

Table S3 The mortalities of each grade of published scores in their original populations and our cohort

| Risk models | Variables used for classification | Grade of score | Mortality | |
|---|--|-------------------|-----------|------------|
| | | | Reported | Our cohort |
| Augoustides <i>et al.</i> (Penn classification) | Localized ischemia and generalized ischemia | Penn class Aa | 3% | 6% |
| | | Penn class Ab | 26% | 11% |
| | | Penn class Ac | 18% | 24% |
| | | Penn class Abc | 40% | 63% |
| Ghoreishi <i>et al.</i> | Lactate, creatinine, liver malperfusion | Risk score <7 | 4% | 0% |
| | | Risk score 7–20 | 14% | 10% |
| | | Risk score >20 | 37% | 21% |
| Mejare-Berggren <i>et al.</i> (Leipzig-Halifax Scorecard) | Critical preoperative state, Penn class non-Aa, coronary artery disease | Risk score 0–5 | 12% | 6% |
| | | Risk score 10–15 | 23% | 16% |
| | | Risk score 20–25 | 43% | 56% |
| Leontyev <i>et al.</i> | Age <50, age 50–70, age >70, critical preoperative state, coronary malperfusion syndrome, extremity malperfusion syndrome, visceral malperfusion syndrome, coronary artery disease | Risk score 0–3 | 7% | 6% |
| | | Risk score 4–6 | 13% | 8% |
| | | Risk score 7–10 | 39% | 18% |
| | | Risk score >10 | 75% | 64% |
| Santini <i>et al.</i> | Older age, cardiac tamponade, hypotension, acute myocardial ischemia, mesenteric ischemia, acute renal failure, neurologic injury | Risk score 10–14 | <15% | 7% |
| | | Risk score 15–27 | 15–30% | 18% |
| | | Risk score 28–36 | 30–45% | 9% |
| | | Risk score 37–115 | >45% | 52% |

Table S4 Comparison of pre-operative variables among patients with different clinical outcomes in derivation population

