Coronary artery surgery results
2010, in Japan

The President of Japanese Association
for Coronary Artery Surgery (JACAS)

Yukiyasu Sezai
The Survey Committee of Japanese Association for Coronary Artery Surgery (JACAS)

Yukihiro Orime (Nihon Univ.)

Hirokuni Arai (Tokyo Medical and Dental Univ.)

Masami Ochi (Nihon Medical Univ.)

Hiroshi Nishida (Tokyo Woman Medical Univ.)

Hankei Shin (Ichikawa Medical Center of Tokyo Dental Univ.)

Hiroshi Niinami (Saitama International Medical Center)

Official home-page of JACAS : http://www.jacas.org
## Coronary artery bypass grafting (CABG), 2010

<table>
<thead>
<tr>
<th></th>
<th>Total cases</th>
<th>Isolated CABG</th>
<th>Concomitant CABG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total cases</td>
<td>: 12,789</td>
<td>9,429 (74%)</td>
<td>3,369 (26%)</td>
</tr>
<tr>
<td>Isolated CABG</td>
<td></td>
<td>(previous year: 75%)</td>
<td>(previous year: 24%)</td>
</tr>
<tr>
<td>Concomitant CABG</td>
<td></td>
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</table>

### Isolated CABG

<table>
<thead>
<tr>
<th></th>
<th>Initial elective</th>
<th>Extra initial elective</th>
</tr>
</thead>
<tbody>
<tr>
<td>Off-pump</td>
<td>: 5,193</td>
<td>: 1,454</td>
</tr>
<tr>
<td>On-pump</td>
<td>: 765</td>
<td>: 689</td>
</tr>
<tr>
<td></td>
<td>(Off-pump rate : 65%)</td>
<td>(Off-pump rate : 53%)</td>
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<tr>
<td></td>
<td>(previous year : 66%)</td>
<td>(previous year : 50%)</td>
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</tbody>
</table>
Changes in OPCAB frequency rate of initial elective CABG

- 66%
- 65%
<table>
<thead>
<tr>
<th>Description</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total cases of initial elective</td>
<td>7,975(100%)</td>
</tr>
<tr>
<td>On-pump (cardiac arrest)</td>
<td>1,987(24.9%)</td>
</tr>
<tr>
<td>On-pump (cardiac beating)</td>
<td>795(10.0%)</td>
</tr>
<tr>
<td>Off-pump (total cases)</td>
<td>5,193(65.1%)</td>
</tr>
<tr>
<td>Off-pump (complete)</td>
<td>5,073</td>
</tr>
<tr>
<td>Off to on-pump (convert)</td>
<td>120</td>
</tr>
<tr>
<td>OPCAB complete rate</td>
<td>97.7%</td>
</tr>
<tr>
<td>Off to on-pump convert rate</td>
<td>2.3%</td>
</tr>
<tr>
<td>(previous year: 1.8%)</td>
<td></td>
</tr>
</tbody>
</table>
Mortality of isolated CABG: **1.45%**
(previous year: **2.12%**)

Mortality of initial elective CABG: **0.75%**
(previous year: **1.20%**)

- On-pump (cardiac arrest): **0.75%**
- On-pump (cardiac beating): **1.64%**
- Off-pump (total cases): **0.62%**
  - Off-pump (complete): **0.53%** (previous year: **1.22%**)
- On to on-pump (convert): **4.17%** (previous year: **6.42%**
Changes in mortality of CABG

- Total cases
- Initial elective cases


Mortality:
- 1996: 3.5%
- 1997: 3.3%
- 1998: 3.0%
- 1999: 2.8%
- 2000: 2.7%
- 2001: 2.6%
- 2002: 2.5%
- 2003: 2.4%
- 2004: 2.3%
- 2005: 2.2%
- 2006: 2.1%
- 2007: 2.0%
- 2008: 2.1%
- 2009: 2.0%
- 2010: 1.8%

Mortality decreases over the years.
Changes of mortality for procedures (Initial elective CABG)
Surgical results according to diseased vessels

(Initial elective cases: 7,975, mortality: 0.75%)
Surgical results according to diseased vessels
(Initial elective off-pump (complete): 5,073, mortality: 0.53%)
Surgical results according to diseased vessels

Initial elective on-pump (arrest): 1,987, mortality: 0.75%
Surgical results according to diseased vessels

(Initial elective off to on-pump (conversion): 120, mortality: 4.17%)

Mortality (%)

- 1VD (0%)
- 2VD (0%)
- LMT (0%)
- LMT + 1VD (0%)
- LMT + 2VD (0%)
- LMT + 3VD (8.33%)
Surgical results according to diseased vessels

(Initial elective on-pump (beating): 795, mortality: 1.64%)

Mortality (%)

- 1VD: 0%
- 2VD: 0.86%
- 3VD: 1.56%
- LMT: 4.55%
- LMT + 1VD: 5.26%
- LMT + 2VD: 1.61%
- LMT + 3VD: 1.66%
Surgical results according to diseased vessels
(Extra initial elective cases: 1,454, mortality: 5.30%)

