**Supplementary Table 1.** Clinical characteristics of the 3,618 patients included in the adverse outcome analyses

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  |  |  | CAD |
|  | Total(n = 3,618) | Control (n = 2,906) | Pre-CAD(n = 416) | Mod-CAD(n = 205) | Sig-CAD(n = 91) |
| Age (years) | 59 ± 7 | 59 ± 7 | 61 ± 7 \* | 62 ± 7 # | 62 ± 8 |
| Male (n, %) | 1,753 (48.5%) | 1,329 (45.7%) | 237 (57.0%) \* | 133 (64.9%) # | 54 (59.3%) |
| Baseline data at admission |  |  |  |  |  |
| eGFR (ml/min/1.73 m2) | 79.4 ± 16.9 | 80.0 ± 16.8 | 77.3 ± 17.1 \* | 77.0 ± 17.3 # | 74.6 ± 17.6 |
| NYHA class III or IV (n, %) | 1,083 (29.9%) | 877 (30.2%) | 123 (29.6%) | 53 (25.9%) | 30 (33.0%)  |
| LVEF (%) | 61 ± 9 | 61 ± 9 | 60 ± 9 | 61 ± 11 | 60 ± 10 |
| Concomitant diseases |  |  |  |  |  |
| Pulmonary hypertension (n, %) | 1,290 (35.7%) | 1,036 (35.7%) | 157 (37.7%) | 65 (31.7%)  | 32 (35.2%) |
| Diabetes (n, %) | 246 (6.8%) | 172 (5.9%) | 44 (10.6%) \* | 21 (10.2%) # | 9 (9.9%)  |
| Hypertension (n, %) | 556 (15.4%) | 377 (13.0%) | 104 (25.0%) \* | 53 (25.9%) # | 22 (24.2%)  |
| COPD (n, %) | 27 (0.7%) | 20 (0.7%) | 2 (0.5%) | 2 (1.0%)  | 3 (3.3%) |
| Hyperuricemia (n, %) | 105 (2.9%) | 79 (2.7%) | 18 (4.3%)  | 5 (2.4%)  | 3 (3.3%)  |
| Cerebrovascular disorder (n, %) | 256 (7.1%) | 194 (6.7%) | 37 (8.9%) | 16 (7.8%) | 9 (9.9%)  |
| Anemia (n, %) | 918 (25.4%) | 720 (24.8%) | 115 (27.6%) | 60 (29.3%) | 23 (25.3%) |
| Peripheral arterial disease (n, %) | 24 (0.7%) | 18 (0.6%) | 4 (1.0%) | 0 | 2 (2.2%) |
| Preoperative medication |  |  |  |  |  |
| Vasoactive agents (n, %) | 196 (5.4%) | 155 (5.3%) | 22 (5.3%) | 11 (5.4%)  | 8 (8.8%) |
| Diuretics (n, %) | 3,201 (88.5%) | 2,572(88.5%) | 366 (88.0%) | 186 (90.7%)  | 77 (84.6%)  |
| RASIs (n, %) |  871 (24.1%) | 624 (21.5%) |  128 (30.8%) \*  |  83 (40.5%) # | 36 (39.6%) |
| Dose of contrast agent (ml) | 39 ± 14 | 39 ± 14 | 40 ±14 | 41 ± 15 # | 44 ± 21  |
| Treated valve(s) |  |  |  |  |  |
| Isolated MV (n, %) | 520 (14.4%) | 421 (14.5%) | 49 (11.8%) | 36 (17.6%) | 14 (15.4%) |
| Isolated AV (n, %) | 508 (14.0%) | 390 (13.4%) | 58 (13.9%) |  44 (21.5%) # | 16 (17.6%) |
| Isolated RHV (n, %) | 80 (2.2%) | 64 (2.1%) | 9 (2.2%) | 5 (2.4%) | 2 (2.2%) |
| Two valves (n, %) | 1,829 (50.6%) | 1,481 (51.0%) | 212 (51.0%) | 91 (44.4%) | 45 (49.5%) |
| Three valves (n, %) | 681 (18.8%) | 550 (18.9%) | 88 (21.2%) |  29 (14.1%) # | 14 (15.4%) |
| Type of treated valve |  |  |  |  |  |
| Any MV (n, %) | 3,001 (82.9%) | 2,430 (83.6%) | 345 (82.9%) | 153 (74.6%) # | 73 (80.2%) |
| Any AV (n, %) | 1,426 (39.4%) | 1,134 (39.0%) | 170 (40.9%) | 86 (42.0%) | 36 (39.6%) |
| Any RHV (n, %) | 2,382 (65.8%) | 1,923 (66.2%) | 289 (69.5%) | 115 (56.1%) # | 55 (60.4%) |

