr>
<td>LMT+1</td>
<td>0.94</td>
<td>1.56</td>
</tr>
<tr>
<td>LMT+2</td>
<td>0.43</td>
<td>0.94</td>
</tr>
<tr>
<td>LMT+3</td>
<td>0.51</td>
<td>1.22</td>
</tr>
<tr>
<td>Total</td>
<td>0.62</td>
<td>0.90</td>
</tr>
</tbody>
</table>
Off to on-pump conversion rate according to diseased vessels (total: 2.4%)

- 1 vessel: Off-pump (1.2%)
- 2 vessels: Off-pump (1.9%)
- 3 vessels: Off-pump (2.9%)
- LMT: Off-pump (1.5%)
- LMT+1: Off-pump (3.2%)
- LMT+2: Off-pump (2.0%)
- LMT+3: Off-pump (2.7%)
On-pump (arrest) vs. off-pump (Initial elective CABG)

- **RCA**: 
  - On-pump (arrest): 69% (bypass+) 65% (bypass-)
  - Off-pump: 65% (bypass+)

- **LAD**: 
  - On-pump (arrest): 94% (bypass+) 97% (bypass-)
  - Off-pump: 97% (bypass+)

- **LCX**: 
  - On-pump (arrest): 84% (bypass+) 70% (bypass-)
  - Off-pump: 70% (bypass+)
Off-pump vs. off to on-pump conversion (Initial elective CABG)

<table>
<thead>
<tr>
<th>Bypass</th>
<th>No.</th>
<th>Conversion Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>RCA(+)</td>
<td>3,954</td>
<td>2.4%</td>
</tr>
<tr>
<td>LAD(+)</td>
<td>5,877</td>
<td>2.2%</td>
</tr>
<tr>
<td>LCX(+)</td>
<td>4,317</td>
<td>2.7%</td>
</tr>
<tr>
<td>RCA(−)</td>
<td>2,135</td>
<td>2.6%</td>
</tr>
<tr>
<td>LAD(−)</td>
<td>212</td>
<td>8.5%</td>
</tr>
<tr>
<td>LCX(−)</td>
<td>1,772</td>
<td>1.9%</td>
</tr>
</tbody>
</table>
Age distribution (Initial elective cases)

- Male: 77.5%
- Female: 22.5%

Age distribution:
- ≥80: 260 (M) + 260 (F)
- 70–79: 867 (M) + 535 (F)
- 60–69: 535 (M) + 535 (F)
- 50–59: 177 (M) + 177 (F)
- 49 ≥: 36 (M) + 36 (F)

Mortality:
- 0.90% (previous: 0.98%)
- 0.64% (previous: 1.04%)
Changes in elderly patients (Initial elective cases)

- Initial elective cases
- 80 y.o. ≥ 70 y.o.
Changes in mortality according to age (Initial elective cases)

- 49 y.o. ≥
- 50-59 y.o.
- 60-69 y.o.
- 70-79 y.o.
- 80 y.o. ≤

Graft selection
(Total number of grafts: 25,044 grafts)
Complication rate of postoperative stroke according to surgical procedures

Total complication rate: 1.01%

- Off-pump (complete): 1.03%
- On-pump (beating): 1.50%
- On-pump (arrest): 0.72%
- Off to on-pump (conversion): 1.68%
Changes in mortality of VSP

Mortality (\%)

<table>
<thead>
<tr>
<th>Year</th>
<th>Mortality</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980以前</td>
<td></td>
</tr>
<tr>
<td>1981-1985</td>
<td></td>
</tr>
<tr>
<td>1986-1990</td>
<td></td>
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<td>1991-1995</td>
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<td>1996-2000</td>
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<td>2001</td>
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<td>2002</td>
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<td>2005</td>
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<tr>
<td>2006</td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td></td>
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<tr>
<td>2008</td>
<td></td>
</tr>
</tbody>
</table>

Total cases: 178, death cases: 42 (Mortality: 23.6\%)
Results of VSP (1)

- Total cases:
  - Alive: 136
  - Death: 42 (mortality: 23.60%)
  - Total: 178

- Bypass (+):
  - Alive: 53
  - Death: 17 (mortality: 24.28%)
  - Total: 70

- Bypass (-):
  - Alive: 83
  - Death: 25 (mortality: 23.14%)
  - Total: 108

(case)
Anterior infarction (mortality: 18.8%)