| Variables | Derivation population (n=159) | Died before surgery (n=10) | Operative patients (n=149) | Survived (n=128) | Died after surgery (n=21) | P value |
|---------------------------------------|-------------------------------|----------------------------|----------------------------|------------------|---------------------------|---------|
| Characteristics and medical history | | | | | | |
| Age, years | 54 [45–64] | 60 [54–65] | 53 [44–64] | 52 [44–64] | 54 [46–63] | 0.680 |
| Male gender | 129 (81%) | 7 (70%) | 122 (82%) | 102 (80%) | 20 (95%) | 0.125 |
| Hypertension | 106 (67%) | 9 (90%) | 97 (65%) | 82 (64%) | 15 (71%) | 0.625 |
| Coronary artery disease | 16 (10%) | 0 (0%) | 16 (11%) | 13 (10%) | 3 (14%) | 0.702 |
| Remote myocardial infarction | 6 (4%) | 0 (0%) | 6 (4%) | 3 (2%) | 3 (14%) | 0.037 |
| History of stroke | 10 (6%) | 1 (10%) | 9 (6%) | 8 (6%) | 1 (5%) | 1.000 |
| Iatrogenic dissection | 6 (4%) | 0 (0%) | 6 (4%) | 5 (4%) | 1 (5%) | 1.000 |
| Onset symptoms | | | | | | |
| Time of onset, hours | 19 [10–41] | 12 [10–29] | 19 [10–41] | 19 [10–41] | 17 [10–31] | 0.677 |
| Chest or back pain | 150 (94%) | 10 (100%) | 140 (94%) | 120 (94%) | 20 (95%) | 1.000 |
| Abdominal pain | 21 (13%) | 1 (10%) | 20 (13%) | 15 (12%) | 5 (24%) | 0.163 |
| Neurological abnormalities | 31 (19%) | 2 (20%) | 29 (19%) | 23 (18%) | 6 (29%) | 0.248 |
| Dyspnea | 17 (11%) | 1 (10%) | 16 (11%) | 13 (10%) | 3 (14%) | 0.702 |
| Nausea and vomiting | 14 (9%) | 0 (0%) | 14 (9%) | 12 (9%) | 2 (10%) | 1.000 |
| Painless AD | 8 (5%) | 0 (0%) | 8 (5%) | 7 (5%) | 1 (5%) | 1.000 |
| Involvement of vessels | | | | | | |
| Supra-aortic arteries involved | 110 (69%) | 8 (80%) | 102 (68%) | 84 (66%) | 18 (86%) | 0.079 |
| Mesenteric arteries involved | 31 (19%) | 4 (40%) | 27 (18%) | 20 (16%) | 7 (33%) | 0.066 |
| Renal arteries involved | 65 (41%) | 5 (50%) | 60 (40%) | 51 (40%) | 9 (43%) | 0.814 |
| Iliac arteries involved | 44 (28%) | 7 (70%) | 37 (25%) | 27 (21%) | 10 (48%) | 0.014 |
| Circulation variables | | | | | | |
| SBP, mmHg | 152 [134–168] | 133 [103–145] | 154 [136–169] | 155 [136–169] | 151 [124–165] | 0.365 |
| DBP, mmHg | 88 [71–96] | 81 [50–93] | 88 [73–96] | 88 [73–97] | 85 [65–91] | 0.195 |
| MAP, mmHg | 108 [95–118] | 95 [70–107] | 108 [95–118] | 109 [96–120] | 108 [76–116] | 0.336 |
| Difference in SBP, mmHg | 10 [5–18] | 7 [6–13] | 10 [4–18] | 10 [4–17] | 15 [7–20] | 0.155 |
