

Comprehensive Registry of Esophageal Cancer in Japan, 2009

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Received: 7 February 2016 / Accepted: 14 March 2016 / Published online: 29 March 2016
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Preface 2009

We deeply appreciate the great contributions of many physicians in the registry of esophageal cancer cases. The Comprehensive Registry of Esophageal Cancer in Japan, 2009 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, 2009. Japanese Classification of Esophageal Cancer 10th and UICC TNM Classification 6th were used for cancer staging according to the subjected year. A total of 6260 cases were registered from

276 institutions in Japan. Tumor locations were cervical: 4.4 %, upper thoracic: 11.9 %, middle thoracic: 48.0 %, lower thoracic: 27.7 % and EG junction: 6.6 %. Superficial carcinomas (Tis, T1a, T1b) were 36.7 %. As for the histologic type of biopsy specimens, squamous cell carcinoma and adenocarcinoma accounted for 90.5 and 3.8 %, respectively. Regarding clinical results, the 5-year survival rates of patients treated using endoscopic mucosal resection, concurrent chemoradiotherapy, radiotherapy alone, chemotherapy alone, or esophagectomy were 86.2, 27.9, 20.2, 5.8, and 55.9 %, respectively. Esophagectomy was performed in 3844 cases. Concerning the approach used for esophagectomy, 24.9 % of the cases were treated thoracoscopically. The operative mortality (within 30 days after surgery) was 1.01 % and the hospital mortality was 4.76 %.

We hope that this Comprehensive Registry of Esophageal Cancer in Japan, 2009 will help to improve all aspects of the diagnosis and treatment of esophageal cancer in Japan.

These data were first made available on January 2016, as the Comprehensive Registry of Esophageal Cancer in Japan, 2009. Not all the tables and figures 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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I. Clinical factors of esophageal cancer patients treated in 2009

Institution-registered cases in 2009

Institutions

Aichi Cancer Center
 Aizawa Hospital
 Akita University Hospital
 Aomori Municipal Hospital
 Aomori Prefectural Central Hospital
 Arao Municipal Hospital
 Asahikawa Medical College Hospital
 Chiba Cancer Center
 Chiba Medical Center
 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 Hospital
 Fukuoka Wajiro Hospital
 Fukushima Medical University Hospital
 Fukuyama City Hospital
 Gifu Prefectural General Medical Center
 Gifu University Hospital
 Gunma Central General Hospital
 Gunma Prefectural Cancer Center
 Gunma University Hospital
 Gunmaku Saiseikai Maebashi Hospital
 Hachinohe City Hospital
 Hakodate Goryokaku Hospital
 Hakodate National Hospital
 Hamamatsu University School of Medicine, University Hospital
 Handa City Hospital
 Hannan Chuo Hospital
 Heartlife Hospital
 Higashiosaka City General Hospital
 Hino Memorial Hospital
 Hiratsuka City Hospital
 Hiratsuka Kyosai Hospital

Continued

Institutions

Hirosaki University Hospital
 Hiroshima City Asa Hospital
 Hiroshima University Research Institute for Radiation Biology
 Medicine
 Hitachi General Hospital
 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
 Imazu Surgical Clinic
 Inazawa City Hospital
 Internatinal University of Health and Welfare Hospital
 Isehara Kyodo Hospital
 Ishikawa Prefectural Central Hospital
 Iwakuni Medical Center
 Iwate Medical University Hospital
 Iwate Prefectural Chubu Hospital
 Iwate Prefectural Isawa 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 Narita Hospital
 Japanese Red Cross Nasu Hospital
 Jichi Medical University Hospital
 Juntendo University Hospital
 Juntendo University Shizuoka Hospital
 Junwakai Memorial 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 Rosai Hospital
 Kashiwa Kousei General Hospital
 Kawakita General Hospital
 Kawasaki Medical School Hospital
 Kawasaki Medical School Kawasaki Hospital
 Kawasaki Municipal Hospital
 Kawasaki Municipal Ida Hospital

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Institutions

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
 Kitasato University Hospital
 Kobe City Medical Center General Hospital
 Kobe University Hospital
 Kochi University Hospital
 Kokura Memorial Hospital
 Kumamoto City Hospital
 Kumamoto University Hospital
 Kurashiki Central Hospital
 Kurume General Hospital
 Kurume University Hospital
 Kuwana West Medical Center
 Kyoto University Hospital
 Kyushu Central Hospital of the Mutual Aid Association of Public School Teachers
 Kyushu University Beppu Hospital
 Kyushu University Hospital
 Kyushu Medical Center
 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
 Musashimurayama 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
 Nara Hospital Kinki University Faculty of Medicine

Continued

Institutions

Nara Medical University Hospital
 National Cancer Center Hospital
 National Cancer Center Hospital East
 National Center for Global Health and Medicine
 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 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
 Ohta General Hospital Foundation Ohta Nishinouchi Hospital
 Oita Red Cross Hospital
 Oita University Hospital
 Okayama Saiseikai General Hospital
 Okayama University Hospital
 Onomichi Municipal Hospital
 Osaka City General 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 Red Cross Hospital
 Osaka University Hospital
 Otsu Municipal Hospital
 Otsu Red Cross Hospital
 Rakusei Hospital
 Ryukyu University Hospital

Continued

Institutions

Saga University Hospital
 Saga-ken Medical Center Koseikan
 Saiseikai Fukushima General Hospital
 Saiseikai Hiroshima Hospital
 Saiseikai Kyoto Hospital
 Saiseikai Utsunomiya Hospital
 Saitama City Hospital
 Saitama Medical Center Jichi Medical University
 Saitama Medical University Hospital
 Saitama Medical University Saitama International Medical Center
 Saitama Medical University Saitama Medical Center
 Saitama Medical Center
 Sakai City Medical Center
 Saku Central Hospital
 Sanin Rosai Hospital
 Sano Kousei General Hospital
 Sendai City Hospital
 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 Hospital
 Showa University Northern Yokohama Hospital
 Showa University Koto-Toyosu Hospital
 Social Insurance Omuta Tenryo Hospital
 Social Insurance Tagawa Hospital
 Yokohama Chuo Hospital
 Sonoda Daiichi 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
 Teikyo University Hospital
 Tenri Hospital
 The Cancer Institute Hospital of JFCR
 The Jikei University Hospital
 The Research Center Hospital for Charged Particle Therapy of NIRS
 Toho University Omori Medical Center

Continued

Institutions

Toho University Sakura Medical Center
 Tohoku Kosai Hospital
 Tohoku University Hospital
 Tokai University Hachioji Hospital
 Tokai University Hospital
 Tokai University Tokyo Hospital
 Tokushima Municipal 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 Cancer and Infectious Center Komagome Hospital
 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
 Tone Chuo Hospital
 Tottori Prefectural Central Hospital
 Tottori University Hospital
 Toyama Prefectural Central Hospital
 Toyama University 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
 Yamagata University Hospital
 Yamaguchi University Hospital
 Yamaguchi-ken Saiseikai Shimonoseki General Hospital
 Yamanashi Prefectural Central Hospital
 Yamanashi University Hospital
 Yao Municipal Hospital
 Yokohama City Municipal Hospital
 Yokohama City University Hospital
 Yokohama City University Medical Center
 Yuri General Hospital

(Total 276 institutions)

Patient Background

Table 1 Age and gender

Age	Male	Female	Unknown	Cases (%)
~29	6	1	0	7 (0.1 %)
30–39	12	6	0	18 (0.3 %)
40–49	121	34	0	155 (2.5 %)
50–59	946	173	1	1120 (17.9 %)
60–69	2332	354	0	2686 (42.9 %)
70–79	1575	270	1	1846 (29.5 %)
80–89	303	75	0	378 (6.0 %)
90~	16	3	0	19 (0.3 %)
Unknown	27	4	0	31 (0.5 %)
Total	5338	920	2	6260 (100 %)

Table 2 Primary treatment

Treatments	Cases (%)
Surgery	3943 (63.0 %)
Esophagectomy	3844 (61.8 %)
Palliative	99 (1.2 %)
Chemotherapy/radiotherapy	1383 (22.1 %)
Endoscopic treatment	932 (14.9 %)
Others	2 (0.0 %)
Total	6260 (100 %)

