


Comprehensive Registry of Esophageal Cancer in Japan, 2010

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Preface 2010

We deeply appreciate the great contributions of many physicians in the registry of esophageal cancer cases. The Comprehensive Registry of Esophageal Cancer in Japan, 2010, was published here, despite some delay. The registry complies with the Act for the Protection of Personal Information. The encryption with a HASH function is used for “anonymity in an unlinkable fashion”.

We briefly summarized the Comprehensive Registry of Esophageal Cancer in Japan, 2010. Japanese Classification of Esophageal Cancer 10th and UICC TNM Classification 7th were used for cancer staging according to the subjected year. A total of 5878 cases were registered from

280 institutions in Japan. Tumor locations were cervical: 4.3%, upper thoracic: 12.7%, middle thoracic: 48.8%, lower thoracic: 26.5% and EG junction: 6.5%. Superficial carcinomas (Tis, T1a, T1b) were 34.9%. As for the histologic type of biopsy specimens, squamous cell carcinoma and adenocarcinoma accounted for 90.5 and 4.0%, respectively. Regarding clinical results, the 5-year survival rates of patients treated using endoscopic mucosal resection, concurrent chemoradiotherapy, or esophagectomy were 85.5, 27.3, and 55.5%, respectively. Esophagectomy was performed in 3564 cases. Concerning the approach used for esophagectomy, 30.4% of the cases were treated thoracoscopically. The operative mortality (within 30 days after surgery) was 0.61% and the hospital mortality was 4.29%.

We hope that this Comprehensive Registry of Esophageal Cancer in Japan for 2010 will help to improve all aspects of the diagnosis and treatment of esophageal cancer in Japan.

These data were first made available on January 2017, as the Comprehensive Registry of Esophageal Cancer in Japan, 2010. Not all the pages are reprinted here.

The authors were members of the Registration Committee for Esophageal Cancer, the Japan Esophageal Society, and made great contributions to the preparation of this material.

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Contents

I. Clinical factors of esophageal cancer patients treated in 2010

1. Institution-registered cases in 2010
2. Patient background
 - Table 1 Age and gender
 - Table 2 Primary treatment
 - Table 3 Tumor location
 - Table 4 Histologic types of biopsy specimens
 - Table 5 Depth of tumor invasion, cT (UICC TNM 7th)
 - Table 6 Lymph node metastasis, cN (UICC TNM 7th)
 - Table 7 Distant metastasis, cM (UICC TNM 7th)
 - Table 8 Clinical Stage (UICC TNM 7th)

II. Results of endoscopically treated patients in 2010

- Table 9 Details of endoscopic treatment
- Table 10 Complications of EMR/ESD
- Table 11 Pathological depth of tumor invasion of EMR/ESD specimens
- Figure 1 Survival of patients treated with EMR/ESD
- Figure 2 Survival of patients treated with EMR/ESD according to the pathological depth of tumor invasion (pT)
- Figure 3 Survival of patients treated with EMR/ESD according to the lymphatic and venous invasion

III. Results in patients treated with chemotherapy and/or radiotherapy in 2010

- Table 12 Dose of irradiation (non-surgically treated cases)
- Table 13 Dose of irradiation (surgically treated cases)
- Figure 4 Survival of patients treated with chemotherapy and/or radiotherapy
- Figure 5 Survival of patients treated with definitive chemoradiotherapy according to clinical stage (UICC TNM 7th)

IV. Results in patients who underwent esophagectomy in 2010

- Table 14 Treatment modalities of esophagectomy

Table 15 Tumor location

Table 16 Approaches to tumor resection

Table 17 Video-assisted surgery

Table 18 Fields of lymph node dissection according to the location of the tumor

Table 19 Reconstruction route

Table 20 Organs used for reconstruction

Table 21 Histological classification

Table 22 Depth of tumor invasion, pT (JES 10th)

Table 23 Pathological grading of lymph node metastasis, pN (JES 10th)

Table 24 Pathological findings of lymph node metastasis, pN (UICC 7th)

Table 25 Pathological findings of distant organ metastasis, pM (JES 10th)

Table 26 Residual tumor

Table 27 Causes of death

Figure 6 Survival of patients who underwent esophagectomy

Figure 7 Survival of patients who underwent esophagectomy according to clinical stage (JES 10th)

Figure 8 Survival of patients who underwent esophagectomy according to clinical stage (UICC 7th)

Figure 9 Survival of patients who underwent esophagectomy according to the depth of tumor invasion, pT (JES 10th)

Figure 10 Survival of patients who underwent esophagectomy according to lymph node metastasis, pN (JES 10th)

Figure 11 Survival of patients who underwent esophagectomy according to lymph node metastasis, pN (UICC 7th)

Figure 12 Survival of patients who underwent esophagectomy according to pathological stage (JES 10th)

Figure 13 Survival of patients who underwent esophagectomy according to pathological stage (UICC TNM 7th)

Figure 14 Survival of patients who underwent esophagectomy according to residual tumor (R)

I. Clinical factors of esophageal cancer patients treated in 2010

Institution-registered cases in 2010

Institution
Aichi Cancer Center
Aichi Medical University Hospital
Aizawa Hospital
Akita Kouseiren Hiraka Hospital
Akita University Hospital
Arao Municipal Hospital
Asahikawa Medical College Hospital
Chiba Aoba Municipal Hospital
Chiba Cancer Center
Chiba Medical Center
Chiba Prefectural Sawara Hospital
Chiba University Hospital
Chibaken Saiseikai Narashino Hospital
Dokkyo Medical University Hospital
Ehime University Hospital
Foundation for Detection of Early Gastric Carcinoma
Fuchu Hospital
Fujioka General Hospital
Fujisawa Shounandai Hospital
Fujita Health University
Fukui Prefectural Hospital
Fukui University Hospital
Fukuoka Dental College and Dental Hospital
Fukuoka Saiseikai General Hospital
Fukuoka University Chikushi Hospital
Fukuoka University Hospital
Fukuoka Wajiro Hospital
Fukushima Medical University Hospital
Fukuyama City Hospital
Fussa Hospital
Gifu Prefectural General Medical Center
Gifu University Hospital
Gunma Central General Hospital
Gunma Prefectural Cancer Center
Gunma University Hospital
Gunmaken Saiseikai Maebashi Hospital
Hachinohe City Hospital
Hakodate Goryokaku Hospital
Hakodate National Hospital
Hamamatsu University School of Medicine, University Hospital
Hannan Chuo Hospital
Heartlife Hospital
Higashiosaka City General Hospital
Hiratsuka City Hospital
Hiratsuka Kyosai Hospital

Continued

Institution
Hirosaki University Hospital
Hiroshima City Asa Hospital
Hiroshima University Research Institute for Radiation Biology Medicine
Hofu Institute of Gastroenterology
Hokkaido Kin-Ikyo Chuo Hospital
Hokkaido University Hospital
Hyogo Cancer Center
Hyogo College of Medicine
Hyogo Prefectural Nishinomiya Hospital
Ibaraki Prefectural Central Hospital
Iizuka Hospital
Ikeda Municipal Hospital
Imazu Surgical Clinic
Inazawa City Hospital
International University of Health and Welfare Hospital
International University of Health and Welfare, Mita Hospital
Isehara Kyodo Hospital
Ishikawa Prefectural Central Hospital
Iwakuni Medical Center
Iwate Medical University Hospital
Iwate Prefectural Chubu Hospital
Japanese Red Cross Fukui Hospital
Japanese Red Cross Ishinomaki Hospital
Japanese Red Cross Kyoto Daini Hospital?
Japanese Red Cross Maebashi Hospital
Japanese Red Cross Nagaoka Hospital
Japanese Red Cross Okayama Hospital
Japanese Red Cross Society Azumino Hospital
Japanese Red Cross Tottori Hospital
Jichi Medical University Hospital
Juntendo University Hospital
Juntendo University Shizuoka Hospital
Junwakai Memorial Hospital
Kagawa Prefectural Central Hospital
Kagawa Rosai Hospital
Kagawa University Hospital
Kagoshima Kenritsu Satsunan Hospital
Kagoshima University Hospital
Kameda General Hospital
Kanagawa Cancer Center
Kanazawa Medical University Hospital
Kanazawa University Hospital
Kansai Medical University Hirakata Hospital
Kansai Medical University Medical Center
Kansai Rosai Hospital
Kasamatsu Hospital
Kashiwa Kousei General Hospital
Kawakita General Hospital
Kawasaki Medical School Hospital
Kawasaki Medical School Kawasaki Hospital

Continued

Institution

Kawasaki Municipal Ida Hospital
 Keio University Hospital
 Keiyukai Sapporo Hospital
 Kikuna Memorial Hospital
 Kinki Central Hospital
 Kinki University Hospital
 Kiryu Kosei General Hospital
 Kishiwada City Hospital
 Kitaakita Municipal Hospital
 Kitakyushu Municipal Medical Center
 Kitano Hospital
 Kobe City Medical Center General Hospital
 Kobe University Hospital
 Kochi Health Science Center
 Kochi University Hospital
 Kokura Memorial Hospital
 Kumamoto City Hospital
 Kumamoto University Hospital
 Kurashiki Central Hospital
 Kurume General Hospital
 Kurume University Hospital
 Kyoto University Hospital
 Kyushu Central Hospital of the Mutual Aid Association of Public School Teachers
 Kyushu Hospital
 Kyushu Medical Center
 Kyushu University Hospital
 Machida Municipal Hospital
 Matsuda Hospital
 Matsushita Memorial Hospital
 Matsuyama Red Cross Hospital
 Mie University Hospital
 Mino City Hospital
 Mito Red Cross Hospital
 Mitsui Memorial Hospital
 Miyazaki Konan Hospital
 Murakami General Hospital
 Musashino Red Cross Hospital
 Nagahama City Hospital
 Nagano Red Cross Hospital
 Nagaoka Chuo General Hospital
 Nagasaki University Hospital
 Nagayoshi General Hospital
 Nagoya City University Hospital
 Nagoya City West Medical Center
 Nagoya Daiichi Red Cross Hospital
 Nagoya University Hospital
 Nanpuh Hospital
 Nara Hospital Kinki University Faculty of Medicine