| Difference in PP, mmHg | 10 [5–18] | 4 [1–20] | 11 [5–17] | 11 [6–17] | 9 [3–13] | 0.142 |
| Pulse deficit | 8 (5%) | 3 (30%) | 5 (3%) | 3 (2%) | 2 (10%) | 0.146 |
| Lactate, mmol/L | 1.6 [1.2–2.6] | 2.9 [2.1–6.3] | 1.5 [1.1–2.3] | 1.4 [1.1–2.2] | 1.8 [1.2–4.3] | 0.050 |
| Hyperlactacidemia | 51 (32%) | 7 (70%) | 44 (30%) | 35 (27%) | 9 (43%) | 0.196 |
| Shock | 1 (1%) | 1 (10%) | 0 (0%) | 0 (0%) | 0 (0%) | 1.000 |
| Cardiac and coronary artery variables | | | | | | |
| LVEF, % | 62 [60–66] | 54 [37–59] | 62 [60–66] | 62 [60–66] | 63 [60–66] | 0.983 |
| LVEF <50% | 10 (6%) | 4 (40%) | 6 (4%) | 4 (3%) | 2 (10%) | 0.200 |
| Aortic root diameter, mm | 40 [37–45] | 48 [42–52] | 40 [37–45] | 40 [37–45] | 42 [39–44] | 0.121 |
| Massive pericardial effusion | 12 (8%) | 3 (30%) | 9 (6%) | 6 (5%) | 2 (14%) | 0.116 |
| cTnT, ng/mL | 0.02 [0.01–0.07] | 0.29 [0.16–1.09] | 0.02 [0.01–0.05] | 0.02 [0.01–0.05] | 0.04 [0.02–0.93] | 0.012 |
| Abnormal ECG | 39 (25%) | 8 (80%) | 31 (21%) | 21 (16%) | 10 (48%) | 0.003 |
| Acute myocardial ischemia | 29 (18%) | 8 (80%) | 21 (14%) | 12 (9%) | 9 (43%) | <0.001 |
| Renal function | | | | | | |
| Creatinine mg/dL | 1.01 [0.80–1.30] | 1.68 [1.46–1.97] | 1.01 [0.79–1.27] | 0.95 [0.79–1.16] | 1.44 [1.22–1.89] | <0.001 |
| UO, ml/kg/h | 0.9 [0.7–1.3] | 0.8 [0.5–1.0] | 0.9 [0.7–1.3] | 1.0 [0.7–1.3] | 0.9 [0.4–1.1] | 0.144 |
| Oliguria | 15 (9%) | 3 (30%) | 12 (8%) | 6 (5%) | 6 (29%) | 0.002 |
| Acute kidney injury | 55 (35%) | 8 (80%) | 47 (32%) | 33 (26%) | 14 (67%) | <0.001 |
| Acute renal failure | 11 (7%) | 4 (40%) | 7 (5%) | 4 (3%) | 3 (14%) | 0.059 |
| Liver function | | | | | | |
| ALT, U/L | 29 [19–48] | 66 [35–130] | 28 [18–46] | 26 [18–44] | 33 [23–75] | 0.038 |
| AST, U/L | 27 [18–44] | 63 [42–213] | 26 [18–39] | 25 [17–35] | 59 [29–110] | <0.001 |
| Transaminase elevation | 51 (32%) | 7 (70%) | 44 (30%) | 32 (25%) | 12 (57%) | 0.005 |
| Bilirubin, μ mol/L | 17 [12–24] | 21 [12–40] | 17 [12–24] | 17 [12–24] | 12 [9–21] | 0.133 |
| Liver malperfusion | 86 (54%) | 8 (80%) | 78 (52%) | 62 (48%) | 16 (76%) | 0.020 |
| Others | | | | | | |
| WBC, 10^9 /L | 11.8 [9.5–15.3] | 12.7 [11.0–15.1] | 11.8 [9.2–15.3] | 11.6 [9.0–15.1] | 12.9 [10.7–18.6] | 0.069 |
| PLT, 10^9 /L | 165 [127–202] | 114 [95–145] | 166 [129–205] | 166 [129–201] | 179 [124–210] | 0.787 |
| Pre-operative CPR | 1 (1%) | 0 (0%) | 1 (1%) | 1 (1%) | 0 (0%) | 1.000 |