Table 3 Tumor location

Location of tumor	Endoscopic treatment (%)	Chemotherapy and/or radiotherapy (%)	Palliative surgery (%)	Esophagectomy (%)	Other (%)	Total (%)
Cervical	18 (1.9 %)	112 (8.1 %)	9 (9.1 %)	137 (3.6 %)	0	276 (4.4 %)
Upper thoracic	105 (11.3 %)	184 (13.3 %)	19 (19.2 %)	437 (11.4 %)	0	745 (11.9 %)
Middle thoracic	511 (54.8 %)	665 (48.1 %)	50 (50.5 %)	1778 (46.3 %)	1 (50.0 %)	3005 (48.0 %)
Lower thoracic	243 (26.1 %)	325 (23.5 %)	18 (18.2 %)	1147 (29.8 %)	0	1733 (27.7 %)
E > G	40 (4.3 %)	38 (2.7 %)	2 (2.0 %)	245 (6.4 %)	0	325 (5.2 %)
E = G	5 (0.5 %)	6 (0.4 %)	0	41 (1.1 %)	0	52 (0.8 %)
G > E	0	2 (0.1 %)	0	34 (0.9 %)	0	36 (0.6 %)
Unknown	10 (1.1 %)	51 (3.7 %)	1 (1.0 %)	25 (0.7 %)	1 (50.0 %)	88 (1.4 %)
Total	932 (100 %)	1383 (100 %)	99 (100 %)	3844 (100 %)	2 (100 %)	6260 (100 %)

E esophageal, G gastric

Table 4 Histologic types of biopsy specimens

Histologic types	Cases (%)
Squamous cell carcinoma	5665 (90.5 %)
Squamous cell carcinoma	3827 (61.1 %)
Well differentiated	354 (5.7 %)
Moderately differentiated	1140 (18.2 %)
Poorly differentiated	344 (5.5 %)
Adenocarcinoma	296 (4.7 %)
Adenosquamous carcinoma	13 (0.2 %)
Mucoepidermoid carcinoma	1 (0.0 %)
Basaloid carcinoma	22 (0.4 %)
Neuroendocrine cell carcinoma	14 (0.2 %)
Undifferentiated carcinoma	10 (0.2 %)
Malignant melanoma	7 (0.1 %)
Carcinosarcoma	17 (0.3 %)
Other tumors	28 (0.4 %)
Unknown	187 (3.0 %)
Total	6260 (100 %)

Table 5 Depth of tumor invasion, cT (UICC TNM 6th)

cT	Cases (%)
cTX	29 (0.5 %)
cT0	11 (0.2 %)
cTis	157 (2.5 %)
cT1	359 (5.7 %)
cT1a	650 (10.4 %)
cT1b	1134 (18.1 %)
cT2	868 (13.9 %)
cT3	2252 (36.0 %)
cT4	701 (11.2 %)
Unknown	99 (1.6 %)
Total	6260 (100 %)

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

cN	Cases (%)
cNX	72 (1.2 %)
cN0	2920 (46.6 %)
cN1	3157 (50.4 %)
Unknown	111 (1.8 %)
Total	6260 (100 %)

Table 7 Distant metastasis, cM (UICC TNM 6th)

cM	Cases (%)
cMX	57 (0.9 %)
cM0	5295 (84.6 %)
cM1	223 (3.6 %)
cM1a	141 (2.3 %)
cM1b	466 (7.4 %)
Total	6260 (100 %)

Table 8 Clinical Stage (UICC TNM 6th)

Location of tumor	Endoscopic treatment (%)	Chemotherapy and/or radiotherapy (%)	Palliative surgery (%)	Esophagectomy (%)	Other (%)	Total (%)
0	131 (14.1 %)	6 (0.4 %)	1 (1.0 %)	13 (0.3 %)	0	151 (2.4 %)
I	658 (70.6 %)	152 (11.0 %)	2 (2.0 %)	964 (25.1 %)	0	1776 (28.4 %)
IIA	6 (0.6 %)	125 (9.0 %)	7 (7.1 %)	717 (18.7 %)	0	855 (13.7 %)
IIB	7 (0.8 %)	98 (7.1 %)	2 (2.0 %)	555 (14.4 %)	0	662 (10.6 %)
III	29 (3.1 %)	452 (32.7 %)	62 (62.6 %)	1243 (32.3 %)	1 (50.0 %)	1787 (28.5 %)
IV	10 (1.1 %)	139 (10.1 %)	7 (7.1 %)	44 (1.1 %)	0	200 (3.2 %)
IVA	5 (0.5 %)	53 (3.8 %)	1 (1.0 %)	81 (2.1 %)	0	140 (2.2 %)
IVB	18 (1.9 %)	265 (19.2 %)	12 (12.1 %)	156 (4.1 %)	0	451 (7.2 %)
Unknown	68 (7.3 %)	93 (6.7 %)	5 (5.1 %)	71 (1.8 %)	1 (50.0 %)	238 (3.8 %)
Total	932 (100 %)	1383 (100 %)	99 (100 %)	3844 (100 %)	2 (100 %)	6260 (100 %)

II. Results of endoscopically treated patients in 2009

Table 9 Details of endoscopic treatment

Treatment details	Cases (%)
EMR	201 (21.6 %)
EMR + ESD	11 (1.2 %)
EMR + YAG laser	7 (0.8 %)
ESD	607 (65.1 %)
ESD + other treatment	7 (0.8 %)
PDT	2 (0.2 %)
PDT + YAG laser	2 (0.2 %)
YAG laser	10 (1.1 %)
Esophageal stenting	70 (7.5 %)
Esophageal stenting + tracheal stenting	2 (0.2 %)
Tracheal stenting	4 (0.4 %)
Others	5 (0.5 %)
Unknown	4 (0.4 %)
Total	753 (100 %)

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

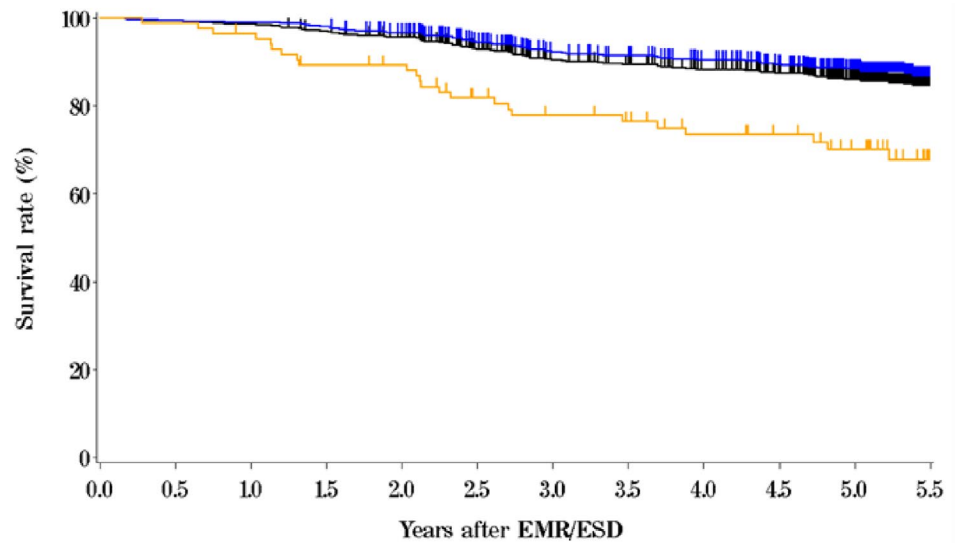
Table 10 Complications of EMR/ESD

Complications of EMR/ESD	Cases (%)
None	766 (91.8 %)
Perforation	16 (1.9 %)
Bleeding	2 (0.2 %)
Mediastinitis	0
Stenosis	42 (5.0 %)
Others	7 (0.8 %)
Unknown	1 (0.1 %)
Total	834 (100 %)

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

Pathological depth of tumor invasion	Cases (%)
pTX	1 (0.1 %)
pT0	5 (0.6 %)
pTis	166 (19.9 %)
pT1a	507 (60.9 %)
pT1b	86 (10.3 %)
pT2	0
Unknown	68 (8.2 %)
Total	833 (100 %)