Continued

Institution

Nara Medical University Hospital
 National Cancer Center Hospital
 National Cancer Center Hospital East
 National Defense Medical College Hospital
 National Hospital Organization Beppu Medical Center
 National Hospital Organization Chiba-East-Hospital
 National Hospital Organization Fukuoka-Higashi Medical Center
 National Hospital Organization Iwakuni Medical Center
 National Hospital Organization Kure Medical Center
 National Hospital Organization Kyoto Medical Center
 National Hospital Organization Kyushu Cancer Center
 National Hospital Organization Matsumoto National Hospital
 National Hospital Organization Nagasaki Medical Center
 National Hospital Organization Nagoya Medical Center
 National Hospital Organization Osaka National Hospital
 National Hospital Organization Tokyo Medical Center
 Niigata Cancer Center Hospital
 Niigata City General Hospital
 Niigata Prefectural Shibata Hospital
 Niigata University Medical and Dental Hospital
 Nikko Memorial Hospital
 Nippon Medical School Chiba Hokusoh Hospital
 Nippon Medical School Hospital
 Nippon Medical School Musashi Kosugi Hospital
 Nippon Medical School Tama Nagayama Hospital
 Nishi-Kobe Medical Center
 Nishinomiya Municipal Central Hospital
 Numazu City Hospital
 Obihiro Kousei General Hospital
 Obitsusankei Hospital
 Ohta General Hospital Foundation Ohta Nishinouchi Hospital
 Oita Red Cross Hospital
 Oita University Hospital
 Okayama Saiseikai General Hospital
 Okayama University Hospital
 Omuta City Hospital
 Osaka City University Hospital
 Osaka Hospital of Japan Seafarers Relief Association
 Osaka Medical Center for Cancer and Cardiovascular Diseases
 Osaka Medical College Hospital
 Osaka Police Hospital
 Osaka Prefectural Hospital Organization Osaka General Medical Center
 Osaka University Hospital
 Otsu Municipal Hospital
 Otsu Red Cross Hospital
 Rinku General Medical Center
 Ryukyu University Hospital
 Saga-ken Medical Center Koseikan
 Saiseikai Fukushima General Hospital

Continued

Institution

Saiseikai Hiroshima Hospital
 Saiseikai Kyoto Hospital
 Saiseikai Yahata General Hospital
 Saitama Cancer Center
 Saitama City Hospital
 Saitama Medical Center
 Saitama Medical University Hospital
 Saitama Medical University Saitama International Medical Center
 Saitama Medical University Saitama Medical Center
 Sakai City Medical Center
 Saku Central Hospital
 Sanin Rosai Hospital
 Sano Kousei General Hospital
 Sendai City Hospital
 Sendai Medical Center
 Shiga Medical Center for Adults
 Shiga University of Medical Science Hospital
 Shikoku Cancer Center
 Shimada Hospital
 Shimane University Hospital
 Shimizu Welfare Hospital
 Shinshu University Hospital
 Shizuoka Cancer Center
 Shizuoka City Shizuoka Hospital
 Shizuoka General Hospital
 Showa University Fujigaoka Hospital
 Showa University Hospital
 Showa University Koto-Toyosu Hospital
 Showa University Northern Yokohama Hospital
 Social Insurance Omuta Tenryo Hospital
 Social Insurance Tagawa Hospital
 St. Marianna University School of Medical Hospital
 St. Luke's International Hospital
 Sugita Genpaku Memorial Obama Municipal Hospital
 Suita Municipal Hospital
 Takasago Municipal Hospital
 Takatsuki Red Cross Hospital
 Takeda Hospital
 Teikyo University Hospital
 Teikyo University Hospital, Mizonokuchi
 Tenri Hospital
 The Cancer Institute Hospital of JFCR
 The Jikei University Hospital
 The Research Center Hospital for Charged Particle Therapy of NIRS
 Tochigi Medical Center

Continued

Institution

Toho University Omori Medical Center
 Toho University Sakura Medical Center
 Tohoku Kosai Hospital
 Tohoku University Hospital
 Tokai University Hospital
 Tokushima Municipal Hospital
 Tokushima Prefectural Naruto Hospital
 Tokushima Red Cross Hospital
 Tokushima University Hospital
 Tokyo Dental College Ichikawa General Hospital
 Tokyo Medical and Dental University Hospital
 Tokyo Medical University Hospital
 Tokyo Medical University Ibaraki Medical Center
 Tokyo Metropolitan Health and Medical Corporation Toshima Hospital
 Tokyo University Hospital
 Tokyo Women's Medical University Hospital
 Tokyo Women's Medical University Medical Center East
 Tonan Hospital
 Toranomon Hospital
 Tottori Prefectural Central Hospital
 Tottori University Hospital
 Toyama Prefectural Central Hospital
 Toyama University Hospital
 Toyonaka Municipal Hospital
 Tsuchiura Kyodo Hospital
 Tsukuba University Hospital
 Tsuruoka Municipal Shonai Hospital
 University Hospital, Kyoto Prefectural University of Medicine
 University of Miyazaki Hospital
 Wakayama Medical University Hospital
 Yamagata Prefectural and Sakata Municipal Hospital Organization
 Yamagata Prefectural Central Hospital
 Yamagata Prefectural Shinjo Hospital
 Yamaguchi University Hospital
 Yamaguchi-ken Saiseikai Shimonoseki General Hospital
 Yamanashi Prefectural Central Hospital
 Yamanashi University Hospital
 Yao Municipal Hospital
 Yokohama Chuo Hospital
 Yokohama City Municipal Hospital
 Yokohama City University Hospital
 Yokohama City University Medical Center
 Yuri General Hospital

(Total 280 institutions)

Patient background

Table 1 Age and gender

Age	Male	Female	Unknown	Cases (%)
≤29	1	1		2 (0.0%)
30–39	14	4		18 (0.3%)
40–49	125	44		169 (2.9%)
50–59	802	145	1	948 (16.1%)
60–69	2140	291	1	2432 (41.4%)
70–79	1596	267		1863 (31.7%)
80–89	342	78		420 (7.1%)
≥90	8	7		15 (0.3%)
Unknown	10	1		11 (0.2%)
Total	5038	838	2	5878

Table 2 Primary treatment

Treatments	Cases (%)
Surgery	3638 (61.9%)
Esophagectomy	3564 (60.6%)
Palliative	74 (1.3%)
Chemotherapy/radiotherapy	1413 (24.0%)
Endoscopic treatment	827 (14.1%)
Total	5878

Table 3 Tumor location

Location of tumor	Endoscopic treatment (%)	Surgery		Chemotherapy and/or radiotherapy (%)	Total (%)
		Esophagectomy (%)	Palliative surgery (%)		
Cervical	18 (2.2%)	116 (3.3%)	6 (8.1%)	114 (8.1%)	254 (4.3%)
Upper thoracic	90 (10.9%)	411 (11.5%)	15 (20.3%)	233 (16.5%)	749 (12.7%)
Middle thoracic	483 (58.4%)	1669 (46.8%)	39 (52.7%)	677 (47.9%)	2868 (48.8%)
Lower thoracic	186 (22.5%)	1054 (29.6%)	12 (16.2%)	303 (21.4%)	1555 (26.5%)
EG	34 (4.1%)	241 (6.8%)	1 (1.4%)	31 (2.2%)	307 (5.2%)
E = G	1 (0.1%)	38 (1.1%)	1 (1.4%)	1 (0.1%)	41 (0.7%)
GE	3 (0.4%)	27 (0.8%)		6 (0.4%)	36 (0.6%)
Unknown	12 (1.5%)	8 (0.2%)		48 (3.4%)	68 (1.2%)
Total	827	3564	74	1413	5878

E esophageal, *G* gastric

Table 4 Histologic types of biopsy specimens

Histologic types	Cases (%)
Squamous cell carcinoma	5320 (90.5%)
Squamous cell carcinoma	3581 (60.9%)
Well differentiated	334 (5.7%)
Moderately differentiated	1072 (18.2%)
Poorly differentiated	333 (5.7%)
Adenocarcinoma	233 (4.0%)
Barrett's adenocarcinoma	64 (1.1%)
Adenosquamous carcinoma	8 (0.1%)
Mucoepidermoid carcinoma	2 (0.0%)
Basaloid carcinoma	27 (0.5%)
Endocrine cell carcinoma	13 (0.2%)
Undifferentiated carcinoma	10 (0.2%)
Sarcoma	2 (0.0%)
Malignant melanoma	16 (0.3%)
Carcinosarcoma	9 (0.2%)
GIST	1 (0.0%)
Other tumors	34 (0.6%)
Unknown	139 (2.4%)
Total	5878

Table 5 Depth of tumor invasion, cT (UICC TNM 7th)

cT	Cases (%)
cTX	16 (0.3%)
cT0	9 (0.2%)
cTis	144 (2.4%)
cT1a	780 (13.3%)
cT1b	1130 (19.2%)
cT2	813 (13.8%)
cT3	2134 (36.3%)
cT4a	357 (6.1%)
cT4b	410 (7.0%)
Unknown	85 (1.4%)
Total	5878