Data are presented as median [interquartile range] or number (%). Difference in SBP or PP means the difference between measurements taken from both arms. AD, aortic dissection; SBP, systolic blood pressure; DBP, diastolic blood pressure; MAP, mean arterial pressure; LVEF, left ventricular ejection fraction; cTnT, cardiac troponin T; ECG, electrocardiography; UO, urinary output; ALT, alanine aminotransferase; AST, aspartate aminotransferase; WBC, white blood cell; PLT, platelet; CPR, cardiopulmonary resuscitation.

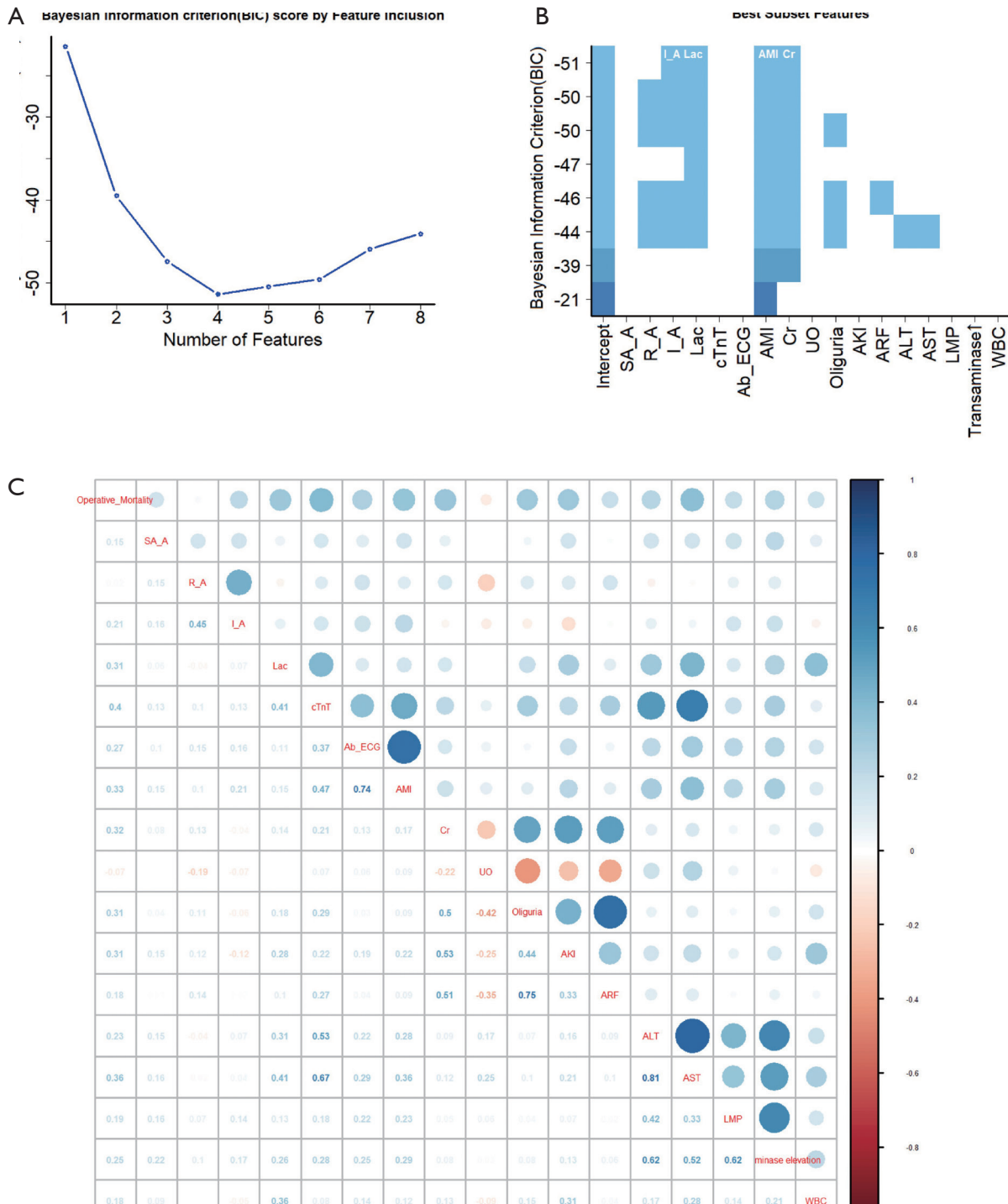


Figure S1 Collinearity diagnosis and variables selection. (A) Correlation matrix among post-operative mortality and candidate variables. Collinearities existed among same kinds of variables, such as renal function, liver function and cardiac parameters. In addition, the cTnT had strong correlation with aminotransferases. (B) Best subset selection based on BIC also suggested a subset comprising of 4 variables. (C) The best subset with the highest BIC was consisted of lactate, creatinine, acute myocardial ischemia and involvement of Iliac arteries.