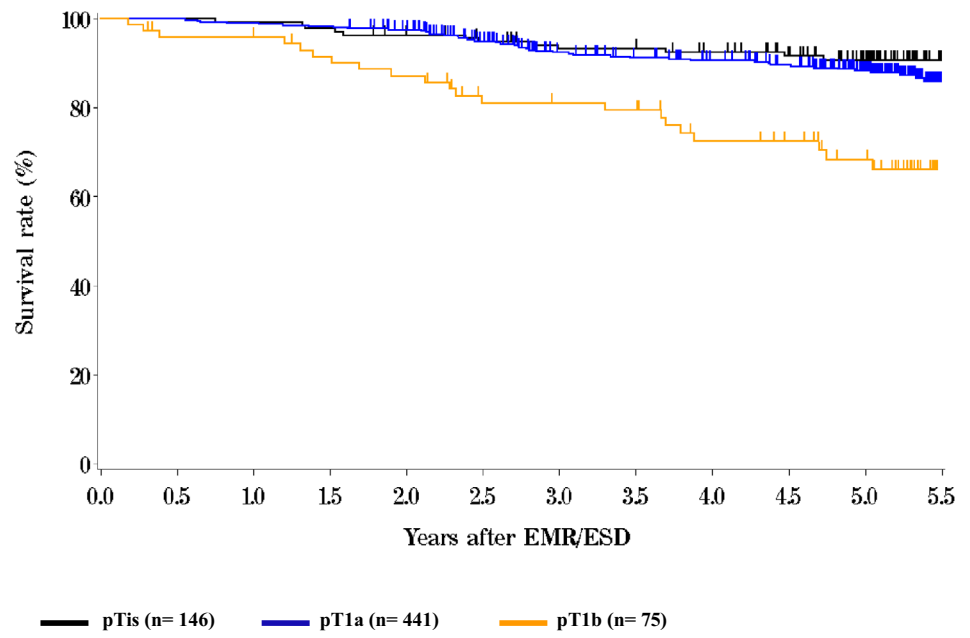
Fig. 1 Survival of patients treated with EMR/ESD



— Total (n= 725) — Complete resection (n= 638) — Incomplete resection (n= 87)

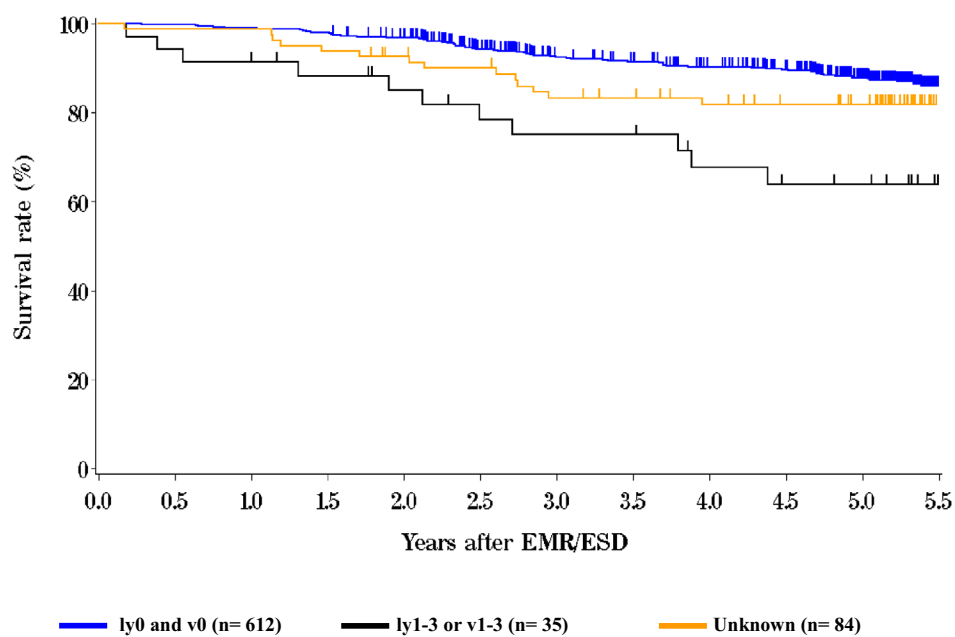
	Years after EMR/ESD				
	1	2	3	4	5
Total	98.7%	95.7%	90.4%	88.3%	86.2%
Complete resection	99.0%	96.7%	92.2%	90.4%	88.4%
Incomplete resection	96.5%	89.3%	77.8%	73.4%	70.1%

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%	96.4%	93.3%	92.5%	90.7%
pT1a	99.0%	97.6%	92.4%	90.6%	88.2%
pT1b	95.9%	87.2%	81.1%	72.5%	68.3%

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	99.1%	96.8%	92.4%	90.4%	88.0%
ly1-3 or v1-3	91.4%	85.1%	75.0%	67.7%	63.9%
Unknown	98.8%	92.6%	83.3%	81.8%	81.8%

III. Results in patients treated with chemotherapy and/or radiotherapy in 2009

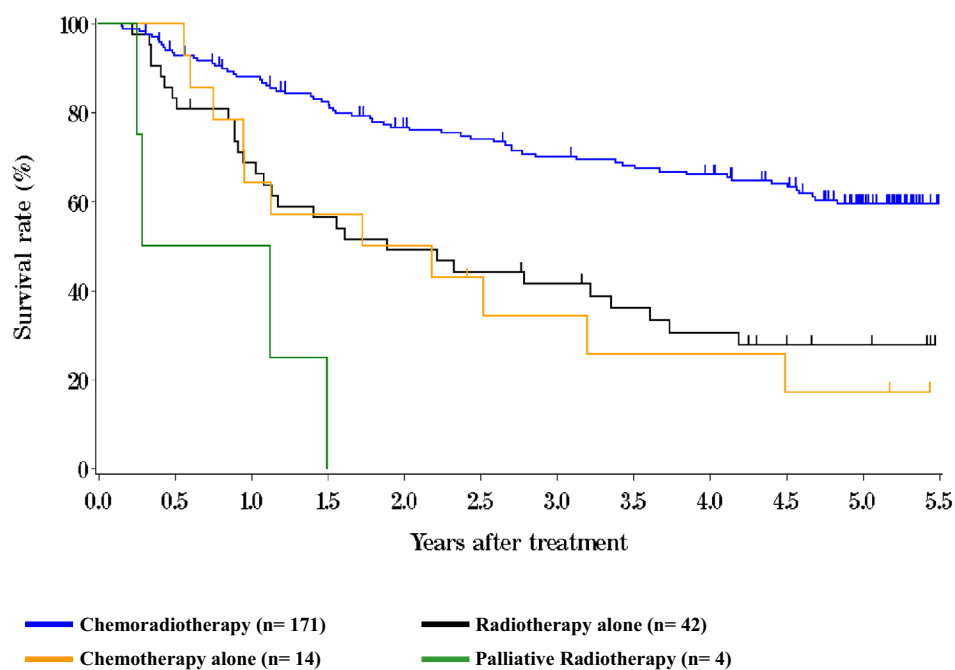
Table 12 Dose of radiation (non-surgically treated cases)

Dose of radiation (Gy)	Definitive		Palliative (%)	Recurrence (%)	Others (%)	Unknown (%)	Total (%)
	Radiation alone (%)	With chemotherapy (%)					
–29	5 (4.1 %)	18 (2.3 %)	23 (11.0 %)	2 (6.1 %)	0	1 (5.6 %)	49 (4.1 %)
30–39	1 (0.8 %)	15 (1.9 %)	25 (11.9 %)	3 (9.1 %)	1 (7.1 %)	0	45 (3.8 %)
40–49	11 (8.9 %)	40 (5.1 %)	31 (14.8 %)	9 (27.3 %)	8 (57.1 %)	1 (5.6 %)	100 (8.4 %)
50–59	24 (19.5 %)	199 (25.3 %)	47 (22.4 %)	8 (24.2 %)	2 (14.3 %)	1 (5.6 %)	281 (23.7 %)
60–69	74 (60.2 %)	493 (62.6 %)	81 (38.6 %)	9 (27.3 %)	2 (14.3 %)	15 (83.3 %)	674 (56.8 %)
70–	6 (7.2 %)	8 (2.1 %)	2 (0.0 %)	0	0	0	16 (2.2 %)
Unknown	2 (1.6 %)	15 (1.9 %)	1 (0.5 %)	2 (6.1 %)	1 (7.1 %)	0	21 (1.8 %)
Total	123 (100 %)	788 (100 %)	210 (100 %)	33 (100 %)	14 (100 %)	18 (100 %)	1186 (100 %)
Median (min–max)	60.0 (6.0–120.0)	60.0 (2.0–124.0)	54.0 (2.0–95.4)	50.0 (20.0–66.0)	40.0 (36.0–60.0)	60.0 (2.0–61.2)	60.0 (2.0–124.0)

