Supplementary Table 1 Univariate Cox regression analysis for overall survival

Variable	HR	95% CI	*P* value
Age	1.002	0.986-1.017	0.838
Sex			
Male (vs Female)	0.868	0.615-1.224	0.419
BMI	0.991	0.953-1.030	0.649
ECOG performance status score			
2 (vs 0-1)	1.407	0.863-2.295	0.171
NRS 2002 score			
≥3 (vs <3)	0.810	0.559-1.173	0.264
cTNM stage			
III (vs II)	4.509	2.574-7.899	**<0.001**
IV (vs II)	6.228	3.454-11.231	**<0.001**
Neoadjuvant regimen			
PAC (vs PC)	0.460	0.316-0.670	**<0.001**
Preoperative therapy cycles	0.939	0.831-1.062	0.317
Treatment-related adverse events			
Yes (vs No)	1.043	0.735-1.479	0.814
Tumor location			
Middle third (vs Upper third)	1.301	0.915-1.850	0.142
Lower third (vs Upper third)	0.977	0.647-1.476	0.913
Tumor long diameter	1.134	1.092-1.178	**<0.001**
Tumor histological differentiation			
Moderate (vs Well)	0.813	0.580-1.139	0.228
Poor (vs Well)	1.086	0.736-1.603	0.677
Tumor pathological type			
Signet ring cell carcinoma (vs Adenocarcinoma)	1.607	0.946-2.731	0.080
Lauren type			

Mixed (vs Intestinal)	1.000	0.672-1.487	0.999
Diffused (vs Intestinal)	1.507	1.001-2.271	**0.049**
Indeterminate (vs Intestinal)	0.830	0.480-1.434	0.504
Bormann type			
II (vs I)	1.253	0.636-2.468	0.514
III (vs I)	2.344	1.107-4.964	**0.026**
IV (vs I)	2.327	1.026-5.275	**0.043**
HER-2 positive			
Yes (vs No)	1.029	0.678-1.561	0.893
dMMR			
Yes (vs No)	0.720	0.354-1.463	0.363
Ki-67 expression rate	1.005	0.999-1.012	0.089
Lymphovascular invasion			
Yes (vs No)	2.111	1.569-2.841	**<0.001**
Perineural invasion			
Yes (vs No)	2.105	1.559-2.841	**<0.001**
Operation method			
Laparoscopic surgery (vs Open surgery)	0.785	0.582-1.058	0.112
Operative time	1.000	0.998-1.003	0.789
Intraoperative blood loss	1.001	0.998-1.004	0.525
Multiorgan excision			
Yes (vs No)	1.884	1.178-3.013	**0.008**
R0 resection			
Yes (vs No)	0.299	0.193-0.463	**<0.001**
ycTNM stage			
II (vs I)	1.313	0.742-2.324	0.350
III (vs I)	4.857	2.907-8.115	**<0.001**
Pathological response			

TRG 1b (vs TRG 1a)	3.487	1.334-9.111	**0.011**
TRG 2 (vs TRG 1a)	8.757	3.508-21.864	**<0.001**
TRG 3 (vs TRG 1a)	11.403	4.624-28.123	**<0.001**
ypTNM stage, n (%)			
II (vs I)	5.174	2.905-9.217	**<0.001**
III (vs I)	10.704	6.217-18.428	**<0.001**
Postoperative complication			
Yes (vs No)	0.939	0.674-1.309	0.712
Postoperative hospital stays	0.995	0.968-1.022	0.713

BMI: body mass index; ECOG: Eastern Cooperative Oncology Group; HER-2: human epidermal growth factor receptor-2; dMMR: mismatch repair deficiency; NRS: Nutritional Risk Screening; PAC: PD-1 inhibitors plus apatinib and chemotherapy; PC: preoperative chemotherapy; TNM: tumor node metastasis.

Supplementary Table 2 Univariate Cox regression analysis for progression-free survival

Variable	HR	95% CI	*P* value
Age	1.009	0.992-1.026	0.291
Sex			
Male (vs Female)	0.811	0.566-1.161	0.252
BMI	0.978	0.938-1.020	0.303
ECOG performance status score			
2 (vs 0-1)	1.395	0.843-2.310	0.195
NRS 2002 score			
≥3 (vs <3)	0.898	0.614-1.314	0.581
cTNM stage			
III (vs II)	3.761	2.137-6.618	**<0.001**
IV (vs II)	5.463	3.012-9.910	**<0.001**
Neoadjuvant regimen			
PAC (vs PC)	0.487	0.332-0.716	**<0.001**
Preoperative therapy cycles	0.916	0.804-1.045	0.191
Treatment-related adverse events			
Yes (vs No)	0.978	0.672-1.424	0.909
Tumor location			
Middle third (vs Upper third)	1.397	0.959-2.035	0.082
Lower third (vs Upper third)	1.049	0.678-1.622	0.830
Tumor long diameter	1.132	1.088-1.178	**<0.001**
Tumor histological differentiation			
Moderate (vs Well)	0.756	0.530-1.078	0.123
Poor (vs Well)	1.024	0.679-1.543	0.910
Tumor pathological type			
Signet ring cell carcinoma (vs Adenocarcinoma)	2.013	1.180-3.433	**0.010**