Mortality (%)

1VD (7.59%)

LMT (6.76%)

LMT + 1VD (3.03%)

2VD (4.44%)

3VD (5.51%)

LMT + 2VD (5.08%)

LMT + 3VD (5.15%)
Surgical results according to procedures
(Except initial elective cases: 1,454, mortality: 5.30%)

Mortality (%)

- Off-pump (total) 3.39%
- On-pump (beating) 7.93%
- On-pump (arrest) 6.85%
Number of grafts according to surgical procedures

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

mean grafts (previous)
- On-pump (arrest): 3.18 (3.22)
- On-pump (beating): 3.07 (3.00)
- Off to on (conversion): 3.05 (3.03)
- Off-pump (complete): 2.90 (2.89)

2.99 (2.98)
Surgical procedures according to number of grafts

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

2 grafts
- Off-pump
- Off to on-pump (conversion)
- On-pump (arrest)

3 grafts
- Off-pump
- Off to on-pump (conversion)
- On-pump (arrest)

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

1 vessel
- Off-pump
- On-pump (arrest)

2 vessels
- Off-pump
- On-pump (arrest)

3 vessels
- Off-pump
- On-pump (arrest)

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

LMT + 1
- Off-pump
- On-pump (arrest)

LMT + 2
- Off-pump
- On-pump (arrest)

LMT + 3
- Off-pump
- On-pump (arrest)
Surgical results of off-pump (complete) vs. on-pump (arrest) according to diseased vessels

Mortality (%)

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

1 vessel: 0.63 vs. 0
2 vessels: 1.11 vs. 0
3 vessels: 0.76 vs. 0.19
LMT: 1.59 vs. 0
LMT +1: 0.61 vs. 0
LMT +2: 0.61 vs. 0
LMT +3: 1.29 vs. 0.55
Total: 0.75 vs. 0.53
Off to on-pump conversion rate according to diseased vessels (total: 2.3%)
On-pump (arrest) vs. off-pump (Initial elective CABG)

- RCA: On-pump 73%, Off-pump 64%
- LAD: On-pump 97%, Off-pump 98%
- LCX: On-pump 86%, Off-pump 73%
Off-pump vs. off to on-pump conversion (Initial elective CABG)

<table>
<thead>
<tr>
<th>Bypass</th>
<th>No.</th>
<th>Off-pump</th>
<th>Off to on-pump(conversion)</th>
</tr>
</thead>
<tbody>
<tr>
<td>RCA(+)</td>
<td>3,345</td>
<td>Off-pump</td>
<td>2.5%</td>
</tr>
<tr>
<td>LAD(+)</td>
<td>5,123</td>
<td>Off-pump</td>
<td>2.3%</td>
</tr>
<tr>
<td>LCX(+)</td>
<td>3,799</td>
<td>Off-pump</td>
<td>2.5%</td>
</tr>
<tr>
<td>RCA(−)</td>
<td>1,848</td>
<td>Off-pump</td>
<td>1.9%</td>
</tr>
<tr>
<td>LAD(−)</td>
<td>70</td>
<td>Off-pump</td>
<td>2.8%</td>
</tr>
<tr>
<td>LCX(−)</td>
<td>1,394</td>
<td>Off-pump</td>
<td>1.7%</td>
</tr>
</tbody>
</table>
Age distribution (Initial elective cases)

- **Male**: 78.8%
- **Female**: 21.2%

- **Mortality**: 0.62% (previous: 1.01%)
- **Mortality**: 1.00% (previous: 2.10%)

- **Age Distribution**:
  - 70-79: 2352 males, 796 females
  - 60-69: 2341 males, 459 females
  - 50-59: 2352 males, 118 females
  - 49 or over: 267 males, 49 females
Changes in elderly patients (Initial elective cases)

![Graph showing changes in elderly patients from 2000 to 2010. The graph indicates an increase in patients 70 or more years old, with a slight increase in patients 80 or more years old.](image-url)
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: 24,925 grafts)

SVG (41.6%)
LITA (35.3%)
RITA (13.0%)
RA (6.4%)
GEA (3.6%)
Changes in graft selection

- LITA
- RITA
- GEA
- RA
- SVG
Complication rate of postoperative stroke according to surgical procedures

Total complication rate: 83/8990 (isolated CABG) = 1.77%

- Off-pump (complete): 1.68%
- On-pump (beating): 1.91%
- On-pump (arrest): 1.67%
- Off to on-pump (conversion): 5.51%

**p-values:**
- Off-pump (complete): p=1.0000
- On-pump (beating): p=0.9171
- On-pump (arrest): p=0.9336
- Off to on-pump (conversion): p<0.0001
Changes in mortality of VSP

2010;
Total cases: 164, death cases: 41 (Mortality: 25.0%)
Results of VSP (1)