Table 13 Dose of radiation (surgically treated cases)

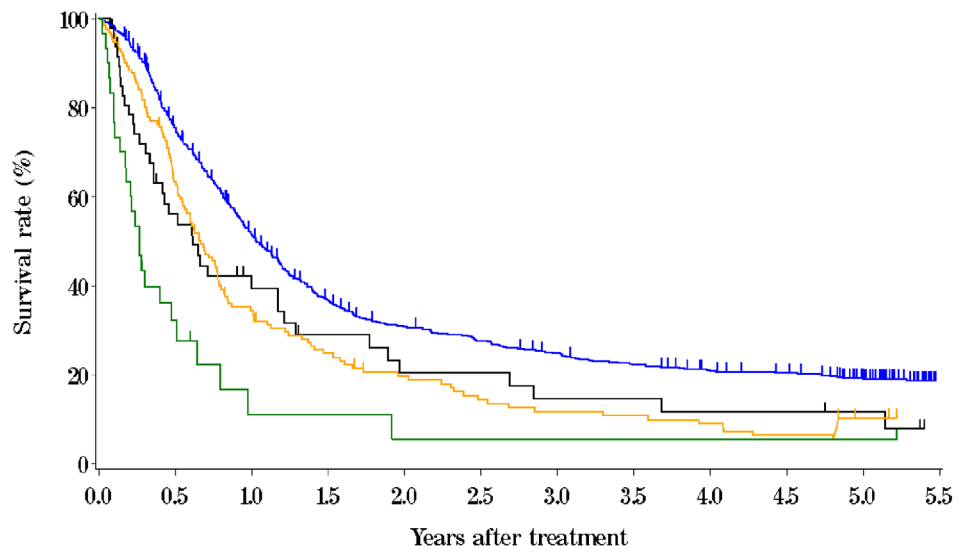
Dose of radiation (Gy)	Preoperative radiation (%)	Postoperative radiation (%)
–29	3 (1.4 %)	1 (1.4 %)
30–39	54 (24.4 %)	2 (2.7 %)
40–49	132 (59.7 %)	21 (28.4 %)
50–59	9 (4.1 %)	18 (24.3 %)
60–69	15 (6.8 %)	27 (36.5 %)
70–	0	0 (1.1 %)
Unknown	8 (3.6 %)	5 (6.8 %)
Total	221 (100 %)	74 (100 %)
Median (min–max)	40.0 (15.0–66.0)	50.4 (4.0–64.0)

Fig. 4 Survival of patients treated with chemotherapy and/or radiotherapy (cStage I-IIA)



	Years after treatment				
	1	2	3	4	5
Chemoradiotherapy	88.0%	76.7%	70.8%	66.1%	59.5%
Radiotherapy alone	73.6%	49.1%	41.6%	30.5%	27.8%
Chemotherapy alone	64.3%	50.0%	34.3%	25.7%	17.1%
Palliative radiotherapy	50.0%	0.0%	-	-	-

Fig. 5 Survival of patients treated with chemotherapy and/or radiotherapy (cStage IIB-IVB)



— Chemoradiotherapy (n= 625) — Radiotherapy alone (n= 48)
— Chemotherapy alone (n= 133) — Palliative Radiotherapy (n= 30)

	Years after treatment				
	1	2	3	4	5
Chemoradiotherapy	51.5%	30.7%	24.7%	20.8%	19.1%
Radiotherapy alone	39.4%	20.2%	14.4%	11.6%	11.6%
Chemotherapy alone	34.4%	19.6%	11.6%	8.9%	5.3%
Palliative radiotherapy	11.0%	5.5%	5.5%	5.5%	5.5%

IV. Results in patients who underwent esophagectomy in 2009

Table 14 Treatment modalities of esophagectomy

Treatments	Cases (%)
Esophagectomy	1630 (42.4 %)
Esophagectomy + radiotherapy	65 (1.7 %)
Esophagectomy + chemoradiotherapy	655 (17.0 %)
Esophagectomy + chemoradiotherapy + endoscopic treatment	16 (0.4 %)
Esophagectomy + chemoradiotherapy + other treatment	2 (0.1 %)
Esophagectomy + radiotherapy + endoscopic treatment	3 (0.1 %)
Esophagectomy + radiotherapy + other treatment	1 (0.0 %)
Esophagectomy + chemotherapy	1385 (36.0 %)
Esophagectomy + chemotherapy + endoscopic treatment	8 (0.2 %)
Esophagectomy + chemotherapy + other treatment	2 (0.1 %)
Esophagectomy + endoscopic treatment	77 (2.0 %)
Total	3844 (100 %)

Table 15 Tumor location

Locations	Cases (%)
Cervical	137 (3.6 %)
Upper thoracic	437 (11.4 %)
Middle thoracic	1778 (46.3 %)
Lower thoracic	1147 (29.8 %)
E > G	245 (6.4 %)
E = G	41 (1.1 %)
G > E	34 (0.9 %)
Unknown	25 (0.7 %)
Total lesions	3844 (100 %)

Table 16 Approaches to tumor resection

Approaches	Cases (%)
Cervical approach	132 (3.4 %)
Right thoracotomy	3239 (84.3 %)
Left thoracotomy	66 (1.7 %)
Left thoracoabdominal approach	49 (1.3 %)
Laparotomy	148 (3.9 %)
Transhiatal thoracic esophagectomy	52 (1.4 %)
Transhiatal lower esophagectomy	92 (2.4 %)
Sternotomy	2 (0.1 %)
Others	32 (0.8 %)
Unknown	32 (0.8 %)
Total	3844 (100 %)

Table 17 Video-assisted surgery

Video-assisted surgery	Cases (%)
None	2549 (66.3 %)
Thoracoscopy	554 (14.4 %)
Laparoscopy	124 (3.2 %)
Thoracoscopy + laparoscopy	388 (10.1 %)
Mediastinoscopy	26 (0.7 %)
Thoracoscopy + laparoscopy + mediastinoscopy	4 (0.1 %)
Thoracoscopy + other	11 (0.3 %)
Laparoscopy + mediastinoscopy	5 (0.1 %)
Others	17 (0.4 %)
Unknown	166 (4.3 %)
Total	3844 (100 %)

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	9 (6.6 %)	21 (4.8 %)	76 (4.3 %)	39 (3.4 %)	5 (2.0 %)	4 (9.8 %)	1 (2.9 %)	6 (75.0 %)	161 (4.2 %)
C	51 (37.2 %)	5 (1.1 %)	13 (0.7 %)	3 (0.3 %)	0 (0.0 %)	0	0	1 (12.5 %)	73 (1.9 %)
C + UM	20 (14.6 %)	5 (1.1 %)	0	0	0	0	0	0	25 (0.7 %)
C + UM + MLM	7 (5.1 %)	9 (2.1 %)	45 (2.5 %)	18 (1.6 %)	2 (0.8 %)	0	0	0 (0.0 %)	81 (2.1 %)
C + UM + MLM + A	35 (25.5 %)	286 (65.4 %)	935 (52.6 %)	435 (37.9 %)	29 (11.8 %)	3 (7.3 %)	1 (2.9 %)	8 (100.0 %)	1732 (45.1 %)
C + UM + MLM + A + other	2 (1.5 %)	4 (0.9 %)	0	1 (0.1 %)	0	0	0	0	7 (0.2 %)
C + UM + A	0 (0.0 %)	1 (0.2 %)	1 (0.1 %)	0	0	0	0	0	2 (0.1 %)
C + MLM + A	0	2 (0.5 %)	4 (0.2 %)	4 (0.3 %)	0	0	0	0	10 (0.3 %)
C + A	5 (3.6 %)	1 (0.2 %)	3 (0.2 %)	3 (0.3 %)	0	0	0	1 (12.5 %)	13 (0.3 %)
UM	0	5 (1.1 %)	4 (0.2 %)	5 (0.4 %)	0	0	0	0	14 (0.4 %)
UM + MLM	2 (1.5 %)	10 (2.3 %)	17 (1.0 %)	13 (1.1 %)	2 (0.8 %)	0	0	1 (12.5 %)	45 (1.2 %)
UM + MLM + A	0	64 (14.6 %)	584 (32.8 %)	485 (42.3 %)	81 (33.1 %)	9 (22.0 %)	5 (14.7 %)	2 (25.0 %)	1230 (32.0 %)
UM + MLM + A + other	0	0 (0.0 %)	1 (0.1 %)	0	0	0	0	0	1 (0.0 %)
UM + A	0	1 (0.2 %)	3 (0.2 %)	3 (0.3 %)	0	0	0	0	7 (0.2 %)
MLM	0	3 (0.7 %)	13 (0.7 %)	5 (0.4 %)	3 (1.2 %)	0	0	0 (0.0 %)	24 (0.6 %)
MLM + A	1 (0.7 %)	12 (2.7 %)	50 (2.8 %)	104 (9.1 %)	91 (37.1 %)	16 (39.0 %)	9 (26.5 %)	3 (37.5 %)	286 (7.4 %)
A	1 (0.7 %)	5 (1.1 %)	20 (1.1 %)	24 (2.1 %)	30 (12.2 %)	9 (22.0 %)	18 (52.9 %)	0	107 (2.8 %)
Unknown	4 (2.9 %)	3 (0.7 %)	9 (0.5 %)	5 (0.4 %)	2 (0.8 %)	0	0	3 (37.5 %)	26 (0.7 %)
Total	137 (100 %)	437 (100 %)	1778 (100 %)	1147 (100 %)	245 (100 %)	41 (100 %)	34 (100 %)	25 (100 %)	3844 (100 %)