Table 6 Lymph node metastasis, cN (UICC TNM 7th)

cN	Cases (%)
cNX	88 (1.5%)
cN0	2646 (45.0%)
cN1	1642 (27.9%)
cN2	986 (16.8%)
cN3	342 (5.8%)
Unknown	174 (3.0%)
Total	5878

Table 7 Distant metastasis, cM (UICC TNM 7th)

cM	Cases (%)
cM0	5091 (86.6%)
cM1	652 (11.1%)
Unknown	135 (2.3%)
Total	5878

Table 8 Clinical Stage (UICC TNM 7th)

Clinical stage	Endoscopic treatment (%)	Surgery		Chemotherapy and/or radiotherapy (%)	Total (%)
		Esophagectomy (%)	Palliative surgery (%)		
0	112 (13.5%)	12 (0.3%)		1 (0.1%)	125 (2.1%)
IA	563 (68.1%)	862 (24.2%)		158 (11.2%)	1583 (26.9%)
IB	4 (0.5%)	299 (8.4%)	2 (2.7%)	68 (4.8%)	373 (6.3%)
IIA	2 (0.2%)	336 (9.4%)	7 (9.5%)	49 (3.5%)	394 (6.7%)
IIB	2 (0.2%)	378 (10.6%)	2 (2.7%)	64 (4.5%)	446 (7.6%)
IIIA	7 (0.8%)	783 (22.0%)	12 (16.2%)	165 (11.7%)	967 (16.5%)
IIIB	5 (0.6%)	354 (9.9%)	13 (17.6%)	92 (6.5%)	464 (7.9%)
IIIC	25 (3.0%)	241 (6.8%)	22 (29.7%)	315 (22.3%)	603 (10.3%)
IV	31 (3.7%)	145 (4.1%)	12 (16.2%)	409 (28.9%)	597 (10.2%)
Unknown	76 (9.2%)	154 (4.3%)	4 (5.4%)	92 (6.5%)	326 (5.5%)
Total	827	3564	74	1413	5878

II. Results of endoscopically treated patients in 2010

Table 9 Details of endoscopic treatment

Treatment details	Cases (%)
EMR	59 (7.8%)
EMR + YAG laser	6 (0.8%)
ESD	667 (88.5%)
ESD + EMR	6 (0.8%)
ESD + PDT	4 (0.5%)
ESD + YAG laser	1 (0.1%)
PDT	3 (0.4%)
YAG laser	8 (1.1%)
Total	754

EMR endoscopic mucosal resection, *ESD* endoscopic submucosal dissection, *YAG* yttrium aluminum garnet, *PDT* photodynamic therapy

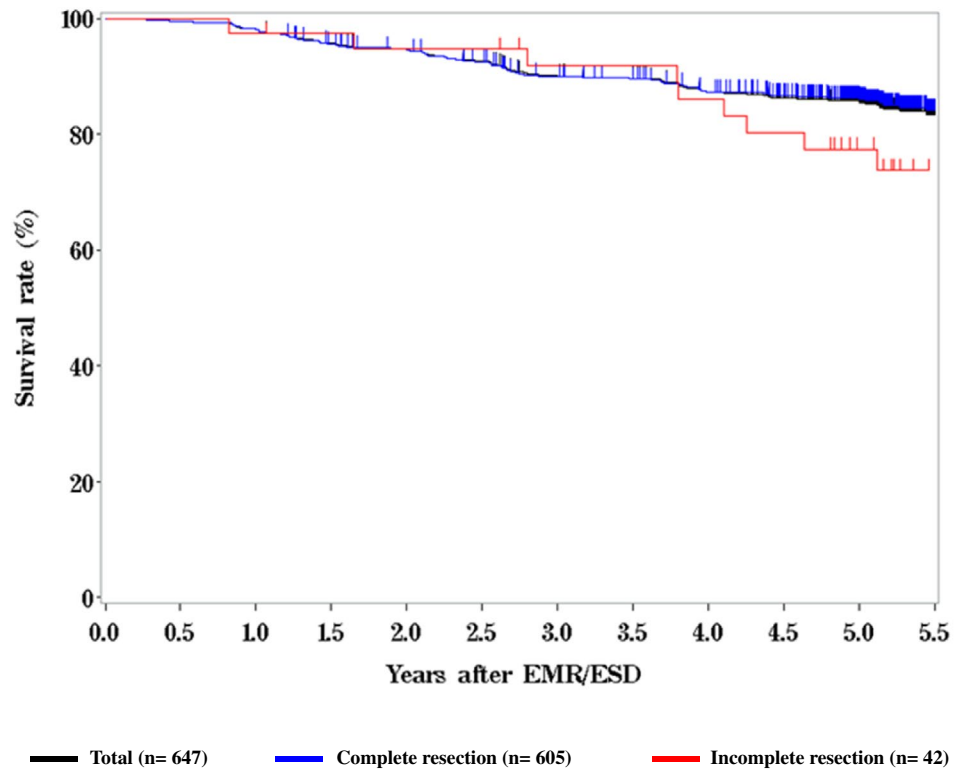
Table 11 Pathological depth of tumor invasion of EMR/ESD specimens

Pathological depth of tumor invasion (pT)	Cases (%)
pTX	1 (0.1%)
pT0	7 (0.9%)
pTis	163 (21.9%)
pT1a	482 (64.9%)
pT1b	74 (10.0%)
pT2	1 (0.1%)
Unknown	15 (2.0%)
Total	743

Table 10 Complications of EMR/ESD

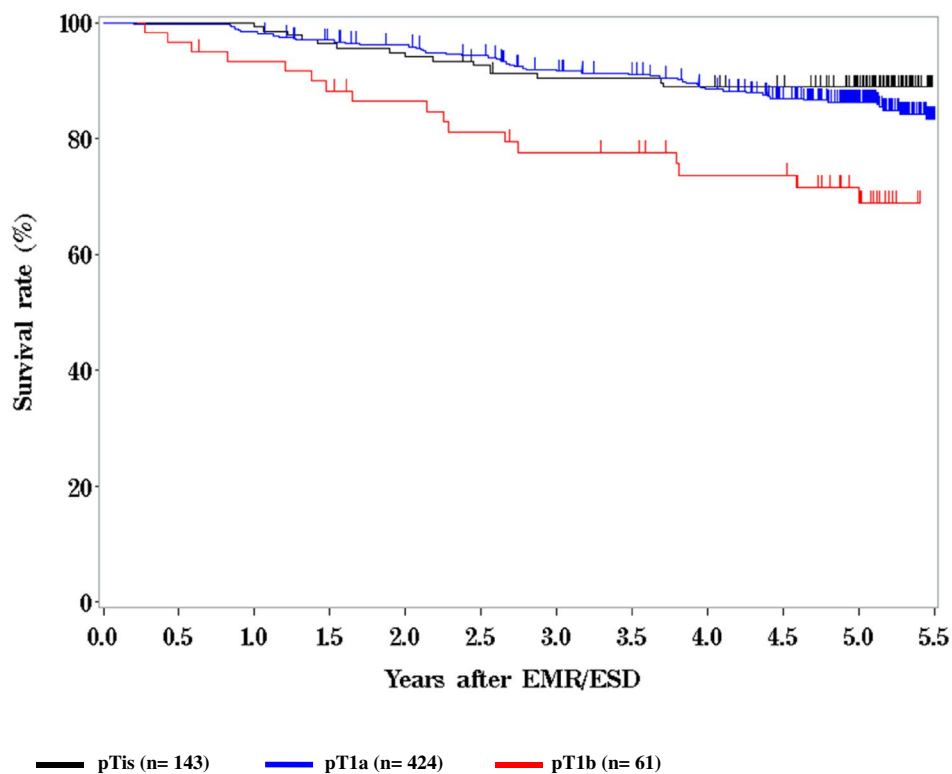
Complications of EMR/ESD	Cases (%)
None	672 (90.4%)
Perforation	13 (1.7%)
Bleeding	2 (0.3%)
Mediastinitis	4 (0.5%)
Stenosis	44 (5.9%)
Others	8 (1.1%)
Total	743

Fig. 1 Survival of patients treated with EMR/ESD



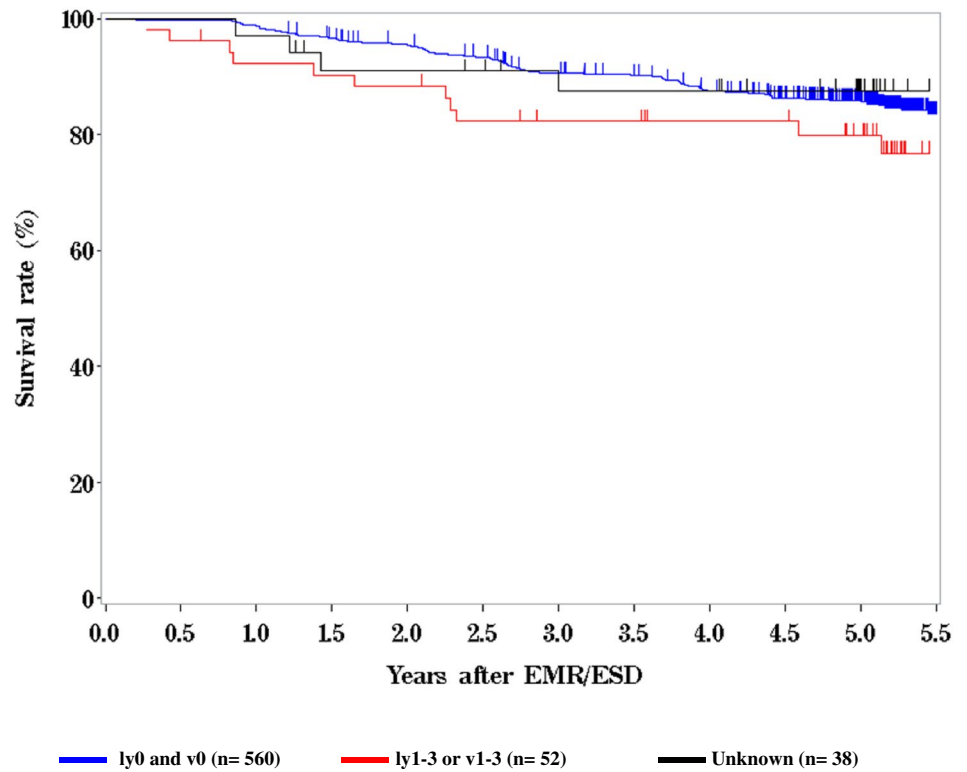
	Years after EMR/ESD				
	1	2	3	4	5
Total	98.0%	94.5%	90.0%	87.3%	85.5%
Complete resection	98.1%	94.5%	89.9%	87.4%	86.1%
Incomplete resection	97.4%	94.7%	91.8%	77.5%	73.8%

