

Table S1 Comparison of general baseline data

| Characteristics | NDSL (n=2,448) | DSL (n=63) | P value | Training cohort (n=1,759) | Test cohort (n=752) | P value |
|---|----------------|------------|---------|---------------------------|---------------------|---------|
| Age (years) | 60.7±10.6 | 62.1±8.7 | 0.199 | 60.7±10.4 | 60.8±10.7 | 0.914 |
| Sex | | | 0.391 | | | 0.066 |
| Male | 1,785 | 49 | | 1,266 | 568 | |
| Female | 663 | 14 | | 493 | 184 | |
| BMI (kg/m ²) | 22.0±4.4 | 22.6±2.9 | 0.236 | 22.4±3.1 | 22.5±2.9 | 0.463 |
| Neoadjuvant chemotherapy | | | 0.289 | | | 0.789 |
| No | 2,444 | 63 | | 1,704 | 730 | |
| Yes | 77 | 0 | | 55 | 22 | |
| Hypertension | | | 0.759 | | | 0.680 |
| No | 1,943 | 51 | | 1,393 | 601 | |
| Yes | 505 | 12 | | 366 | 151 | |
| Diabetes mellitus | | | | | | 0.075 |
| No | 1,943 | 51 | 0.655 | 1,626 | 710 | |
| Yes | 172 | 3 | | 133 | 42 | |
| Preoperative gastric outlet obstruction | | | 0.512 | | | 0.175 |
| No | 2,234 | 56 | | 1,613 | 677 | |
| Yes | 214 | 7 | | 146 | 75 | |
| History of upper abdominal surgery | | | 0.190 | | | 0.468 |
| No | 2,310 | 57 | | 1,662 | 705 | |
| Yes | 138 | 6 | | 97 | 47 | |

Data are presented as mean ± standard deviation or n. DSL, duodenal stump leakage; NDSL, non-duodenal stump leakage; BMI, body mass index

Table S2 Comparison of perioperative characteristics

| Characteristics | NDSL (n=2,448) | DSL (n=63) | P value | Training cohort (n=1,759) | Test cohort (n=752) | P value |
|--------------------------------|----------------|---------------|---------|---------------------------|---------------------|---------|
| Preoperative albumin (g/L) | | | <0.001 | | | 0.615 |
| ≥30 | 1,797 | 20 | | 1,278 | 539 | |
| <30 | 651 | 43 | | 481 | 213 | |
| Preoperative hemoglobin (g/L) | | | <0.001 | | | 0.784 |
| ≥90 | 1,856 | 23 | | 1,319 | 560 | |
| <90 | 592 | 40 | | 440 | 192 | |
| ASA-PS | | | 0.001 | | | 0.181 |
| 1–2 | 867 | 10 | | 629 | 248 | |
| 3–4 | 1,581 | 53 | | 1,130 | 504 | |
| Reconstruction methods | | | 0.003 | | | |
| Roux-en-Y | 1,000 | 14 | | 719 | 295 | 0.441 |
| B-II | 1,448 | 49 | | 1,040 | 457 | |
| Operation time (min) | 215 (176–256) | 260 (235–295) | <0.001 | 221.5±59.8 | 220.6±59.5 | 0.713 |
| Intraoperative blood loss (mL) | 100 (50–150) | 120 (85–180) | <0.001 | 109.1±64.4 | 110.9±66.0 | 0.516 |
| Tumor size (cm) | 3.9±2.1 | 5.1±2.6 | <0.001 | 3.9±2.0 | 3.9±2.1 | 0.868 |
| Degree of differentiation | | | 0.292 | | | 0.695 |
| High | 189 | 8 | | 141 | 56 | |
| Moderately | 661 | 14 | | 479 | 196 | |
| Poorly | 1,598 | 41 | | 1,139 | 500 | |
| T category | | | | | | 0.736 |
| T1 | 457 | 5 | 0.180 | 324 | 138 | |
| T2 | 273 | 7 | | 204 | 76 | |
| T3 | 661 | 19 | | 475 | 205 | |
| T4 | 1,057 | 32 | | 756 | 333 | |
| Total lymph nodes | 30.8±12.6 | 29.8±10.7 | 0.522 | 30.7±12.7 | 31.0±12.3 | 0.476 |
| Total positive lymph nodes | 5.9±8.4 | 8.4±8.4 | 0.022 | 5.7±8.2 | 6.0±8.5 | 0.353 |
| N category | | | 0.004 | | | 0.725 |
| N0 | 849 | 13 | | 611 | 251 | |
| N1 | 547 | 10 | | 384 | 173 | |
| N2 | 399 | 11 | | 293 | 117 | |
| N3 | 653 | 29 | | 471 | 211 | |
| 1st post-operative-day CRP | 58.4±37.5 | 61.9±36.4 | 0.459 | 57.9±36.8 | 59.8±38.9 | 0.239 |
| 4th post-operative-day CRP | 68.6±41.7 | 157.4±47.1 | <0.001 | 70.9±44.2 | 70.6±44.0 | 0.879 |
| The distal margin (cm) | 6.0 (4.6–8.0) | 3.0 (2.0–4.0) | 0.007 | 6.4±2.6 | 6.4±2.8 | 0.921 |

Data are presented as n, XXXXXXXXXXXXXXX (XXXXXXXX) or mean ± standard deviation. DSL, duodenal stump leakage; NDSL, non-duodenal stump leakage; ASA-PS, American Society of Anesthesiologists-Physical Status; CRP, C-reactive protein.

Table S3 Comparison of predictive modeling capabilities

| Characteristics | Logistic | LASSO | SVM | DT | RF | KNN |
|-----------------|----------|-------|-------|-------|-------|-------|
| Training cohort | | | | | | |
| Accuracy | 0.934 | 0.949 | 0.999 | 0.932 | 1.000 | 0.878 |
| AUC | 0.980 | 0.977 | 1.000 | 0.863 | 1.000 | 0.885 |
| Sensitivity | 0.933 | 0.911 | 1.000 | 0.756 | 1.000 | 0.833 |
| Specificity | 0.933 | 0.949 | 0.999 | 0.937 | 1.000 | 0.879 |
| PPV | 0.269 | 0.320 | 0.957 | 0.239 | 1.000 | 0.153 |
| NPV | 0.998 | 0.998 | 1.000 | 0.993 | 1.000 | 0.995 |
| Test cohort | | | | | | |
| Accuracy | 0.956 | 0.943 | 0.834 | 0.918 | 0.919 | 0.854 |
| AUC | 0.954 | 0.945 | 0.895 | 0.724 | 0.944 | 0.719 |
| Sensitivity | 0.833 | 0.872 | 0.887 | 0.500 | 0.889 | 0.556 |
| Specificity | 0.962 | 0.944 | 0.833 | 0.928 | 0.920 | 0.861 |
| PPV | 0.349 | 0.281 | 0.115 | 0.145 | 0.213 | 0.089 |
| NPV | 0.996 | 0.997 | 0.997 | 0.987 | 0.997 | 0.988 |

AUC, area under curve; PPV, positive predictive value; NPV, negative predictive value.