**Supplementary Table 1.** Univariate and multivariate analysis of CSS of the whole cohort prior to match.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Characteristics | Univariable |  |  | Multivariable |  |  |
|  | **Hazard ratio** | **95.0% CI** | ***p***  | **Hazard ratio** | **95.0% CI** | ***p***  |
| Age  |  |  |  |  |  |  |
| Age≤50 | Reference |  |  | Reference |  |  |
| Age 50-70 | 1.000 | 0.869-1.151 | 0.997 | 1.089 | 0.942-1.259 | 0.250 |
| Age >70 | 1.972 | 1.696-2.292 | <0.001 | 2.199 | 1.871-2.585 | <0.001 |
| Sex  |  |  |  |  |  |  |
| Male | Reference |  |  | Reference |  |  |
| Female | 0.657 | 0.594-0.728 | <0.001 | 0.643 | 0.577-0.716 | <0.001 |
| Race |  |  |  |  |  |  |
| White  | Reference |  |  | Reference |  |  |
| Black | 1.354 | 1.172-1.563 | <0.001 | 1.242 | 1.069-1.444 | 0.005 |
| Other | 1.511 | 1.177-1.939 | 0.001 | 1.312 | 1.021-1.687 | 0.034 |
| Unknown | 0.312 | 0.117-0.832 | 0.020 | 0.267 | 0.100-0.715 | 0.009 |
| Marital status  |  |  |  |  |  |  |
| Married | Reference |  |  | Reference |  |  |
| Unmarried | 1.208 | 1.081-1.349 | 0.001 | 1.152 | 1.020-1.301 | 0.023 |
| Unknown | 0.927 | 0.751-1.145 | 0.481 | 0.784 | 0.630-0.977 | 0.030 |
| Grade |  |  |  |  |  |  |
| I-II | Reference |  |  | Reference |  |  |
| III-IV | 1.203 | 1.068-1.355 | 0.002 | 1.137 | 1.005-1.285 | 0.041 |
| Unknown | 0.928 | 0.818-1.053 | 0.247 | 0.882 | 0.776-1.002 | 0.054 |
| Primary site |  |  |  |  |  |  |
| Anus | Reference |  |  |  |  |  |
| Anal canal | 0.869 | 0.775-0.975 | 0.016 | 0.901 | 0.802-1.012 | 0.078 |
| Cloacogenic  | 1.108 | 0.674-1.821 | 0.686 | 0.868 | 0.526-1.432 | 0.579 |
| Overlapping | 1.335 | 1.163-1.533 | <0.001 | 1.132 | 0.984-1.303 | 0.083 |
| T |  |  |  |  |  |  |
| T1-2 | Reference |  |  | Reference |  |  |
| T3-4 | 2.919 | 2.590-3.289 | <0.001 | 2.182 | 1.923-2.477 | <0.001 |
| Unknown | 2.289 | 2.014-2.600 | <0.001 | 1.675 | 1.458-1.924 | <0.001 |
| N |  |  |  |  |  |  |
| 0 | Reference |  |  | Reference |  |  |
| 1 | 2.211 | 1.989-2.459 | <0.001 | 1.703 | 1.509-1.920 | <0.001 |
| Unknown | 2.317 | 1.918-2.798 | <0.001 | 1.246 | 0.968-1.603 | 0.088 |
| M |  |  |  |  |  |  |
| 0 | Reference |  |  | Reference |  |  |
| 1 | 6.074 | 5.372-6.867 | <0.001 | .2.481 | 2.034-3.026 | <0.001 |
| Unknown | 2.003 | 1.576-2.547 | <0.001 | 0.615 | 0.316-1.197 | 0.153 |
| Bone metastasis |  |  |  |  |  |  |
| No | Reference |  |  | Reference |  |  |
| Yes | 6.229 | 4.655-8.335 | <0.001 | 1.685 | 1.227-2.313 | 0.001 |
| Unknown | 1.949 | 1.542-2.462 | <0.001 | 1.563 | 0.763-3.200 | 0.222 |
| Brain metastasis |  |  |  |  |  |  |
| No | Reference |  |  | Reference |  |  |
| Yes | 13.301 | 4.976-35.553 | <0.001 | 2.552 | 0.931-6.996 | 0.069 |
| Unknown | 1.818 | 1.432-2.307 | <0.001 | 0.366 | 0.152-0.878 | 0.024 |
| Liver metastasis |  |  |  |  |  |  |
| No | Reference |  |  | Reference |  |  |
| Yes | 7.352 | 6.256-8.640 | <0.001 | 2.092 | 1.675-2.613 | <0.001 |
| Unknown | 2.085 | 1.650-2.637 | <0.001 | 2.462 | 1.165-5.202 | 0.018 |
| Lung metastasis |  |  |  |  |  |  |
| No | Reference |  |  | Reference |  |  |
| Yes | 7.764 | 6.342-9.503 | <0.001 | 1.536 | 1.210-1.950 | <0.001 |
| Unknown | 2.067 | 1.645-2.597 | <0.001 | 1.261 | 0.636-2.501 | 0.507 |
| Surgery  |  |  |  |  |  |  |
| No  | Reference |  |  | Reference |  |  |
| Yes | 0.574 | 0.514-0.640 | <0.001 | 0.607 | 0.538-0.685 | <0.001 |
| Radiation |  |  |  |  |  |  |
| No/Unknown | Reference |  |  | Reference |  |  |
| Yes | 0.579 | 0.518-0.648 | <0.001 | 0.834 | 0.712-0.977 | 0.025 |
| Chemotherapy  |  |  |  |  |  |  |
| No/Unknown | Reference |  |  | Reference |  |  |
| Yes  | 0.624 | 0.559-0.697 | <0.001 | 0.545 | 0.466-0.636 | <0.001 |

**Abbreviations:** **AA** anal canal adenocarcinomas; **ASCC** squamous cell carcinoma of the anal; **NOS** No other specific; **T** Tumor; **N** Lymph node; **M** Metastasis; **HR**: Hazard ratio; **CI**: Confidence interval. **Grade I**=Well differentiated; **II**= Moderately differentiated; **III**= Poorly differentiated; **IV**=Undifferentiated

**Note:** Other include American Indian/Alaskan native, and Asian/Pacific Islander, and others unspecified.