Fig. 2 Survival of patients treated with EMR/ESD according to the pathological depth of tumor invasion (pT)



	Years after EMR/ESD				
	1	2	3	4	5
pTis	99.3%	94.1%	90.4%	88.9%	88.9%
pT1a	98.5%	96.1%	91.6%	88.4%	86.3%
pT1b	93.3%	86.5%	77.6%	73.6%	68.9%

Fig. 3 Survival of patients treated with EMR/ESD according to the lymphatic and venous invasion



	Years after EMR/ESD				
	1	2	3	4	5
ly0 and v0	98.7%	95.4%	90.6%	87.4%	85.6%
ly1-3 or v1-3	92.3%	88.3%	82.2%	82.2%	79.9%
Unknown	97.1%	91.0%	87.5%	87.5%	-

III. Results in patients treated with chemotherapy and/or radiotherapy in 2010

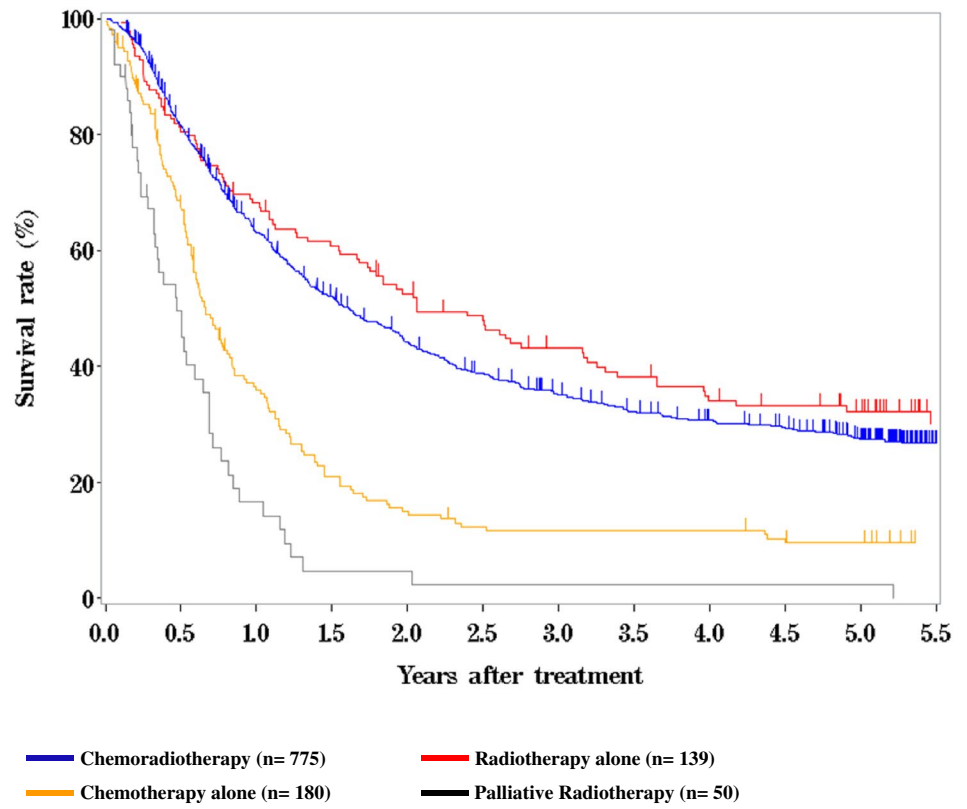
Table 12 Dose of irradiation (non-surgically treated cases)

Dose of irradiation (Gy)	Definitive		Palliative (%)	Recurrence (%)	Others (%)	Unknown (%)	Total (%)
	Radiation alone (%)	With chemotherapy (%)					
≤29	5 (2.9%)	10 (1.4%)	26 (9.2%)		1 (2.7%)		42 (3.5%)
30–39	1 (0.6%)	7 (1.0%)	43 (15.1%)	3 (10.0%)	4 (10.8%)		58 (4.8%)
40–49	9 (5.3%)	24 (3.5%)	36 (12.7%)	1 (3.3%)	10 (27.0%)		80 (6.6%)
50–59	27 (15.9%)	173 (25.0%)	60 (21.1%)	9 (30.0%)	13 (35.1%)	1 (33.3%)	283 (23.3%)
60–69	124 (72.9%)	453 (65.5%)	109 (38.4%)	17 (56.7%)	9 (24.3%)	2 (66.7%)	714 (58.7%)
≥70	4 (7.2%)	14 (2.1%)	5 (0.0%)				23 (2.2%)
Unknown		11 (1.6%)	5 (1.8%)				16 (1.3%)
Total	170	692	284	30	37	3	1216
Median (min–max)	60.0 (2.0–105.0)	60.0 (1.8–72.0)	52.5 (1.8–90.0)	60.0 (37.5–67.0)	50.0 (9.0–66.0)	60.0 (52.0–60.0)	60.0 (1.8–105.0)

Table 13 Dose of irradiation (surgically treated cases)

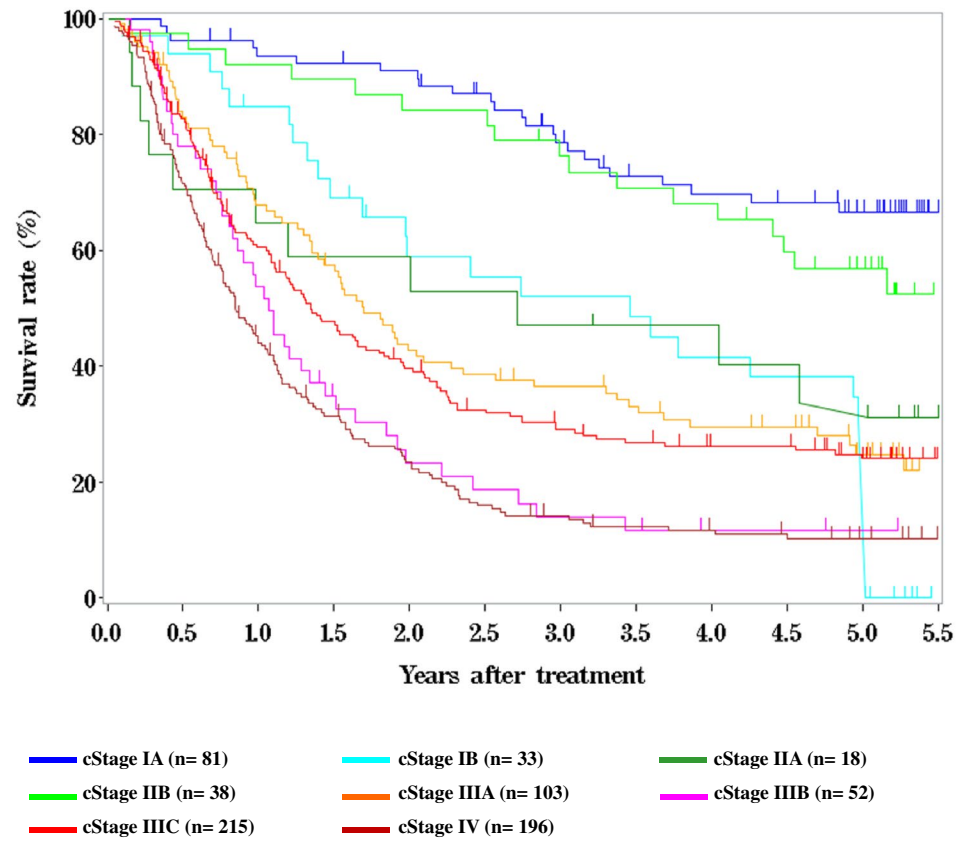
Dose of irradiation (Gy)	Preoperative irradiation (%)	Postoperative irradiation (%)
≤29	2 (1.0%)	
30–39	34 (17.5%)	1 (2.1%)
40–49	132 (68.0%)	10 (21.3%)
50–59	7 (3.6%)	12 (25.5%)
60–69	13 (6.7%)	22 (46.8%)
≥70		2 (1.1%)
Unknown	6 (3.1%)	
Total	194	47
Median (min–max)	40.0 (0.0–66.0)	60.0 (30.0–79.2)

Fig. 4 Survival of patients treated with chemotherapy and/or radiotherapy



	Years after treatment				
	1	2	3	4	5
Chemoradiotherapy	63.0%	44.2%	35.2%	30.7%	27.3%
Radiotherapy alone	68.2%	52.5%	43.2%	34.1%	32.3%
Chemotherapy alone	36.0%	14.9%	11.7%	11.7%	-
Palliative radiotherapy	16.6%	4.7%	2.4%	2.4%	2.4%