\*P < 0.05 compared with the control group using the partitioning of chi-square method; #P < 0.05 non-CAD (controls and pre-CAD) group vs CAD (mod-CAD and sig-CAD) group; &P < 0.05 compared with the mod-CAD group using the partitioning of chi-square method.

eGFR: estimated glomerular filtration rate; NYHA: New York Heart Association; LVEF: left ventricular ejection fraction; COPD: chronic obstructive pulmonary disease; RASI: renin-angiotensin system inhibitor; AV: aortic valve; MV: mitral valve; RHV: right heart valve.

Values are mean ± standard deviation or numbers (%) of observations.

Supplementary Table 2. Factors related to advanced acute kidney injury in the univariate analyses.

|  |  |  |  |
| --- | --- | --- | --- |
| Related factors | OR | 95% CI | P-value |
| **Male** | 0.957 | 0.806–1.137 | 0.618 |
| **Age (years)** |  |  | < 0.001 |
|  40–49 | Reference |  |  |
|  50–59  | 0.778 | 0.491–1.231 | 0.283 |
|  60 - 69 | 1.257 | 0.796–1.987 | 0.326 |
|  ≥ 70 | 1.611 | 0.954–2.721 | 0.074 |
| **eGFR (ml/min/1.73 m2)** |  |  | < 0.001 |
|  ≥ 60 | Reference |  |  |
|  45–59 | 2.355 | 1.849–3.000 | < 0.001 |
|  15–44 | 5.568 | 3.863–8.026 | < 0.001 |
| **CPB time (min)** |  |  | < 0.001 |
|  < 90  | Reference |  |  |
|  90–119 | 0.891 | 0.688–1.153 | 0.379 |
|  120–159 | 1.336 | 1.050–1.701 | 0.019 |
|  ≥ 160  | 1.992 | 1.599–2.482 | < 0.001 |
| **NYHA class III–IV** | 1.743 | 1.459–2.082 | < 0.001 |
| **LVEF** | 0.989 | 0.980–0.998 | 0.013 |
| **Comorbidities** |  |  |  |
| Pulmonary hypertension | 1.241 | 1.040–1.479 | 0.016 |
| Hypertension | 1.440 | 1.154–1.796 | 0.001 |
| Diabetes | 1.538 | 1.132–2.089 | 0.006 |
| Hyperuricemia | 1.113 | 0.679–1.826 | 0.671 |
| Cerebrovascular disorder | 1.871 | 1.401–2.499 | < 0.001 |
| Anemia | 1.655 | 1.375–1.991 | < 0.001 |
| Peripheral arterial disease | 3.406 | 1.506–7.704 | 0.003 |
| COPD | 1.351 | 0.543–3.360 | 0.518 |
| **Preoperative medication** |  |  |  |
| Vasoactive agents | 2.686 | 1.975–3.654 | < 0.001 |
| Diuretics | 1.450 | 1.077–1.953 | 0.014 |
| RASIs | 1.269 | 1.046–1.540 | 0.016 |
| **Dose of contrast agent (ml)** |  |  | 0.891 |
|  0–29 | Reference |  |  |
|  30–49 | 1.025 | 0.712–1.476 | 0.894 |
|  ≥ 50 | 0.981 | 0.677–1.422 | 0.920 |
| **Treated valve(s)** |  |  | < 0.001 |
|  Isolated MV | Reference |  |  |
|  Isolated AV | 0.993 | 0.690–1.427 | 0.968 |
|  Isolated RHV | 1.410 | 0.751–2.649 | 0.286 |
|  Two valves | 1.431 | 1.080–1.897 | 0.013 |
|  Three valves | 2.058 | 1.509–2.807 | < 0.001 |
| **Coronary lesions** |   |   |  0.001 |
|  No coronary lesion | Reference |  |  |
|  Pre-CAD | 1.295 | 1.000–1.677 | 0.050 |
|  Mod-CAD | 1.565 | 1.116–2.194 | 0.009 |
|  Sig-CAD | 2.047 | 1.285–3.260 | 0.003 |