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

Table 19 Reconstruction route

Reconstruction route	Cases (%)
None	48 (1.2 %)
Subcutaneous	323 (8.4 %)
Retrosternal	1422 (37.0 %)
Intrathoracic	446 (11.6 %)
Posterior mediastinal	1491 (38.8 %)
Cervical	49 (1.3 %)
Others	36 (0.9 %)
Unknown	29 (0.8 %)
Total	3844 (100 %)

Table 20 Organs used for reconstruction

Organs used for reconstruction	Cases (%)
None	51 (1.3 %)
Whole stomach	102 (2.6 %)
Gastric tube	3234 (81.6 %)
Jejunum	213 (5.4 %)
Free jejunum	88 (2.2 %)
Colon	153 (3.9 %)
Free colon	12 (0.3 %)
Skin graft	0 (0.0 %)
Others	93 (2.3 %)
Unknown	18 (0.5 %)
Total organs	3964 (100 %)
Total cases	3844

Table 21 Histological classification

Histological classification	Cases (%)
Squamous cell carcinoma	3300 (86.7 %)
Squamous cell carcinoma	685 (18.0 %)
Well differentiated	653 (17.2 %)
Moderately differentiated	1521 (40.0 %)
Poorly differentiated	441 (11.6 %)
Adenocarcinoma	222 (5.8 %)
Adenosquamous cell carcinoma	35 (0.9 %)
Adenoid cystic carcinoma	1 (0.0 %)
Basaloid carcinoma	56 (1.5 %)
Neuroendocrine cell carcinoma	17 (0.4 %)
Undifferentiated carcinoma	10 (0.3 %)
Other carcinoma	9 (0.2 %)
Carcinosarcoma	21 (0.6 %)
Malignant melanoma	11 (0.3 %)
GIST	1 (0.0 %)
Other	46 (1.2 %)
Unknown	78 (2.0 %)
Total	3807 (100 %)

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

pT category	Cases (%)
pTX	24 (0.6 %)
pT0	94 (2.4 %)
pTis	29 (0.8 %)
pT1a	422 (11.0 %)
pT1b	1065 (27.7 %)
pT2	454 (11.8 %)
pT3	1518 (39.5 %)
pT4	127 (3.3 %)
pT4a	27 (0.7 %)
pT4b	30 (0.8 %)
Unknown	54 (1.4 %)
Total	3844 (100 %)

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

Lymph node metastasis	Cases (%)
pN0	2270 (59.1 %)
pN1	492 (12.8 %)
pN2	584 (15.2 %)
pN3	225 (5.9 %)
pN4	185 (4.8 %)
Unknown	88 (2.3 %)
Total	3844 (100 %)

Table 24 Numbers of the metastatic nodes

Numbers of lymph node metastasis	Cases (%)
0	1779 (46.3 %)
1-2	985 (25.6 %)
3-6	640 (16.6 %)
7-	376 (9.8 %)
Unknown	64 (1.7 %)
Total	3844 (100 %)

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

Distant metastasis	Cases (%)
pMX	53 (1.4 %)
pM0	3733 (97.1 %)
pM1	58 (1.5 %)
Total	3844 (100 %)

Table 26 Residual tumor, R

Residual tumor	Cases (%)
RX	156 (4.1 %)
R0	3345 (87.0 %)
R1	187 (4.9 %)
R2	156 (4.1 %)
Total	3844 (100 %)

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

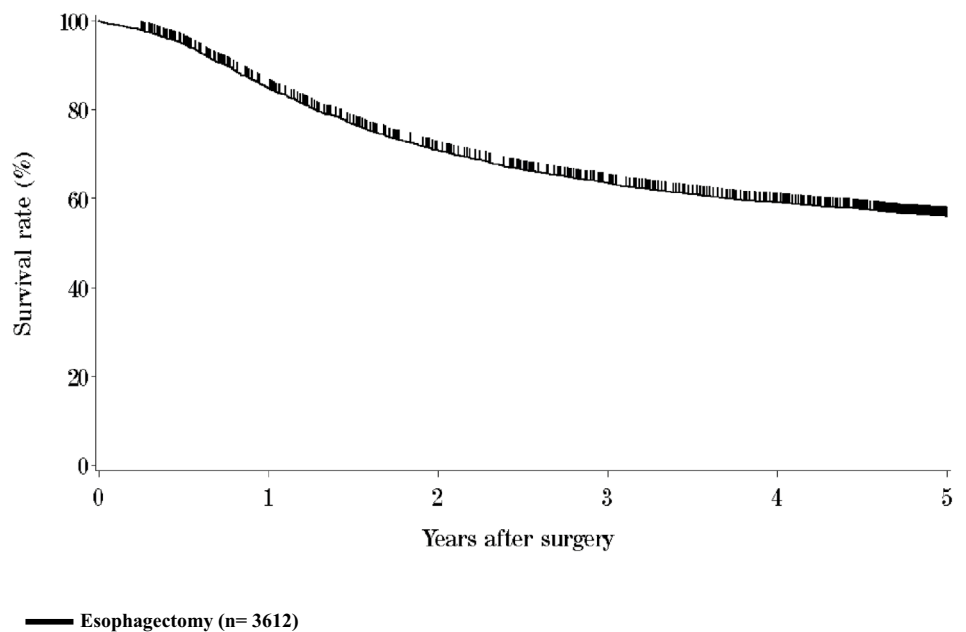
** Hospital death is defined as death during the same hospitalization, regardless of department at time of death

Operative mortality after esophagectomy: 1.01 %

Hospital mortality after esophagectomy: 4.76 %

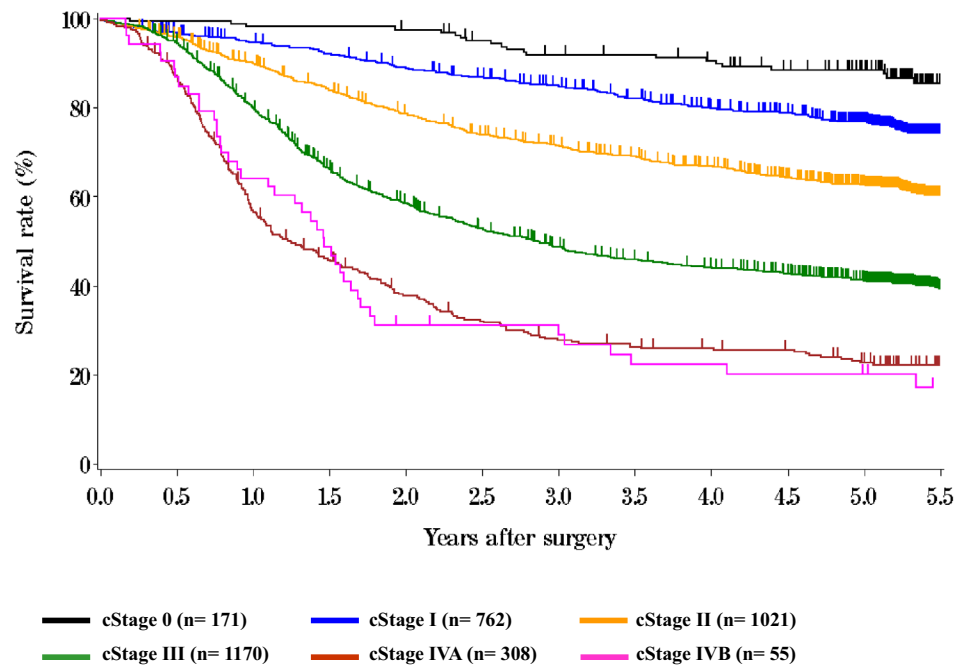
Follow-up period (months)	
Median (min - max)	41.13 (0.00 - 71.03)