Fig. 5 Survival of patients treated with definitive chemoradiotherapy according to clinical stage (UICC TNM 7th)



	Years after treatment				
	1	2	3	4	5
cStage IA	93.6%	91.0%	78.6%	69.7%	65.6%
cStage IB	84.8%	58.9%	52.0%	41.6%	31.2%
cStage IIA	64.7%	58.8%	47.1%	47.1%	33.6%
cStage IIB	92.1%	84.2%	76.2%	68.1%	56.8%
cStage IIIA	67.7%	42.8%	36.5%	29.6%	24.7%
cStage IIIB	53.7%	23.3%	14.0%	11.7%	11.7%
cStage IIIC	60.5%	39.6%	29.1%	26.2%	24.1%
cStage IV	44.1%	23.4%	14.3%	11.8%	10.3%

IV. Results in patients who underwent esophagectomy in 2010

Table 14 Treatment modalities of esophagectomy

Treatments	Cases (%)
Esophagectomy alone	1463 (41.0%)
Esophagectomy + endoscopic treatment	83 (2.3%)
Esophagectomy + chemoradiotherapy	571 (16.0%)
Concurrent chemoradiotherapy	502 (14.1%)
Other	69 (1.9%)
Esophagectomy + chemoradiotherapy + endoscopic treatment	13 (0.4%)
Esophagectomy + chemotherapy	1391 (39.0%)
Preoperative	1027 (28.8%)
Postoperative	183 (5.1%)
Pre and postoperative	75 (2.1%)
Recurrence	46 (1.3%)
Other	60 (1.7%)
Esophagectomy + chemotherapy + endoscopic treatment	3 (0.1%)
Esophagectomy + radiotherapy	39 (1.1%)
Preoperative	4 (0.1%)
Postoperative	7 (0.2%)
Recurrence	15 (0.4%)
Other	13 (0.4%)
Esophagectomy + radiotherapy + endoscopic treatment	1 (0.0%)
Total	3564

Table 15 Tumor location

Locations	Cases (%)
Cervical	116 (3.3%)
Upper thoracic	411 (11.5%)
Middle thoracic	1669 (46.8%)
Lower thoracic	1054 (29.6%)
E > G	241 (6.8%)
E = G	38 (1.1%)
G > E	27 (0.8%)
Unknown	8 (0.2%)
Total lesions	3564

Table 16 Approaches to tumor resection

Approaches	Cases (%)
Cervical approach	150 (4.2%)
Right thoracotomy	3010 (84.5%)
Left thoracotomy	50 (1.4%)
Left thoracoabdominal approach	58 (1.6%)
Laparotomy	108 (3.0%)
Transhiatal thoracic esophagectomy	50 (1.4%)
Transhiatal lower esophagectomy	72 (2.0%)
Sternotomy	4 (0.1%)
Others	28 (0.8%)
Unknown	34 (1.0%)
Total	3564

Table 17 Video-assisted surgery

Video-assisted surgery	Cases (%)
None	2117 (59.4%)
Thoracoscopy	653 (18.3%)
Thoracoscopy + laparoscopy	431 (12.1%)
Thoracoscopy + laparoscopy + mediastinoscopy	1 (0.0%)
Thoracoscopy + laparoscopy + other	1 (0.0%)
Laparoscopy	104 (2.9%)
Laparoscopy + mediastinoscopy	8 (0.2%)
Laparoscopy + other	1 (0.0%)
Mediastinoscopy	4 (0.1%)
Others	11 (0.3%)
Total	3564

Table 18 Fields of lymph node dissection according to the location of the tumor

Field of lymphadenectomy	Cervical	Upper thoracic	Middle thoracic	Lower thoracic	E > G	E = G	G > E	Unknown	Total
None	10 (8.6%)	13 (3.2%)	59 (3.5%)	28 (2.7%)	13 (5.4%)			2 (25.0%)	125 (3.5%)
C	36 (31.0%)	10 (2.4%)	20 (1.2%)	3 (0.3%)	1 (0.4%)				70 (2.0%)
C + UM	21 (18.1%)	6 (1.5%)	3 (0.2%)	1 (0.1%)					31 (0.9%)
C + UM + MLM	2 (1.7%)	12 (2.9%)	28 (1.7%)	12 (1.1%)			1 (3.7%)		55 (1.5%)
C + UM + MLM + A	27 (23.3%)	257 (62.5%)	800 (47.9%)	367 (34.8%)	26 (10.8%)	6 (15.8%)		1 (12.5%)	1484 (41.6%)
C + UM + MLM + A + OT				1 (0.1%)					1 (0.0%)
C + UM + A	2 (1.7%)	1 (0.2%)	2 (0.1%)	2 (0.2%)					7 (0.2%)
C + MLM			1 (0.1%)						1 (0.0%)
C + MLM + A	3 (2.6%)	1 (0.2%)	7 (0.4%)	3 (0.3%)					14 (0.4%)
C + A	1 (0.9%)	2 (0.5%)	4 (0.2%)	2 (0.2%)	1 (0.4%)				10 (0.3%)
UM	4 (3.4%)	3 (0.7%)	5 (0.3%)	3 (0.3%)					15 (0.4%)
UM + MLM	1 (0.9%)	7 (1.7%)	29 (1.7%)	12 (1.1%)	1 (0.4%)			1 (12.5%)	51 (1.4%)
UM + MLM + A	3 (2.6%)	75 (18.2%)	627 (37.6%)	478 (45.4%)	56 (23.2%)	5 (13.2%)	1 (3.7%)	1 (12.5%)	1246 (35.0%)
UM + A	1 (0.9%)	4 (1.0%)	2 (0.1%)	2 (0.2%)	2 (0.8%)				11 (0.3%)
MLM		3 (0.7%)	10 (0.6%)	14 (1.3%)	3 (1.2%)				30 (0.8%)
MLM + A	1 (0.9%)	7 (1.7%)	34 (2.0%)	102 (9.7%)	108 (44.8%)	23 (60.5%)	17 (63.0%)		292 (8.2%)
A	1 (0.9%)	6 (1.5%)	22 (1.3%)	12 (1.1%)	28 (11.6%)	3 (7.9%)	8 (29.6%)	1 (12.5%)	81 (2.3%)
Unknown	3 (2.6%)	4 (1.0%)	16 (1.0%)	12 (1.1%)	2 (0.8%)	1 (2.6%)		2 (25.0%)	40 (1.1%)
Total	116	411	1669	1054	241	38	27	8	3564

C bilateral cervical nodes, UM upper mediastinal nodes, MLM middle-lower mediastinal nodes, A abdominal nodes

Table 19 Reconstruction route

Reconstruction route	Cases (%)
None	57 (1.6%)
Subcutaneous	302 (8.5%)
Retrosternal	1191 (33.4%)
Posterior mediastinal	1473 (41.3%)
Intrathoracic	435 (12.2%)
Cervical	50 (1.4%)
Others	34 (1.0%)
Unknown	22 (0.6%)
Total	3564

Table 20 Organs used for reconstruction

Organs used for reconstruction	Cases (%)
None	72 (2.0%)
Whole stomach	71 (2.0%)
Gastric tube	3059 (85.0%)
Jejunum	176 (4.9%)
Free jejunum	69 (1.9%)
Colon	114 (3.2%)
Free colon	10 (0.3%)
Others	13 (0.4%)
Unknown	16 (0.4%)
Total organs	3600
Total cases	3564

Table 21 Histological classification

Histological classification	Cases (%)
Squamous cell carcinoma	3045 (86.0%)
Squamous cell carcinoma	584 (16.5%)
Well differentiated	566 (16.0%)
Moderately differentiated	1445 (40.8%)
Poorly differentiated	450 (12.7%)
Adenocarcinoma	161 (4.5%)
Barrett’s adenocarcinoma	71 (2.0%)
Adenosquamous cell carcinoma	20 (0.6%)
Mucoepidermoid carcinoma	3 (0.1%)
Adenoid cystic carcinoma	2 (0.1%)
Basaloid carcinoma	71 (2.0%)
Endocrine cell carcinoma	15 (0.4%)
Undifferentiated carcinoma	6 (0.2%)
Other carcinoma	14 (0.4%)
Carcinosarcoma	18 (0.5%)
Malignant melanoma	16 (0.5%)
GIST	1 (0.0%)
Other	33 (0.9%)
Unknown	66 (1.9%)
Total	3542

Table 22 Depth of tumor invasion, pT (JES 10th)

pT category	Cases (%)
pTX	25 (0.7%)
pT0	79 (2.2%)
pTis	25 (0.7%)
pT1a	373 (10.5%)
pT1b	943 (26.5%)
pT2	450 (12.6%)
pT3	1368 (38.4%)
pT4	111 (3.1%)
pT4a	34 (1.0%)
pT4b	33 (0.9%)
Unknown	123 (3.5%)
Total	3564

Table 23 Pathological grading of lymph node metastasis, pN (JES 10th)

Lymph node metastasis	Cases (%)
pN0	2079 (58.3%)
pN1	474 (13.3%)
pN2	564 (15.8%)
pN3	233 (6.5%)
pN4	149 (4.2%)
Unknown	65 (1.8%)
Total	3564

Table 24 Pathological findings of lymph node metastasis, pN (UICC 7th)

Lymph node metastasis	Cases (%)
pN0	1571 (44.1%)
pN1 (1–2)	956 (26.8%)
pN2 (3–6)	623 (17.5%)
pN3 (7–)	351 (9.8%)
Unknown	63 (1.8%)
Total	3564

Regional lymph nodes are different in JES 10th and UICC 7th
 Data for Tables 23 and 24 are analyzed from different variables in the registration application