CPB: cardiopulmonary bypass; eGFR: estimated glomerular filtration rate; NYHA: New York Heart Association; LVEF: left ventricular ejection fraction; COPD: chronic obstructive pulmonary disease; RASI: renin-angiotensin system inhibitor; RHV: right heart valve; MV: mitral valve; AV: aortic valve; CAD: coronary artery disease.

Supplementary Table 3. Factors related to a longer ICU stay in the univariate analyses.

|  |  |  |  |
| --- | --- | --- | --- |
| Risk factors | OR | 95% CI | P-value |
| **Male** | 1.259 | 1.083–1.463 | 0.003 |
| **Age (years)** |  |  | < 0.001 |
|  40–49 | Reference |  |  |
|  50–59  | 0.949 | 0.617–1.460 | 0.811 |
|  60 - 69 | 1.729 | 1.126–2.655 | 0.012 |
|  ≥ 70 | 2.675 | 1.648–4.344 | < 0.001 |
| **eGFR (ml/min/1.73 m2)** |  |  | < 0.001 |
|  ≥ 60 | Reference |  |  |
|  45–59 | 2.039 | 1.630–2.550 | < 0.001 |
|  15–44 | 3.921 | 2.728–5.635 | < 0.001 |
| **CPB time (min)** |  |  | < 0.001 |
|  < 90  | Reference |  |  |
|  90–119 | 0.865 | 0.698–1.073 | 0.187 |
|  120–159 | 0.927 | 0.747–1.151 | 0.493 |
|  ≥ 160  | 1.667 | 1.374–2.023 | < 0.001 |
| **NYHA class III–IV** | 1.692 | 1.444–1.982 | < 0.001 |
| **LVEF** | 0.977 | 0.970–0.985 | < 0.001 |
| **Comorbidities** |  |  |  |
| Pulmonary hypertension | 1.130 | 0.967–1.321 | 0.123 |
| Hypertension | 1.459 | 1.198–1.778 | < 0.001 |
| Diabetes | 1.229 | 0.923–1.637 | 0.159 |
| Hyperuricemia | 1.200 | 0.781–1.846 | 0.405 |
| Cerebrovascular disorder | 1.419 | 1.078–1.868 | 0.013 |
| Anemia | 1.308 | 1.106–1.547 | 0.002 |
| Peripheral arterial disease | 1.497 | 0.638–3.509 | 0.354 |
| COPD | 2.797 | 1.310–5.973 | 0.008 |
| **Preoperative medication** |  |  |  |
| Vasoactive agents | 1.673 | 1.235–2.265 | 0.001 |
| Diuretics | 1.330 | 1.036–1.708 | 0.025 |
| RASIs | 1.249 | 1.052–1.483 | 0.011 |
| **Dose of contrast agent (ml)** |  |  | 0.342 |
|  0–29 | Reference |  |  |
|  30–49 | 1.284 | 0.916–1.799 | 0.147 |
|  ≥ 50 | 1.275 | 0.905–1.796 | 0.165 |
| **Treated valve(s)** |  |  | < 0.001 |
|  Isolated MV | Reference |  |  |
|  Isolated AV | 1.625 | 1.215–2.174 | 0.001 |
|  Isolated RHV | 2.766 | 1.682–4.547 | < 0.001 |
|  Two valves | 1.244 | 0.976–1.586 | 0.078 |
|  Three valves | 1.850 | 1.410–2.426 | < 0.001 |
| **Coronary lesions** |   |   | 0.011 |
|  No coronary lesion | Reference |  |  |
|  Pre-CAD | 1.240 | 0.985–1.561 | 0.067 |
|  Mod-CAD | 1.406 | 1.033–1.915 | 0.030 |
|  Sig-CAD | 1.637 | 1.053–2.547 | 0.029 |

CPB: cardiopulmonary bypass; eGFR: estimated glomerular filtration rate; NYHA: New York Heart Association; LVEF: left ventricular ejection fraction; COPD: chronic obstructive pulmonary disease; RASI: renin-angiotensin system inhibitor; RHV: right heart valve; MV: mitral valve; AV: aortic valve; CAD: coronary artery disease.

