

**Table S1** Baseline tumor number, liver background, and preoperative locoregional therapies for the entire cohort (n=152), together with Iwate difficulty score, conversion rate, and detailed segmental distribution of liver resections among laparoscopic cases (n=36)

| Variables                            | N (%)      |
|--------------------------------------|------------|
| Tumor number (n=152)                 |            |
| 1                                    | 113 (74.3) |
| 2                                    | 24 (15.8)  |
| 3                                    | 9 (5.9)    |
| ≥4                                   | 6 (3.9)    |
| Liver background (n=152)             |            |
| NL                                   | 5 (3.3)    |
| NASH                                 | 2 (1.3)    |
| CH                                   | 101 (66.4) |
| LC                                   | 44 (28.9)  |
| Preoperative treatment (n=73)        |            |
| TACE                                 | 19 (26.0)  |
| TAE                                  | 9 (12.3)   |
| TAI                                  | 3 (4.1)    |
| HAI                                  | 1 (1.4)    |
| RFA                                  | 41 (56.2)  |
| Iwate criteria (n=36)                |            |
| Low (0–3)                            | 15 (41.7)  |
| Intermediate (4–6)                   | 15 (41.7)  |
| Advanced (7–9)                       | 4 (11.1)   |
| Expert (10–12)                       | 2 (5.6)    |
| Conversion to open (n=36)            | 0          |
| Laparoscopy segment resection (n=36) |            |
| Single segment                       | 34 (94.4)  |
| S2                                   | 5 (13.9)   |
| S3                                   | 9 (25.0)   |
| S4                                   | 4 (11.1)   |
| S5                                   | 6 (16.7)   |
| S6                                   | 1 (2.8)    |
| S7                                   | 3 (8.3)    |
| S8                                   | 6 (16.7)   |
| Multiple segments                    | 2 (5.6)    |
| S6 + S7 (posterior sectionectomy)    | 1 (2.8)    |
| S4 + S8                              | 1 (2.8)    |

**Table S2** Complication\*

| Complication                            | N (%)     | Laparoscopy | Open      |
|-----------------------------------------|-----------|-------------|-----------|
| Bile leakage                            | 12 (50%)  | 1           | 11        |
| Ascites                                 | 3 (12.5%) |             | 3         |
| Fistula                                 | 2 (8.33%) |             | 2         |
| Intraoperative duodenal injury          | 1 (4.17%) |             | 1         |
| Postoperative fever                     | 1 (4.17%) | 1           |           |
| Pleural effusion                        | 2 (8.33%) |             | 2         |
| Biloma                                  | 1 (4.17%) | 1           |           |
| Pneumonia                               | 1 (4.17%) |             | 1         |
| Pneumothorax                            | 1 (4.17%) |             | 1         |
| Postoperative liver infarction          | 1 (4.17%) |             | 1         |
| Postoperative cancer-related            | 1 (4.17%) |             | 1         |
| Atelectasis                             | 1 (4.17%) |             | 1         |
| Stump abscess (intraperitoneal abscess) | 1 (4.17%) |             | 1         |
| Clavien Dindo classification, n (%)     |           |             |           |
| I                                       | 2         | 1 (33.3)    | 1 (4.8)   |
| II                                      | 6         | 1 (33.3)    | 5 (23.8)  |
| IIIa                                    | 13        | 1 (33.3)    | 12 (57.1) |
| IIIb                                    | 3         | 0 (0)       | 3 (14.3)  |

*\*, this table presents the complication type and severity distribution for all 152 patients in the unmatched cohort. For the complication rate analysis of the matched cohort (n=72), see Table 3.*

**Table S3** Categorical ALBI, Albumin, bilirubin, and platelet levels prior to second hepatectomy, 1 month, and 3 months after second hepatectomy