Table 25 Pathological findings of distant organ metastasis, pM (JES 10th)

Distant metastasis	Cases (%)
pMX	62 (1.7%)
pM0	3446 (96.7%)
pM1	56 (1.6%)
Total	3564

Table 26 Residual tumor

Residual tumor	Cases (%)
RX	156 (4.1%)
R0	3345 (87.0%)
R1	187 (4.9%)
R2	156 (4.1%)
Total	3844

Table 27 Causes of death

Cause of death	Cases (%)
Death due to recurrence	1139 (72.8%)
Death due to other cancer	65 (4.2%)
Death due to other disease (rec+)	44 (2.8%)
Death due to other disease (rec-)	179 (11.4%)
Death due to other disease (rec?)	7 (0.4%)
Operative death*	39 (2.5%)
Postoperative hospital death**	40 (2.6%)
Unknown	52 (3.3%)
Total of death cases	1565 (100%)

rec recurrence

* Operative death means death within 30 days after operation in or out of hospital

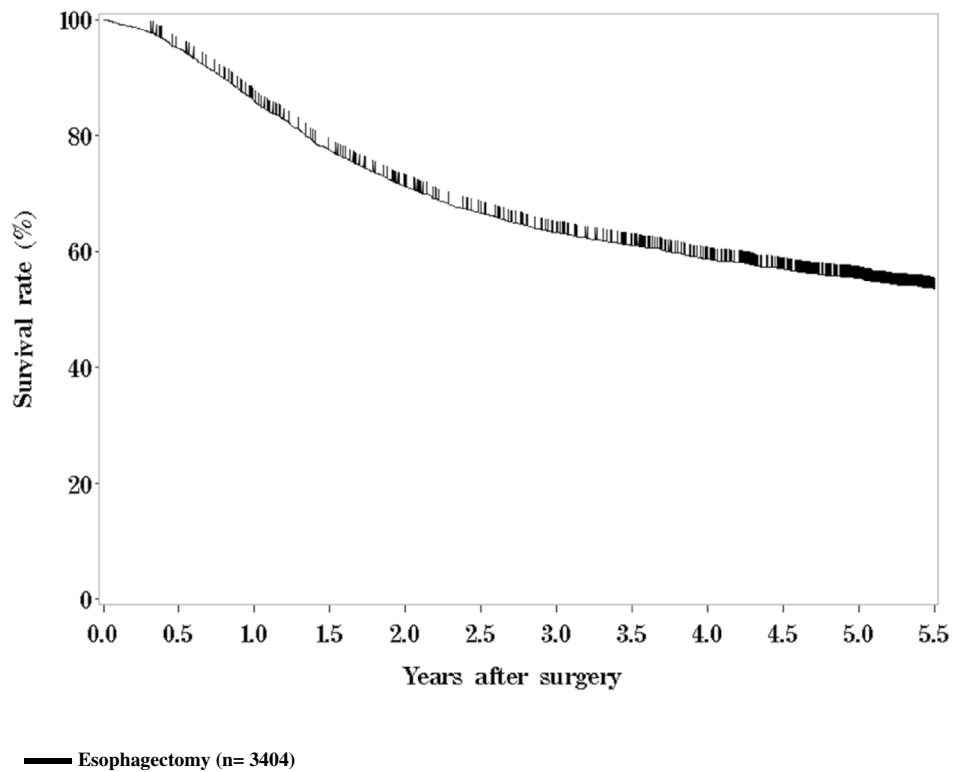
** Hospital death is defined as death during the same hospitalization, regardless of department at time of death

Operative mortality after esophagectomy: 0.61%

Hospital mortality after esophagectomy: 4.29%

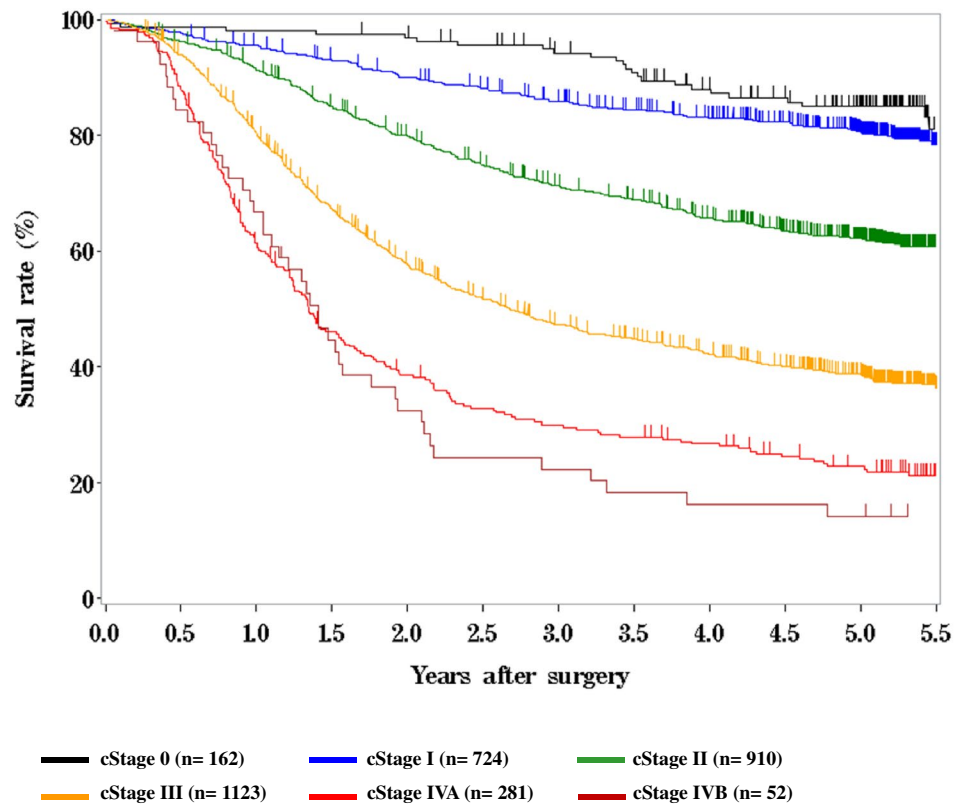
Follow-up period (months)	
Median (min - max)	48.12 (0.03 – 56.32)

Fig. 6 Survival of patients underwent esophagectomy



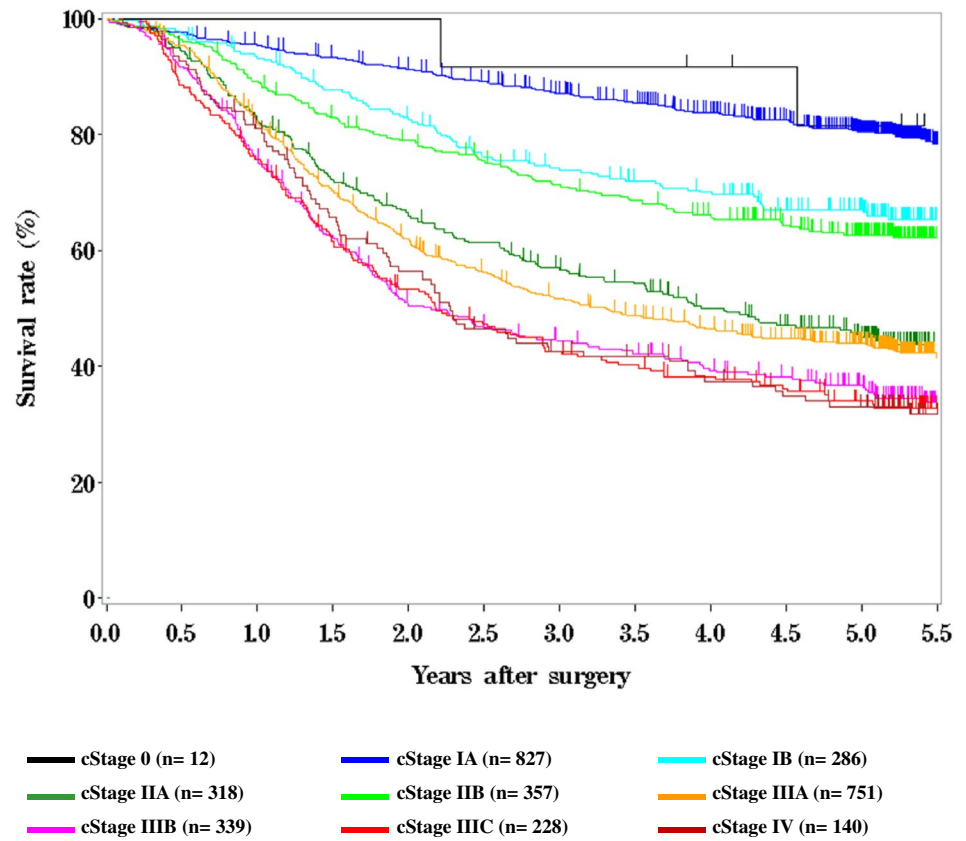
	Years after surgery				
	1	2	3	4	5
Esophagectomy	85.9%	71.2%	63.2%	58.7%	55.5%

Fig. 7 Survival of patients who underwent esophagectomy according to clinical stage (JES 10th)