Supplementary Table 4. Factors related to in-hospital mortality in the univariate analyses.

|  |  |  |  |
| --- | --- | --- | --- |
| Risk factors | OR | 95% CI | P-value |
| **Male** | 0.462 | 0.264–0.806 | 0.007 |
| **Age (years)** |  |  | < 0.001 |
|  40–49 | Reference |  |  |
|  50–59  | 0.950 | 0.123–7.359 | 0.961 |
|  60–69 | 3.020 | 0.409–22.288 | 0.279 |
|  ≥ 70 | 8.797 | 1.150–67.323 | 0.036 |
| **eGFR (ml/min/1.73 m2)** |  |  | < 0.001 |
|  ≥ 60 | Reference |  |  |
|  45–59 | 1.643 | 0.763–3.536 | 0.204 |
|  15–44 | 7.476 | 3.738–14.953 | < 0.001 |
| **CPB time (min)**  |  |  | 0.078 |
|  < 90  | Reference |  |  |
|  90–119 | 0.380 | 0.144–1.003 | 0.051 |
|  120–159 | 0.984 | 0.487–1.989 | 0.964 |
|  ≥ 160 | 1.411 | 0.764–2.608 | 0.272 |
| **NYHA class III–IV** | 1.299 | 0.759–2.225 | 0.340 |
| **LVEF** | 0.993 | 0.962–1.025 | 0.652 |
| **Comorbidities** |  |  |  |
| Pulmonary hypertension | 1.333 | 0.792–2.245 | 0.279 |
| Hypertension | 2.080 | 1.163–3.720 | 0.014 |
| Diabetes | 1.275 | 0.505–3.216 | 0.607 |
| Hyperuricemia | 0.573 | 0.079–4.175 | 0.582 |
| Cerebrovascular disorder | 3.857 | 2.055–7.236 | < 0.001 |
| Anemia | 1.297 | 0.741–2.269 | 0.362 |
| Peripheral arterial disease\* | - | - | - |
| COPD\* | - | - | - |
| **Preoperative medication** |  |  |  |
| Vasoactive agents | 1.275 | 0.457–3.556 | 0.642 |
| Diuretics | 0.967 | 0.436–2.143 | 0.935 |
| RASIs | 1.177 | 0.659–2.100 | 0.582 |
| **Dose of contrast agent (ml)** |  |  | 0.448 |
|  0 - 29 | Reference |  |  |
|  30 - 49 | 0.569 | 0.234–1.381 | 0.213 |
|  ≥ 50 | 0.587 | 0.236–1.457 | 0.251 |
| **Treated valve(s)** |  |  | 0.066 |
|  Isolated MV | Reference |  |  |
|  Isolated RHV | 2.757 | 0.727–10.453 | 0.136 |
|  Isolated AV | 9.070 | 1.991–41.313 | 0.004 |
|  Dual valves | 2.874 | 0.874–9.454 | 0.082 |
|  Triple valves | 3.617 | 1.034–12.653 | 0.044 |
| **Coronary lesions** |   |   | 0.008 |
|  No coronary lesion | Reference |  |  |
|  Pre-CAD | 1.140 | 0.509–2.550 | 0.751 |
|  Mod-CAD | 0.989 | 0.304–3.215 | 0.985 |
|  Sig-CAD | 4.700 | 1.948–11.342 | 0.001 |

CPB: cardiopulmonary bypass; eGFR: estimated glomerular filtration rate; NYHA: New York Heart Association; LVEF: left ventricular ejection fraction; COPD: chronic obstructive pulmonary disease; RASI: renin-angiotensin system inhibitor; RHV: right heart valve; MV: mitral valve; AV: aortic valve; CAD: coronary artery disease.

\*No in-hospital deaths in patients with peripheral arterial disease.