Fig. 6 Survival of patients who underwent esophagectomy



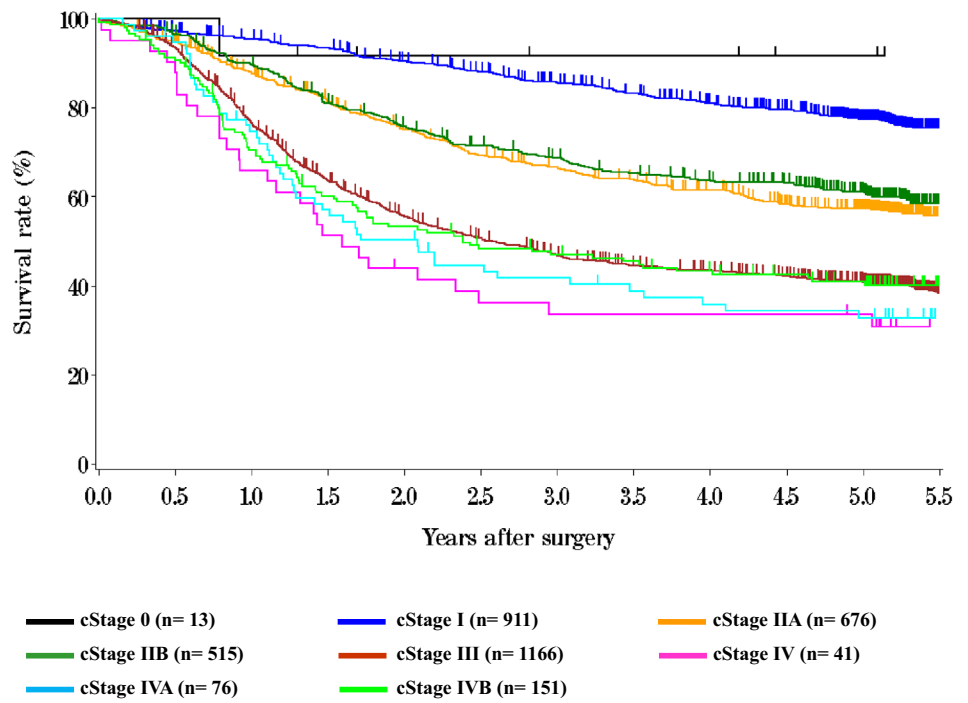
	Years after surgery				
	1	2	3	4	5
Esophagectomy	84.9%	70.8%	63.5%	59.1%	55.9%

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



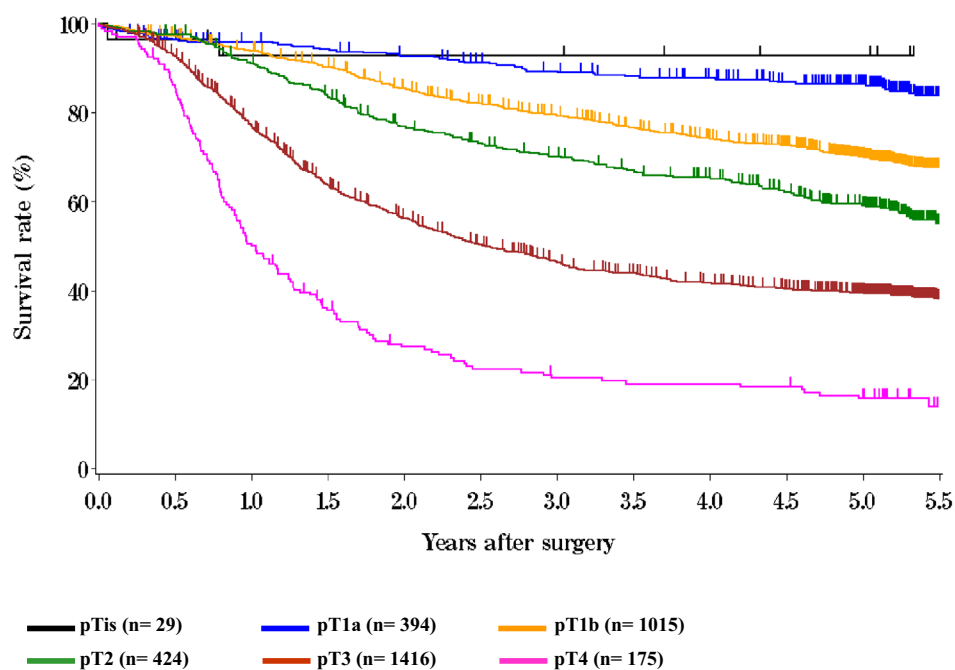
	Years after surgery				
	1	2	3	4	5
cStage 0	98.2%	97.6%	91.9%	90.6%	88.6%
cStage I	94.8%	89.0%	85.0%	79.9%	76.8%
cStage II	90.2%	78.7%	71.5%	66.9%	62.7%
cStage III	80.0%	58.4%	48.6%	44.0%	41.2%
cStage IVA	56.9%	37.7%	27.7%	25.8%	22.6%
cStage IVB	64.2%	31.2%	28.9%	22.3%	20.0%

Fig. 8 Survival of patients who underwent esophagectomy according to clinical stage (UICC TNM 6th)



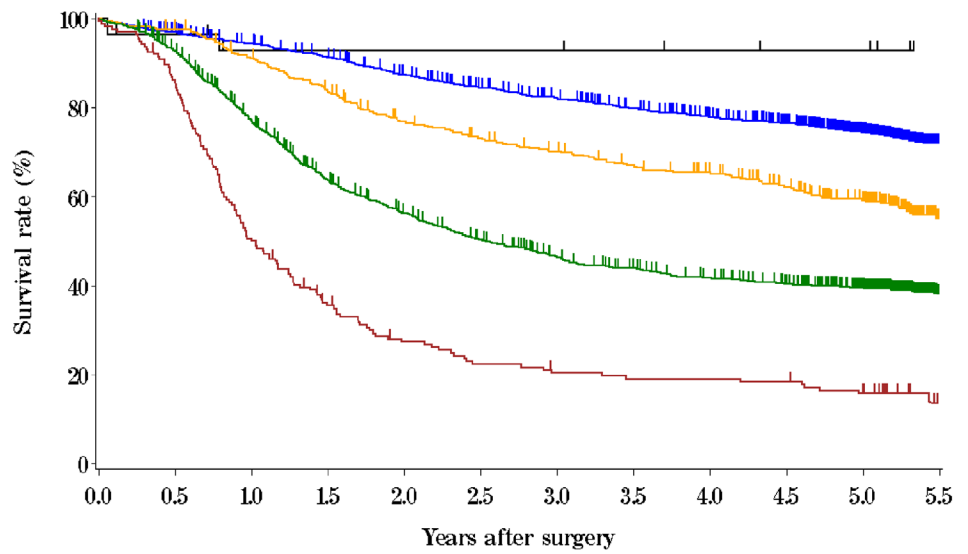
	Years after surgery				
	1	2	3	4	5
cStage 0	91.7%	91.7%	91.7%	91.7%	91.7%
cStage I	95.4%	90.5%	85.8%	81.0%	77.5%
cStage IIA	88.1%	75.3%	66.7%	61.6%	57.4%
cStage IIB	89.7%	75.9%	68.7%	63.7%	61.1%
cStage III	76.8%	55.6%	46.7%	43.5%	40.7%
cStage IV	65.9%	43.9%	33.6%	33.6%	33.6%
cStage IVA	74.7%	50.2%	41.7%	35.8%	32.3%
cStage IVB	70.4%	53.3%	46.9%	43.2%	40.9%