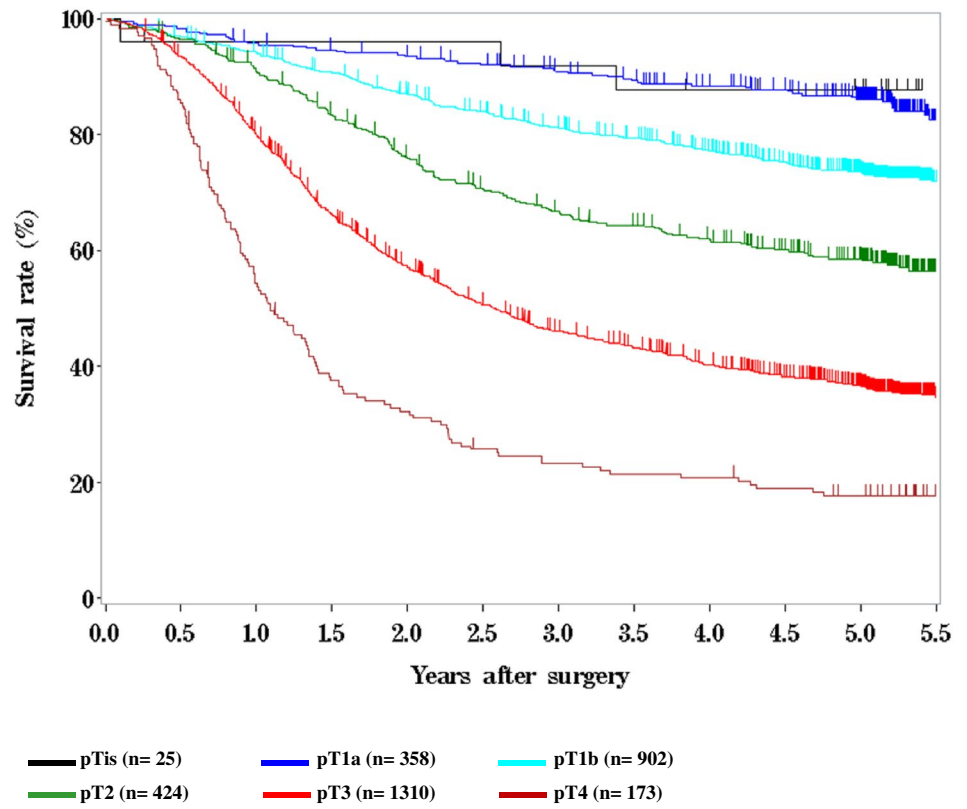
	Years after surgery				
	1	2	3	4	5
cStage 0	98.1%	96.9%	94.2%	88.0%	84.9%
cStage I	95.5%	89.9%	85.9%	83.0%	80.5%
cStage II	91.3%	79.8%	71.3%	65.8%	62.2%
cStage III	80.4%	57.7%	47.2%	42.1%	38.8%
cStage IVA	61.4%	38.6%	29.8%	26.7%	22.8%
cStage IVB	66.7%	32.5%	22.3%	16.2%	14.2%

Fig. 8 Survival of patients who underwent esophagectomy according to clinical stage (UICC 7th)



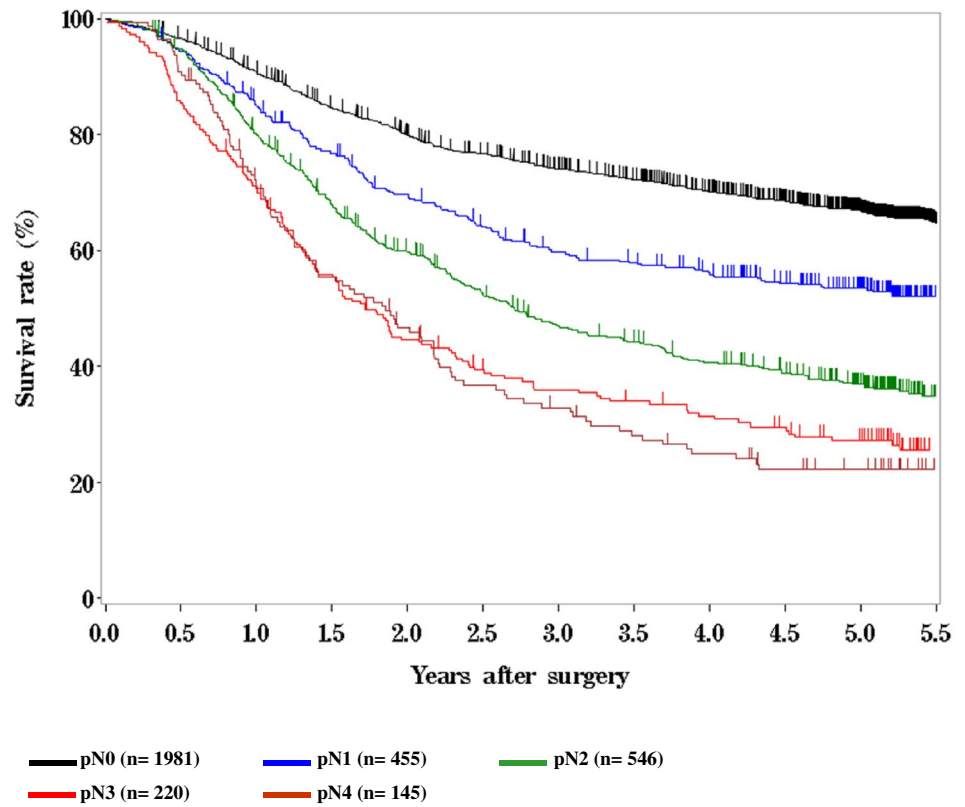
	Years after surgery				
	1	2	3	4	5
cStage 0	91.7%	91.7%	91.7%	91.7%	81.5%
cStage IA	95.5%	91.2%	87.2%	83.7%	80.5%
cStage IB	93.2%	82.5%	73.9%	70.0%	67.1%
cStage IIA	82.5%	66.0%	56.7%	50.0%	45.4%
cStage IIB	89.2%	78.9%	71.3%	65.9%	62.7%
cStage IIIA	82.2%	61.9%	51.7%	46.5%	44.0%
cStage IIIB	75.8%	50.5%	44.4%	39.3%	36.8%
cStage IIIC	75.8%	53.3%	42.6%	38.3%	34.0%
cStage IV	81.0%	56.5%	42.5%	37.5%	33.1%

Fig. 9 Survival of patients who underwent esophagectomy according to the depth of tumor invasion, pT (JES 10th)



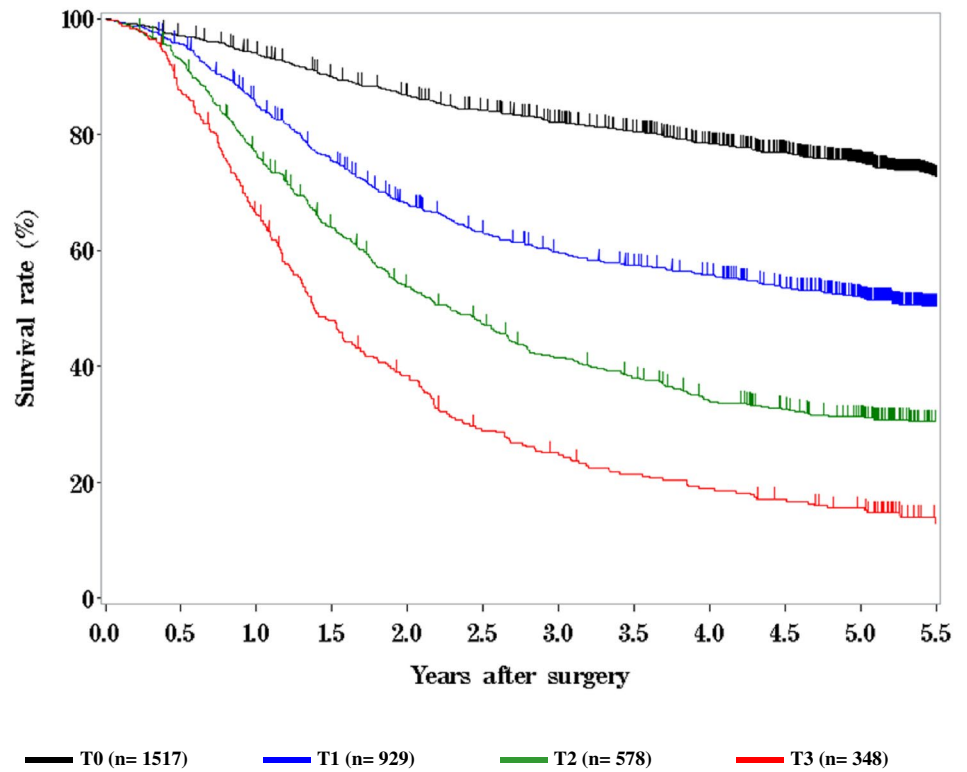
	Years after surgery				
	1	2	3	4	5
pTis	96.0%	96.0%	91.8%	87.7%	87.7%
pT1a	95.8%	93.5%	90.8%	88.4%	86.0%
pT1b	94.2%	86.9%	81.1%	77.2%	73.6%
pT2	90.8%	75.9%	66.7%	61.8%	58.6%
pT3	80.1%	57.1%	46.0%	40.3%	36.8%
pT4	54.3%	32.3%	23.2%	20.8%	17.6%

Fig. 10 Survival of patients who underwent esophagectomy according to lymph node metastasis, pN (JES 10th)