- Dagett: 23 alive, 6 death (29 cases, mortality: 20.69%)
- Komeda: 93 alive, 21 death (114 cases, mortality: 18.42%)

Post-inferior infarction (mortality: 42.8%)

- Dagett: 8 alive, 7 death (15 cases, mortality: 46.67%)
- Komeda: 12 alive, 8 death (20 cases, mortality: 40.00%)

Results of VSP (2)
Changes in mortality of papillary muscle rupture of LV

2008;
Total cases: 21, death cases: 2 (mortality: 9.52%)
Results of papillary muscle rupture

- **Total cases**
  - Alive: 19
  - Death: 2
  - Total: 21 (mortality: 9.52%)

- **Bypass (+)**
  - Alive: 9
  - Death: 1
  - Total: 10 (mortality: 10.00%)

- **Bypass (-)**
  - Alive: 10
  - Death: 1
  - Total: 11 (mortality: 9.09%)
Changes in mortality of cardiac rupture

Mortality (%)

2008;
Total cases: 94, death cases: 30 (mortality: 31.9%)
Results of cardiac rupture

- **Total cases**
  - Alive: 64
  - Death: 30
  - Total: 94 (mortality: 31.91%)

- **Bypass (+)**
  - Alive: 13
  - Death: 8
  - Total: 21 (mortality: 38.10%)

- **Bypass (-)**
  - Alive: 51
  - Death: 22
  - Total: 73 (mortality: 30.14%)
Changes in mortality of left ventricle aneurysm

2008;
Total cases: 333, death cases 17 (mortality: 5.10%)
Results of left ventricular-plasty (including left ventriculectomy) against LV aneurysm and/or ischemic cardiomyopathy

- **Total cases**: 179 (mortality: 3.91%)
  - Alive: 172
  - Death: 7

- **Bypass(+)**: 125 (mortality: 4.00%)
  - Alive: 120
  - Death: 5

- **Bypass(-)**: 54 (mortality: 3.70%)
  - Alive: 52
  - Death: 2

Graph showing the distribution of cases and mortality rates.
Results of mitral valvuloplasty and replacement against ischemic mitral regurgitation

Mitral valvuloplasty

- Total cases: 424
  - Bypass (+): 295 (17 deaths, mortality: 5.44%)
  - Bypass (-): 61 (1 death, mortality: 1.61%)

Mitral valve replacement

- Total cases: 374
  - Bypass (+): 312 (18 deaths, mortality: 5.98%)
  - Bypass (-): 68 (9 deaths, mortality: 11.68%)

- Total cases: 774
  - Bypass (+): 48 (3 deaths, mortality: 12.5%)
  - Bypass (-): 29 (3 deaths, mortality: 10.34%)

- Total deaths: 45
- Total alive: 729

(mortality: 5.98%)
(mortality: 4.81%)
(mortality: 5.44%)
(mortality: 11.68%)
(mortality: 12.5%)
(mortality: 10.34%)
Results of LV aneurysm and or ischemic cardiomyopathy concomitant with mitral valve regurgitation

LV-plasty + MV-plasty

- Total cases: 144
  - Alive: 130 (mortality 6.49%)
  - Death: 14 (mortality 6.66%)
  - Alive with bypass: 98 (mortality 5.76%)
  - Alive without bypass: 32 (mortality 8.57%)

LV-plasty + MV replacement

- Total cases: 15
  - Alive with bypass: 7 (mortality 12.5%)
  - Alive without bypass: 7 (mortality 0%)
1. The mortality of isolated CABG and initial elective CABG were 1.48%, and 0.81% respectively, indicating best results since this survey started.

2. Of all initial elective CABG, 65% cases underwent off-pump CABG (OPCAB), showing high frequency rate. The mortality of OPCAB was 0.62%, showing excellent results.

3. The mean number of grafts for CABG was 2.95, which increased than that of last years, indicating more bypass performed.

4. Of 4 or more bypass surgery, 57% cases underwent OPCAB.
Conclusions (2)

6. CABG cases have been getting older; the rate of 70 or more years old was 50%, 80 or more years old was about 10%.

7. The frequency use rate of arterial grafts was 63%, on the other hand, that of vein graft was 37%.

8. Postoperative stroke rate of CABG was 1.01% and there were no significant differences between those of other procedures.

9. As for the results of complications after myocardial infarction, the cases of ischemic mitral regurgitation increased. The mortality of VSP, rupture of papillary muscle of LV, and cardiac rupture were still bad, indicating high mortality.