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



	Years after surgery				
	1	2	3	4	5
pTis	92.8%	92.8%	92.8%	92.8%	92.8%
pT1a	95.9%	92.7%	89.4%	88.0%	86.5%
pT1b	93.9%	85.5%	79.6%	74.2%	70.0%
pT2	91.1%	76.9%	70.1%	65.4%	59.1%
pT3	77.2%	56.3%	46.4%	41.6%	39.4%
pT4	50.6%	27.3%	20.3%	19.0%	15.6%

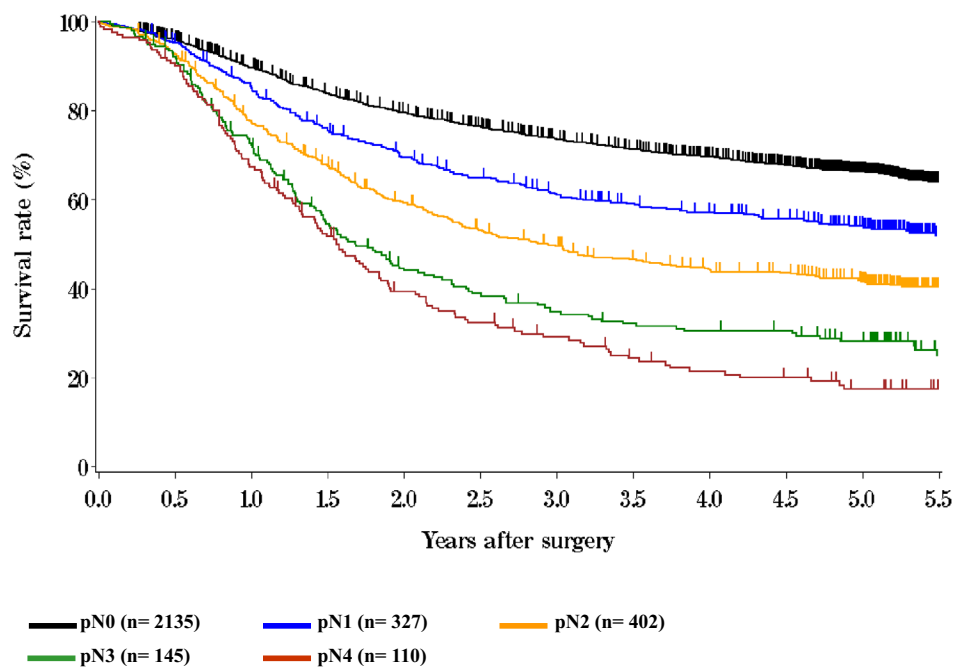
Fig. 10 Survival of patients who underwent esophagectomy according to the depth of tumor invasion (UICC TNM 6th: pT)



— pTis (n= 29)
 — pT1 (n= 1409)
 — pT2 (n= 424)
— pT3 (n= 1416)
 — pT4 (n= 175)

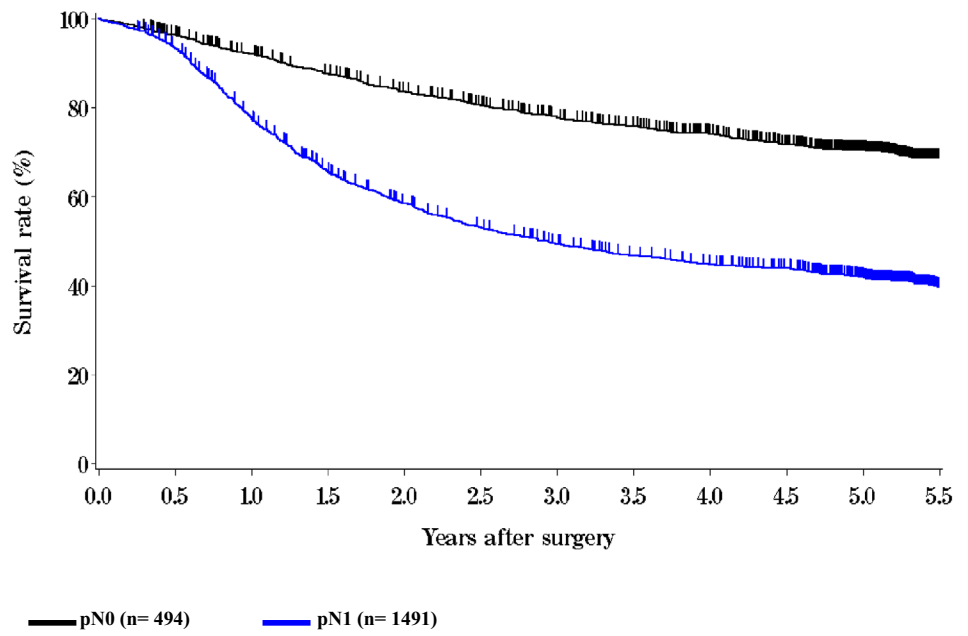
	Years after surgery				
	1	2	3	4	5
pTis	92.8%	92.8%	92.8%	92.8%	92.8%
pT1	94.4%	87.5%	82.3%	78.0%	74.6%
pT2	91.1%	76.9%	70.1%	65.4%	59.1%
pT3	77.2%	56.3%	46.4%	41.6%	39.4%
pT4	50.6%	27.3%	20.3%	19.0%	15.6%

Fig. 11 Survival of patients who underwent esophagectomy according to lymph node metastasis (JES 10th: pN)



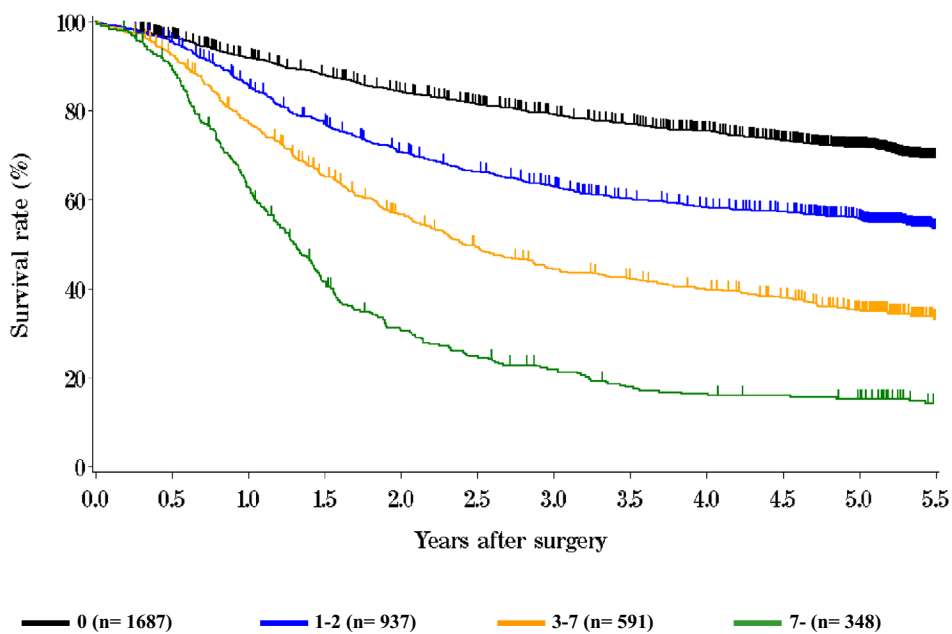
	Years after surgery				
	1	2	3	4	5
pN0	89.7%	79.6%	73.7%	69.7%	66.3%
pN1	85.5%	69.5%	61.0%	57.2%	54.0%
pN2	77.7%	59.3%	49.4%	44.2%	41.5%
pN3	72.7%	44.5%	34.7%	30.4%	28.1%
pN4	67.3%	39.3%	29.0%	21.3%	17.3%

Fig. 12 Survival of patients who underwent esophagectomy according to lymph node metastasis (UICC TNM 6th: pN)