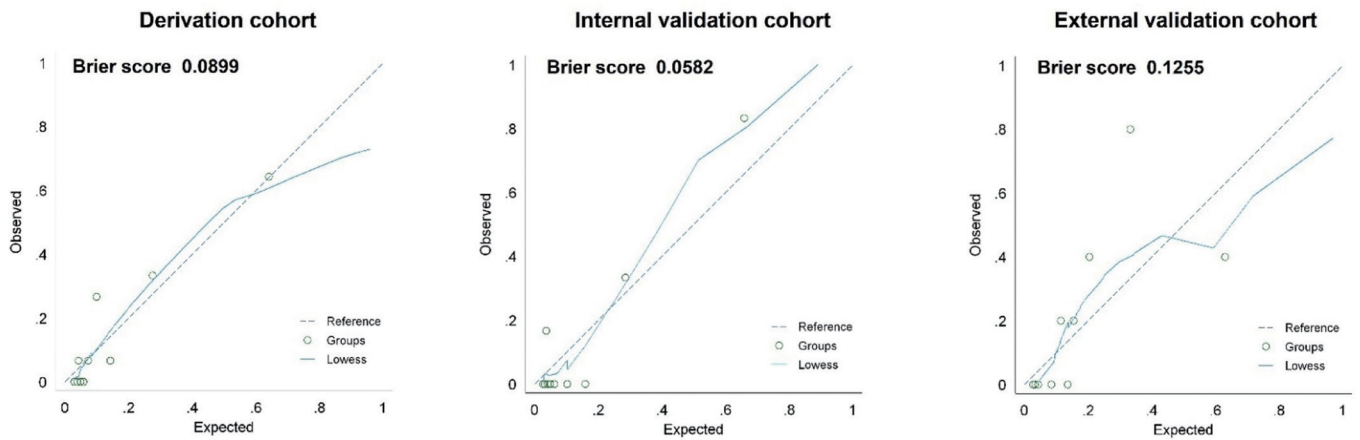


Figure S2 Calibration plots and Brier score for post-operative mortalities among derivation, internal validation and external validation cohorts.

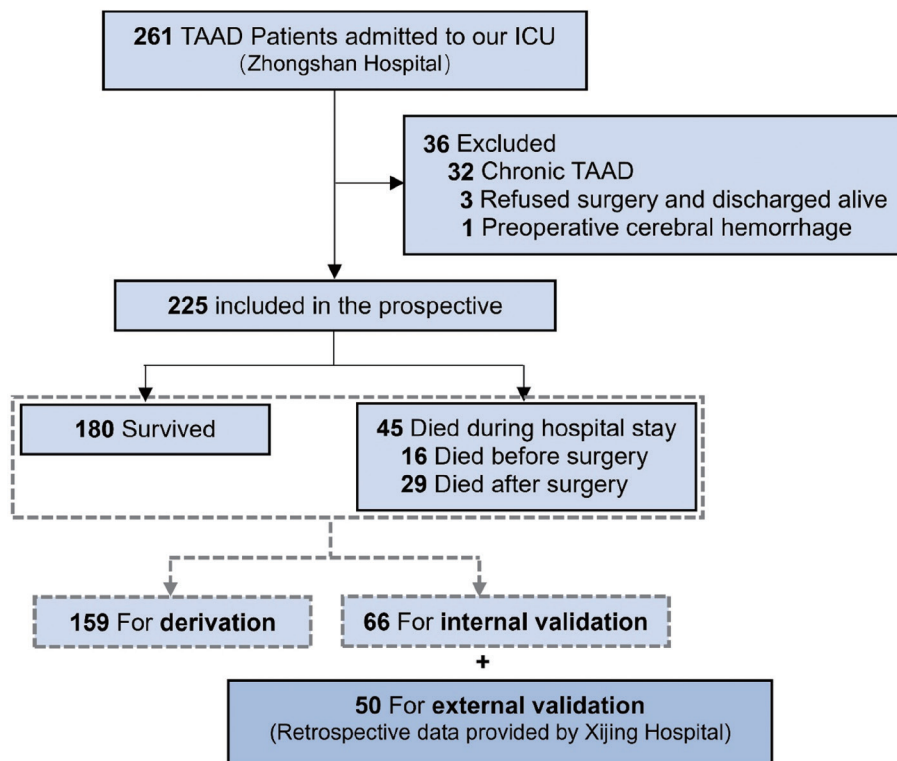


Figure S3 Study flowchart. The original prospective cohort was divided into two parts in a ratio of 7:3 for derivation and internal validation. A 50-patient retrospective cohort was used for external validation.