**Total cases**
- Alive: 123
- Death: 41
- Total: 164 (mortality: 25.0%)

**Bypass (+)**
- Alive: 52
- Death: 22
- Total: 74 (mortality: 29.7%)

**Bypass (-)**
- Alive: 71
- Death: 19
- Total: 90 (mortality: 21.1%)
Results of VSP (2)

Anterior infarction (mortality 20.0%)

- Dagett: 28 alive, 11 death, total 39 (mortality: 28.2%)
- Komeda: 72 alive, 15 death, total 87 (mortality: 17.2%)
- Others: 4 (mortality: 0.0%)

Post-inferior infarction (mortality 44.1%)

- Dagett: 7 alive, 11 death, total 16 (mortality: 68.7%)
- Komeda: 13 alive, 3 death, total 16 (mortality: 18.7%)
- Others: 2 (mortality: 50.0%)
Changes in mortality of papillary muscle rupture of LV

2010;
Total cases: 25, death cases: 11 (mortality: 44.0%)
Results of papillary muscle rupture

Total cases
- Alive: 14
- Death: 11
- Total: 25 (mortality: 44.0%)

Bypass (+)
- Alive: 4
- Death: 3
- Total: 7 (mortality: 42.8%)

Bypass (-)
- Alive: 10
- Death: 8
- Total: 18 (mortality: 44.4%)
Changes in mortality of cardiac rupture

2010;
Total cases: 121, death cases: 38 (mortality: 31.4%)
Results of cardiac rupture

Total cases
- Alive: 83
- Death: 38
- Total: 121 (mortality: 31.4%)

Blowout type
- Bypass (+): 16 alive, 29 death
  - Total: 45 (mortality: 64.4%)
  - Bypass (+): 8 alive, 29 death
    - Mortality: 50.00% (8 out of 16)
  - Bypass (-): 12 alive, 25 death
    - Total: 37 (mortality: 67.5%)

Oozing type
- Bypass (+): 67 alive, 9 death
  - Total: 76 (mortality: 11.8%)
  - Bypass (+): 5 alive, 9 death
    - Mortality: 28.5% (5 out of 18)
  - Bypass (-): 62 alive, 7 death
    - Total: 69 (mortality: 10.1%)
Changes in mortality of left ventricle aneurysm

Total cases: 277, death cases 12 (mortality: 4.3%)
Results of left ventricular-plasty (including left ventriculectomy) against LV aneurysm and/or ischemic cardiomyopathy

- Total cases: 154 (5 deaths, mortality: 3.14%)
- Bypass (+): 126 (4 deaths, mortality: 3.08%)
- Bypass (-): 28 (1 death, mortality: 3.45%)

(case)
Results of mitral valvuloplasty and replacement against ischemic mitral regurgitation

Mitral valvuloplasty

- Total cases: 484
  - Total cases (bypass +): 397
    - Alive: 334
    - Death: 63
      - Mortality: 0.0%
  - Total cases (bypass -): 63
    - Alive: 63
    - Death: 6
      - Mortality: 0.0%

Mitral valve replacement

- Total cases: 11
  - Total cases (bypass +): 93
    - Alive: 43
    - Death: 6
      - Mortality: 6.45%
  - Total cases (bypass -): 44
    - Alive: 44
    - Death: 0
      - Mortality: 0.0%
Results of LV aneurysm and or ischemic cardiomyopathy concomitant with mitral valve regurgitation

LV-plasty + MV-plasty

Total cases: 111 (mortality: 5.93%)
- LV-plasty + bypass (+): 98 (mortality: 4.85%)
  - bypass (+): 73 (mortality: 3.95%)
  - bypass (-): 25 (mortality: 7.41%)
- LV-plasty + MV replacement
  - Total cases: 15 (mortality: 13.30%)
    - bypass (+): 10 (mortality: 40.0%)
    - bypass (-): 5 (mortality: 0.0%)

LV-plasty + MV replacement

Total cases: 7 (mortality: 0.0%)
- LV-plasty + bypass (+): 5
  - bypass (+): 3
  - bypass (-): 2
Conclusions (1)

1. The rate of isolated CABG was reduced, in contrast, that of concomitant surgery with CABG was increased.

2. The mortality of isolated CABG and initial elective CABG were 1.45%, and 0.75% respectively, indicating best results, since this survey started.

3. Of all initial elective CABG, 65% cases underwent off-pump CABG (OPCAB), showing high frequency rate. The mortality of OPCAB was 0.53%, which was lowest value, in recent years.

4. The mean number of grafts for CABG was 2.99, which increased than that of last years, indicating more bypass performed.

5. Of 4 or more bypass surgery, 60% 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 58%, on the other hand, that of vein graft (42%) gradually increased in recent years.

8. Postoperative stroke rate of CABG was 1.77% and that of off to on–pump CABG was significantly lower than those of other procedures.

9. As for the results of complications after myocardial infarction, post–inferior wall VSP, rupture of papillary muscle of LV, and blowout type of cardiac rupture were still bad, indicating high mortality.