Lauren type			
Mixed (vs Intestinal)	1.178	0.765-1.815	0.458
Diffused (vs Intestinal)	1.755	1.125-2.738	**0.013**
Indeterminate (vs Intestinal)	1.040	0.584-1.855	0.893
Bormann type			
II (vs I)	1.414	0.659-3.036	0.374
III (vs I)	2.785	1.210-6.409	**0.016**
IV (vs I)	2.168	0.864-5.442	0.099
HER-2 positive			
Yes (vs No)	0.980	0.625-1.538	0.931
dMMR			
Yes (vs No)	0.596	0.263-1.347	0.214
Ki-67 expression rate	1.005	0.999-1.012	0.131
Lymphovascular invasion			
Yes (vs No)	2.101	1.536-2.875	**<0.001**
Perineural invasion			
Yes (vs No)	1.897	1.379-2.610	**<0.001**
Operation method			
Laparoscopic surgery (vs Open surgery)	0.798	0.583-1.092	0.158
Operative time	1.001	0.998-1.003	0.676
Intraoperative blood loss	1.001	0.998-1.004	0.589
Multiorgan excision			
Yes (vs No)	1.960	1.208-3.180	**0.006**
R0 resection			
Yes (vs No)	0.317	0.201-0.500	**<0.001**
ycTNM stage			
II (vs I)	1.567	0.852-2.882	0.149
III (vs I)	4.775	2.720-8.382	**<0.001**

Pathological response			
TRG 1b (vs TRG 1a)	3.579	1.365-9.381	**0.010**
TRG 2 (vs TRG 1a)	7.237	2.878-18.194	**<0.001**
TRG 3 (vs TRG 1a)	10.207	4.127-25.240	**<0.001**
ypTNM stage, n (%)			
II (vs I)	4.092	2.345-7.141	**<0.001**
III (vs I)	7.619	4.526-12.825	**<0.001**
Postoperative complication			
Yes (vs No)	0.894	0.626-1.276	0.536
Postoperative hospital stays	0.996	0.968-1.026	0.804

BMI: body mass index; ECOG: Eastern Cooperative Oncology Group; HER-2: human epidermal growth factor receptor-2; dMMR: mismatch repair deficiency; NRS: Nutritional Risk Screening; PAC: PD-1 inhibitors plus apatinib and chemotherapy; PC: preoperative chemotherapy; TNM: tumor node metastasis.

Supplementary Table 3 Univariate Cox regression analysis for disease-free survival

Variable	HR	95% CI	*P* value
Age	1.009	0.992-1.026	0.284
Sex			
Male (vs Female)	0.817	0.573-1.165	0.264
BMI	0.976	0.936-1.017	0.246
ECOG performance status score			
2 (vs 0-1)	1.473	0.901-2.407	0.122
NRS 2002 score			
≥3 (vs <3)	0.928	0.638-1.351	0.697
cTNM stage			
III (vs II)	3.328	1.951-5.676	**<0.001**
IV (vs II)	4.778	2.714-8.413	**<0.001**
Neoadjuvant regimen			
PAC (vs PC)	0.496	0.338-0.728	**<0.001**
Preoperative therapy cycles	0.957	0.841-1.089	0.506
Treatment-related adverse events			
Yes (vs No)	1.034	0.711-1.504	0.862
Tumor location			
Middle third (vs Upper third)	1.352	0.931-1.964	0.114
Lower third (vs Upper third)	1.032	0.671-1.588	0.885
Tumor long diameter	1.129	1.085-1.175	**<0.001**
Tumor histological differentiation			
Moderate (vs Well)	0.766	0.538-1.089	0.137
Poor (vs Well)	1.014	0.674-1.527	0.945
Tumor pathological type			
Signet ring cell carcinoma (vs Adenocarcinoma)	2.003	1.175-3.417	**0.011**
Lauren type			

Mixed (vs Intestinal)	1.179	0.765-1.817	0.455
Diffused (vs Intestinal)	1.765	1.132-2.754	**0.012**
Indeterminate (vs Intestinal)	1.208	0.690-2.114	0.508
Bormann type			
II (vs I)	1.237	0.604-2.537	0.561
III (vs I)	2.375	1.077-5.239	**0.032**
IV (vs I)	1.871	0.774-4.526	0.164
HER-2 positive			
Yes (vs No)	0.984	0.628-1.544	0.945
dMMR			
Yes (vs No)	0.592	0.262-1.339	0.208
Ki-67 expression rate	1.005	0.998-1.011	0.174
Lymphovascular invasion			
Yes (vs No)	2.096	1.535-2.861	**<0.001**
Perineural invasion			
Yes (vs No)	1.863	1.356-2.560	**<0.001**
Operation method			
Laparoscopic surgery (vs Open surgery)	0.812	0.594-1.109	0.190
Operative time	1.000	0.998-1.003	0.706
Intraoperative blood loss	1.001	0.998-1.004	0.502
Multiorgan excision			
Yes (vs No)	2.037	1.256-3.305	**0.004**
R0 resection			
Yes (vs No)	0.293	0.185-0.462	**<0.001**
ycTNM stage			
II (vs I)	1.657	0.904-3.036	0.102
III (vs I)	4.830	2.751-8.481	**<0.001**
Pathological response			

TRG 1b (vs TRG 1a)	3.770	1.447-9.820	**0.007**
TRG 2 (vs TRG 1a)	7.205	2.866-18.116	**<0.001**
TRG 3 (vs TRG 1a)	9.990	4.041-24.696	**<0.001**
ypTNM stage, n (%)			
II (vs I)	3.577	2.095-6.106	**<0.001**
III (vs I)	6.876	4.181-11.309	**<0.001**
Postoperative complication			
Yes (vs No)	0.902	0.634-1.283	0.564
Postoperative hospital stays	0.995	0.966-1.024	0.714

BMI: body mass index; ECOG: Eastern Cooperative Oncology Group; HER-2: human epidermal growth factor receptor-2; dMMR: mismatch repair deficiency; NRS: Nutritional Risk Screening; PAC: PD-1 inhibitors plus apatinib and chemotherapy; PC: preoperative chemotherapy; TNM: tumor node metastasis.