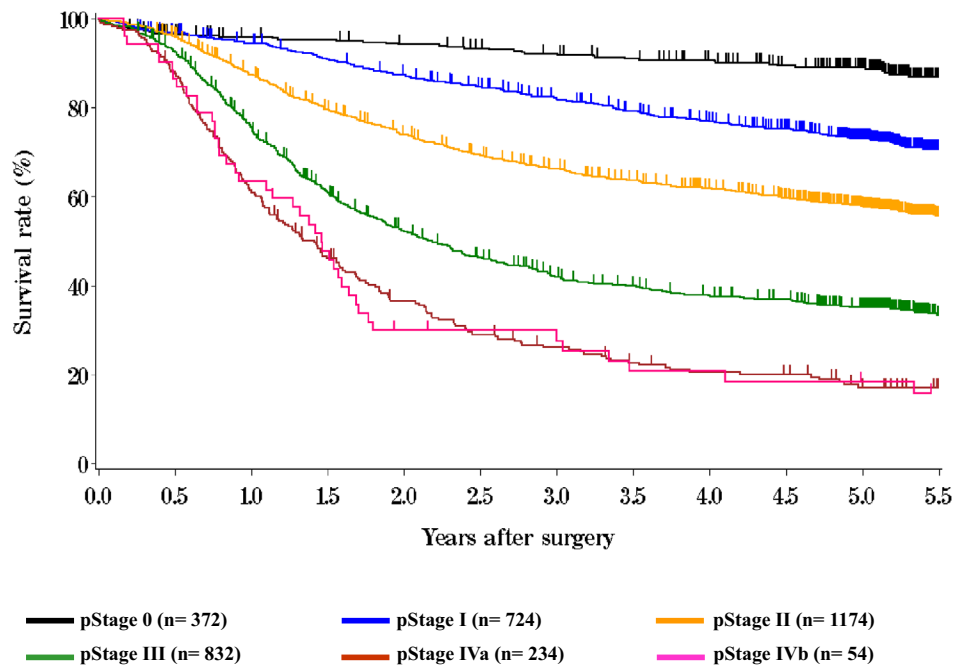
	Years after surgery				
	1	2	3	4	5
pN0	92.0%	83.7%	77.9%	74.1%	70.5%
pN1	77.9%	58.5%	49.4%	44.7%	41.9%

Fig. 13 Survival of patients who underwent esophagectomy according to number of meta-static nodes



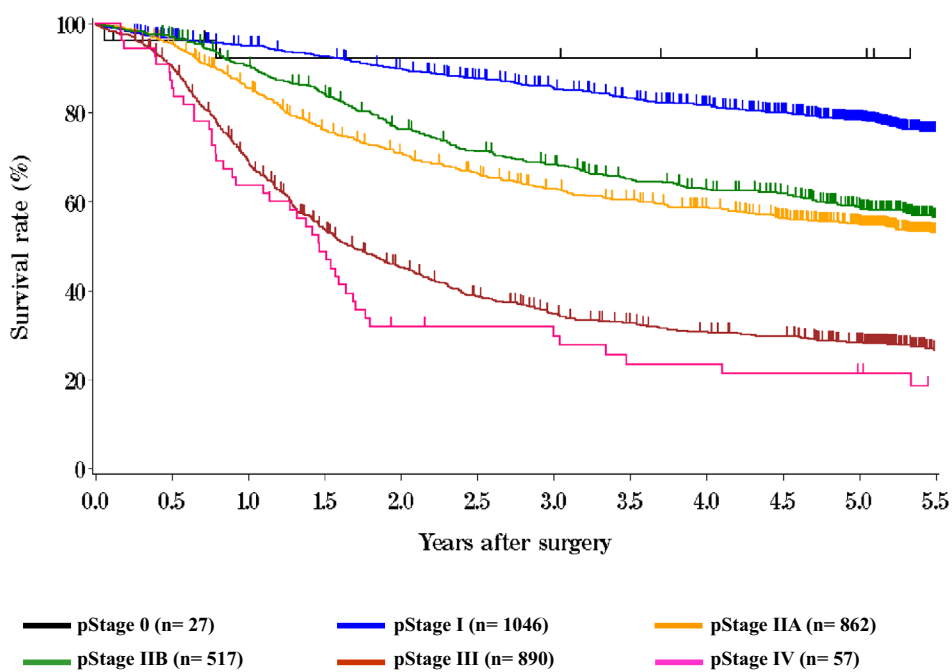
	Years after surgery				
	1	2	3	4	5
0	91.9%	84.3%	79.3%	75.4%	71.9%
1-2	85.8%	70.7%	62.9%	58.4%	55.7%
3-6	77.6%	56.6%	44.4%	39.8%	35.2%
7-	62.9%	30.8%	21.8%	16.2%	15.2%

Fig. 14 Survival of patients who underwent esophagectomy according to pathological stage (JES 10th)



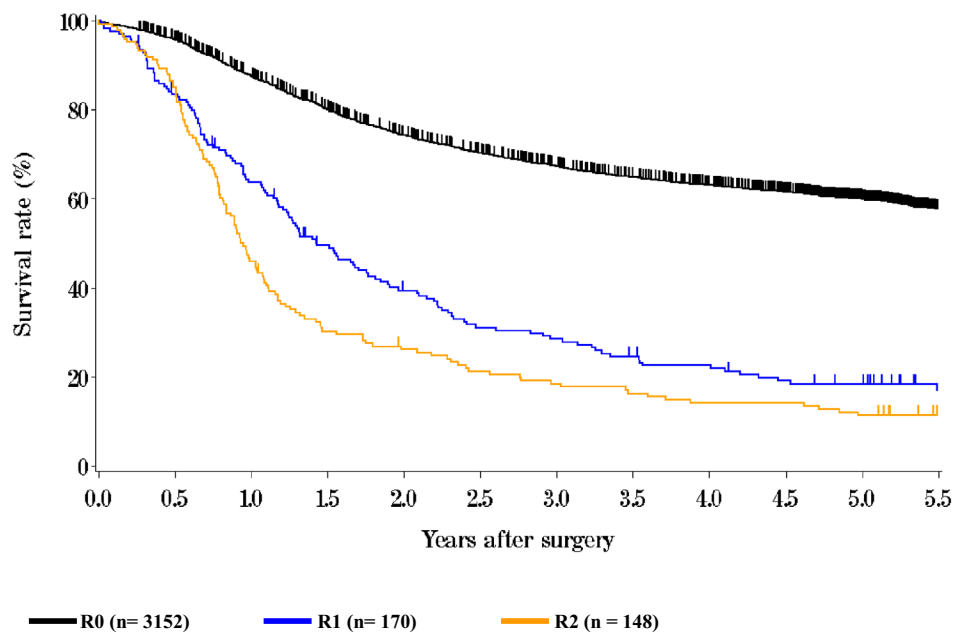
	Years after surgery				
	1	2	3	4	5
pStage 0	95.9%	94.2%	92.2%	90.7%	89.1%
pStage I	94.5%	87.5%	82.2%	76.9%	73.1%
pStage II	87.4%	74.0%	66.3%	61.8%	57.8%
pStage III	75.7%	52.2%	41.8%	37.7%	35.2%
pStage IVa	61.4%	36.4%	26.1%	20.5%	17.0%
pStage IVb	63.5%	29.8%	27.5%	20.6%	18.3%

Fig. 15 Survival of patients who underwent esophagectomy according to pathological stage (UICC TNM 6th)



	Years after surgery				
	1	2	3	4	5
pStage 0	92.2%	92.2%	92.2%	92.2%	92.2%
pStage I	95.0%	90.0%	85.8%	81.6%	78.4%
pStage IIA	85.6%	70.8%	62.9%	58.7%	54.9%
pStage IIB	90.6%	76.3%	68.3%	62.9%	58.6%
pStage III	69.4%	45.2%	34.7%	30.6%	28.2%
pStage IV	63.6%	31.9%	29.8%	23.4%	21.3%

Fig. 16 Survival of patients who underwent esophagectomy according to residual tumor (R)



	Years after surgery				
	1	2	3	4	5
R0	87.7%	74.3%	67.4%	63.1%	60.0%
R1	63.6%	39.4%	28.4%	22.5%	18.3%
R2	46.0%	26.1%	18.3%	14.1%	11.3%

Acknowledgments This study was supported by Health and Labour Sciences Research Grants for Promotion of Cancer Control Programs (H26-Cancer Policy-General-014) from the Ministry of Health, Labour and Welfare of Japan.

Compliance with ethical standards

Ethical Statement All procedures were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1964 and later versions.

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

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