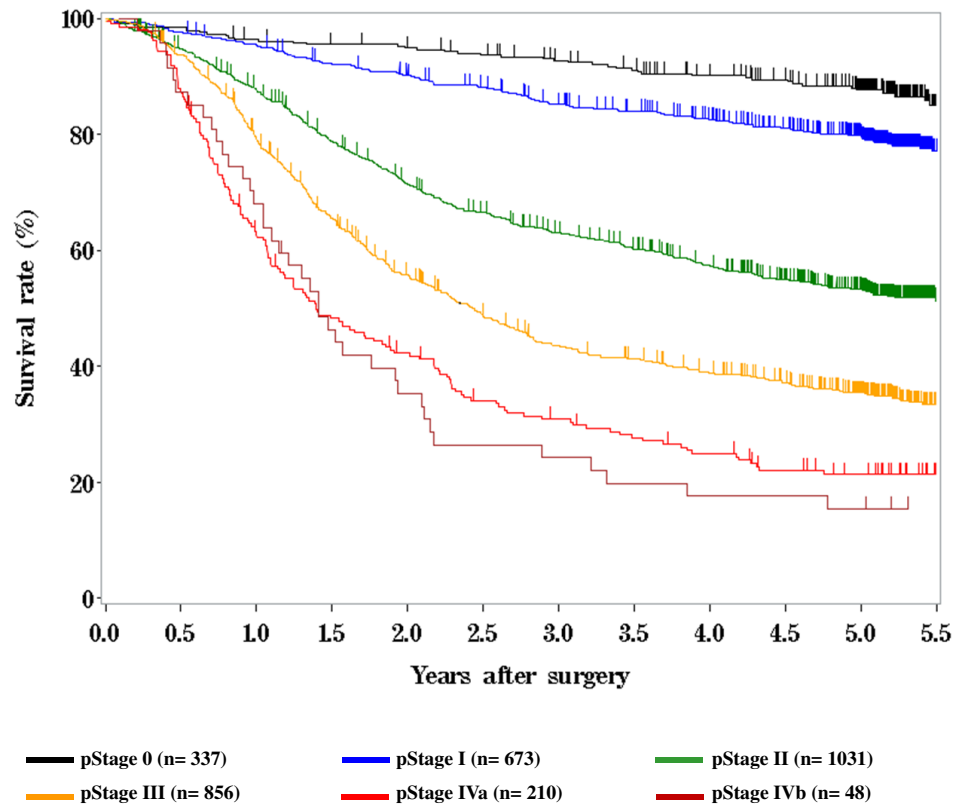
	Years after surgery				
	1	2	3	4	5
pN0	90.8%	79.8%	74.1%	70.2%	66.9%
pN1	85.0%	69.6%	59.8%	55.9%	53.5%
pN2	80.0%	59.8%	47.0%	40.7%	36.9%
pN3	70.7%	44.7%	35.9%	31.4%	27.3%
pN4	71.5%	46.6%	32.9%	24.8%	22.2%

Fig. 11 Survival of patients who underwent esophagectomy according to lymph node metastasis, pN (UICC 7th)



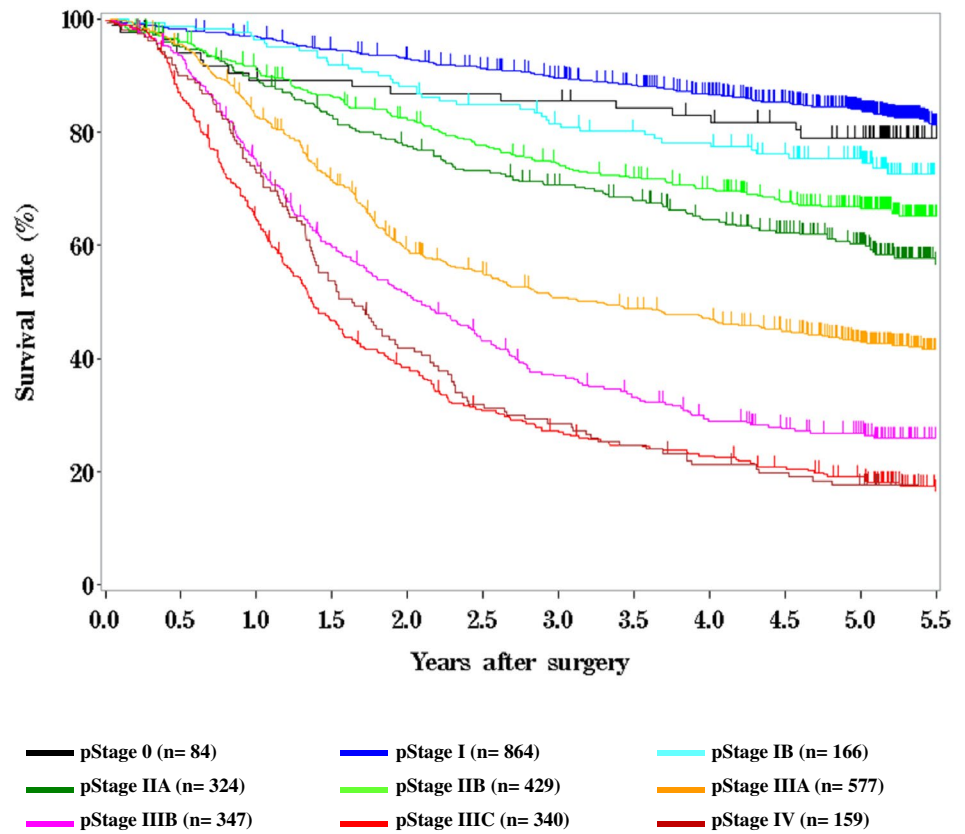
	Years after surgery				
	1	2	3	4	5
pN0	94.0%	86.7%	82.1%	78.5%	75.3%
pN1	85.0%	68.0%	59.6%	55.9%	52.0%
pN2	77.0%	53.6%	41.5%	33.8%	31.3%
pN3	66.2%	38.3%	24.7%	18.9%	15.6%

Fig. 12 Survival of patients who underwent esophagectomy according to pathological stage (JES 10th)



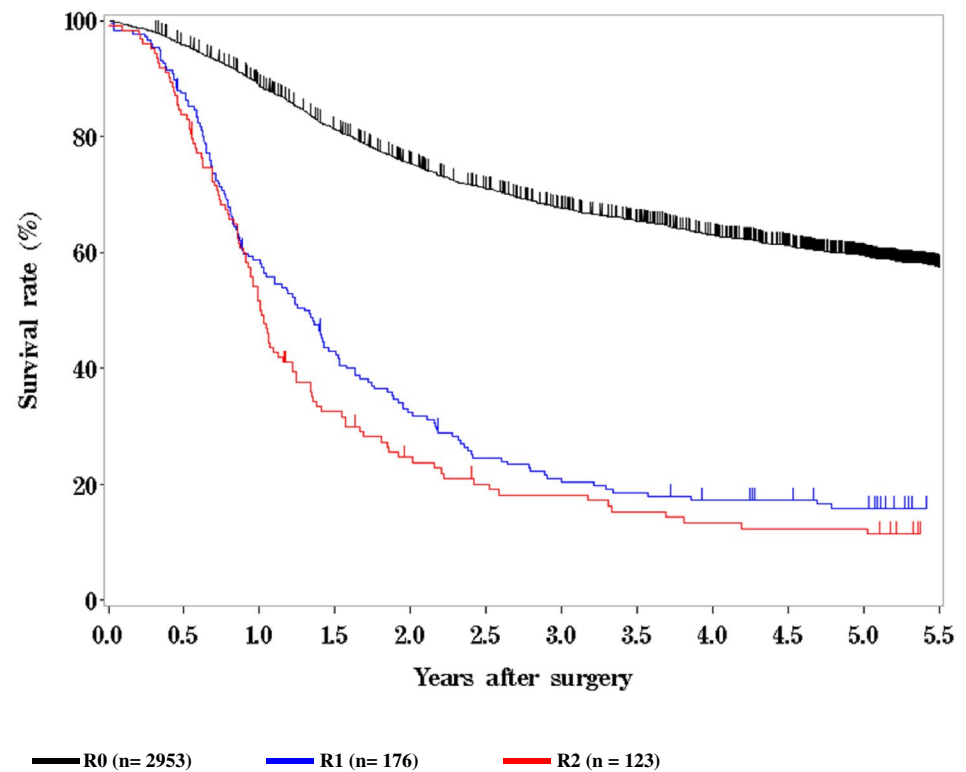
	Years after surgery				
	1	2	3	4	5
pStage 0	96.4%	94.9%	92.4%	90.1%	87.6%
pStage I	95.3%	90.1%	85.2%	82.6%	79.7%
pStage II	87.7%	71.3%	63.0%	57.3%	53.4%
pStage III	79.2%	55.8%	43.5%	38.9%	35.4%
pStage IVa	62.7%	42.3%	30.9%	24.9%	21.4%
pStage IVb	68.1%	35.3%	24.3%	17.7%	15.4%

Fig. 13 Survival of patients who underwent esophagectomy according to pathological stage (UICC TNM 7th)



	Years after surgery				
	1	2	3	4	5
pStage 0	89.2%	86.7%	85.5%	83.0%	79.0%
pStage IA	97.0%	92.9%	89.6%	86.6%	83.9%
pStage IB	96.2%	88.0%	81.5%	78.2%	75.4%
pStage IIA	89.6%	77.4%	70.6%	64.4%	60.2%
pStage IIB	91.0%	82.2%	74.2%	70.1%	66.5%
pStage IIIA	82.7%	59.3%	50.8%	46.9%	43.1%
pStage IIIB	75.2%	51.3%	36.9%	29.0%	26.8%
pStage IIIC	64.6%	38.5%	27.0%	22.8%	19.2%
pStage IV	72.7%	41.9%	28.6%	21.2%	17.7%

Fig. 14 Survival of patients who underwent esophagectomy according to residual tumor (R)



	Years after surgery				
	1	2	3	4	5
R0	88.8%	75.3%	67.7%	63.0%	59.6%
R1	58.7%	32.3%	20.4%	17.4%	15.8%
R2	51.7%	24.7%	18.1%	13.4%	12.4%

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Compliance with ethical standards

Conflict of interest All authors have nothing to disclose with regard to commercial support.

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