|                        | Overall (N=152) | Laparoscopic surgery (n=36) | Open surgery (n=116) | P value |
|------------------------|-----------------|-----------------------------|----------------------|---------|
| Prior to SH            |                 |                             |                      |         |
| Albumin, g/dL          |                 |                             |                      | 0.742   |
| $\geq 3.5$             | 138 (90.28%)    | 32 (88.9%)                  | 106 (91.4%)          |         |
| <3.5                   | 14 (9.2%)       | 4 (11.1%)                   | 10 (8.6%)            |         |
| Total bilirubin, mg/dL |                 |                             |                      | 0.301   |
| $\leq 1.0$             | 123 (80.9%)     | 27 (75.0%)                  | 96 (82.8%)           |         |
| >1.0                   | 29 (19.1%)      | 9 (25.0%)                   | 20 (17.2%)           |         |
| Platelet counts, /mCL  |                 |                             |                      | 0.901   |
| $\geq 100,000$         | 111 (73.0%)     | 26 (72.2%)                  | 85 (73.3%)           |         |
| <100,000               | 41 (27.0%)      | 10 (27.8%)                  | 31 (26.7%)           |         |
| ALBI                   |                 |                             |                      | 0.646   |
| Grade 1                | 106 (69.7%)     | 24 (66.7%)                  | 82 (70.7%)           |         |
| Grade 2                | 46 (30.3%)      | 12 (33.3%)                  | 34 (29.3%)           |         |
| Grade 3                | –               |                             |                      |         |
| 1 month after SH       |                 |                             |                      |         |
| Albumin, g/dL          |                 |                             |                      | 0.219   |
| $\geq 3.5$ g/dL        | 115 (75.7%)     | 30 (83.3%)                  | 85 (73.3%)           |         |
| <3.5 g/dL              | 37 (24.3%)      | 6 (16.7%)                   | 31 (26.7%)           |         |
| Total bilirubin, mg/dL |                 |                             |                      | 0.364   |
| $\leq 1.0$ mg/dL       | 122 (80.3%)     | 27 (75.0%)                  | 95 (81.9%)           |         |
| >1.0 mg/dL             | 30 (19.9%)      | 9 (25.0%)                   | 21 (18.1%)           |         |
| Platelet counts, /mCL  |                 |                             |                      | 0.501   |
| $\geq 100,000$ /mCL    | 124 (81.6%)     | 28 (77.8%)                  | 96 (82.8%)           |         |
| <100,000/mCL           | 28 (18.4%)      | 8 (22.2%)                   | 20 (17.2%)           |         |
| ALBI                   |                 |                             |                      | 0.190   |
| Grade 1                | 70 (46.1%)      | 20 (55.6%)                  | 50 (43.1%)           |         |
| Grade 2                | 81 (53.3%)      | 16 (44.4%)                  | 66 (56.9%)           |         |
| Grade 3                | 1 (0.7%)        |                             |                      |         |
| 3 months after SH      |                 |                             |                      |         |
| Albumin, g/dL          |                 |                             |                      | 0.162   |
| $\geq 3.5$ g/dL        | 132 (86.8%)     | 34 (94.4%)                  | 98 (84.5%)           |         |
| <3.5 g/dL              | 20 (13.2%)      | 2 (5.6%)                    | 18 (15.5%)           |         |
| Total bilirubin, mg/dL |                 |                             |                      | 0.896   |
| $\leq 1.0$ mg/dL       | 117 (77.0%)     | 28 (77.8%)                  | 89 (76.7%)           |         |
| >1.0 mg/dL             | 35 (23.0%)      | 8 (22.2%)                   | 27 (23.3%)           |         |
| Platelet counts, /mCL  |                 |                             |                      | 0.734   |
| $\geq 100,000$ /mCL    | 115 (75.7%)     | 28 (77.8%)                  | 87 (75.0%)           |         |

**Table S3** (continued)

|              | Overall (N=152) | Laparoscopic surgery (n=36) | Open surgery (n=116) | P value |
|--------------|-----------------|-----------------------------|----------------------|---------|
| <100,000/mcL | 37 (24.3%)      | 8 (22.2%)                   | 29 (25.0%)           | 0.083   |
| ALBI         |                 |                             |                      |         |
| Grade 1      | 100 (65.8%)     | 28 (77.8%)                  | 72 (62.1%)           |         |
| Grade 2      | 51 (33.6%)      | 8 (22.2%)                   | 44 (37.9%)           |         |
| Grade 3      | 1 (0.7%)        |                             |                      |         |

**Table S4** Five-year mortality rate after second hepatectomy

|                          |         | 1-year mortality | 3-year mortality | 5-year mortality | Overall mortality |
|--------------------------|---------|------------------|------------------|------------------|-------------------|
| All subjects (N=152)     | n       | 14               | 47               | 68               | 86                |
|                          | At risk | 146              | 137              | 130              | 152               |
|                          | %       | 9.6%             | 34.3%            | 52.3%            | 56.6%             |
| Open group (N=116)       | n       | 10               | 41               | 59               | 77                |
|                          | At risk | 116              | 116              | 114              | 116               |
|                          | %       | 8.6%             | 35.3%            | 51.8%            | 66.4%             |
| Laparoscopy group (N=36) | n       | 4                | 6                | 9                | 9                 |
|                          | At risk | 30               | 21               | 16               | 36                |
|                          | %       | 13.3%            | 28.6%            | 56.3%            | 25.0%             |

**Table S5** Five-year recurrence rate after second hepatectomy

|                          |         | 1-year recurrence | 3-year recurrence | 5-year recurrence |
|--------------------------|---------|-------------------|-------------------|-------------------|
| All subjects (N=152)     | n       | 40                | 77                | 92                |
|                          | At risk | 139               | 128               | 121               |
|                          | %       | 28.8%             | 60.2%             | 81.8%             |
| Open group (n=116)       | n       | 37                | 67                | 81                |
|                          | At risk | 112               | 109               | 106               |
|                          | %       | 33.0%             | 61.5%             | 76.4%             |
| Laparoscopy group (N=36) | n       | 3                 | 10                | 11                |
|                          | At risk | 27                | 19                | 15                |
|                          | %       | 11.1%             | 52.6%             | 73.3%             |