Comprehensive registry of esophageal cancer in Japan, 2014

Masayuki Watanabe1 • Yasushi Toh2 • Ryu Ishihara3 • Koji Kono4 • Hisahiro Matsubara5 • Kentaro Murakami5 • Kei Muro6 • Hodaka Numasaki7 • Tsuneo Oyama8 • Soji Ozawa9 • Hiroshi Saeki10 • Koji Tanaka11 • Takahiro Tsushima12 • Masaki Ueno13 • Takashi Uno14 • Toshiyuki Yoshio15 • Shiyou Usune16 • Arata Takahashi16 • Hiroaki Miyata16 • The Registration Committee for Esophageal Cancer of the Japan Esophageal Society

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Abstract

Background The registration committee for esophageal cancer in the Japan Esophageal Society (JES) has collected the patients' characteristics, treatment, and outcomes annually.

Methods We analyzed the data of patients who had visited the participating hospitals in 2014. We collected the data with a web-based data collection system using the National Clinical Database. We used the Japanese Classification of Esophageal Cancer 10th edition by JES and the TNM classification 7th edition by the Union of International Cancer Control (UICC) for cancer staging.

Results A total of 9026 cases were registered from 344 institutions in Japan. Squamous cell carcinoma and adenocarcinoma accounted for 87.9% and 7.1%, respectively. The 5-year survival rates of patients treated using endoscopic resection, concurrent chemoradiotherapy, radiotherapy alone, and esophagectomy were 87.1%, 33.7%, 25.3%, and 59.3%, respectively. Esophagectomy was performed in 5204 cases. Concerning the approach used for esophagectomy, 48.1% of the cases were treated thoracoscopically. The operative mortality (within 30 days after surgery) was 0.75%, and the hospital mortality was 2.0%. The survival curves showed an excellent discriminatory ability both in the clinical and pathologic stages by the JES system. The survival of pStage IV was better than IIIC in the UICC system, because pStage IV included the patients with supraclavicular lymph-node metastasis (M1 LYM).

Conclusion We hope that this report contributes to improving all aspects of diagnosing and treating esophageal cancer in Japan.

Keywords Esophageal cancer • Esophagectomy • Radiotherapy • Chemotherapy • Endoscopic resection • Chemoradiotherapy

Preface 2014

We sincerely appreciate the outstanding contributions of many physicians in the registry of esophageal cancer cases. The Comprehensive Registry of Esophageal Cancer in Japan, 2014 was published here. Since 2019, the data collection method was changed from an electronic submission to a web-based data collection using the National Clinical Database (NCD).

These data were first made available on July 15, 2021, as the Comprehensive Registry of Esophageal Cancer in Japan, 2014.

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

Masayuki Watanabe
masayuki.watanabe@jfcr.or.jp

Extended author information available on the last page of the article

Personal information was replaced with individual management code inside each institute, and the NCD collected only anonymized information. The registry complies with the Act for the Protection of Personal Information.

We briefly summarized the Comprehensive Registry of Esophageal Cancer in Japan, 2014. According to the subject year, the Japanese Classification of Esophageal Cancer 10th by the Japan Esophageal Society (JES) [1] and the Union of International Cancer Control (UICC) TNM Classification 7th [2] were used for cancer staging. A total of 9026 cases were registered from 344 institutions in Japan. Tumor locations were cervical in 4.8%, upper thoracic in 12.9%, middle thoracic in 46.5%, lower thoracic in 27.2%, and esophagogastric junction in 7.8%. Superficial carcinomas (Tis, T1a, T1b) were 37.2%. As for the histologic type of biopsy specimens, squamous cell carcinoma and adenocarcinoma accounted for 87.9% and 7.1%, respectively. Regarding clinical results, the 5-year survival rates of patients treated...
using endoscopic resection, concurrent chemoradiotherapy, radiotherapy alone, and esophagectomy were 87.1%, 33.7%, 25.3%, and 59.3%, respectively. The endoscopic submucosal dissection accounted for 92.6% of endoscopic resection. Esophagectomy was performed in 5204 cases. Concerning the approach used for esophagectomy, 48.1% of the cases were treated thoracoscopically. The operative mortality (within 30 days after surgery) was 0.75%, and the hospital mortality was 2.0%. The Kaplan–Meier survival curves diverged according to the N-grade both in the JES and the UICC classifications. The survival curves showed an excellent discriminatory ability both in the clinical and pathologic stages by the JES system. In contrast, in the UICC system, the survival of cStage IIB was better than those of IB and IIA, while the survival curves were almost identical between cStage IIIc and IV. Also, the survival curve of pStage IIB was better than that of IIA, and the survival of pStage IV was better than that of IIC. pStage IV in the UICC system included the patients with supraclavicular lymph-node metastasis (M1 LYM), which is probably the reason for the better prognosis of pStage IV than pStage IIC.

We hope that this Comprehensive Registry of Esophageal Cancer in Japan 2014 will help to improve all aspects of the diagnosis and treatment of esophageal cancer in Japan.

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I. Clinical features of esophageal cancer patients treated in 2014

Institution-registered cases in 2014.

Institutions

Ageo Central General Hospital
Aichi Cancer Center
Aichi Medical University Hospital
Aizawa Hospital
Akita University Hospital
Arao Municipal Hospital
Asahi Rousai Hospital
Asahikawa Medical University Hospital
Cancer Institute Hospital of JFCR
Chiba Cancer Center
Chiba University Hospital
Chiba-ken Saiseikai Narashino Hospital
Dokkyo Medical University Hospital
Dokkyo Medical University Saitama Medical Center
Edogawa Hospital
Ehime Prefectural Central Hospital
Eijyu General Hospital
Fuchu Hospital
Fuji City General Hospital
Fujinomiya City General Hospital
Fujioka General Hospital
Fujisaki Hospital
Fujita Health University Hospital
Fukaya Red Cross Hospital
Fukui University Hospital
Fukui-ken Saiseikai Hospital
Fukuoka City Hospital
Fukuoka Shin Mizumaki Hospital
Fukuoka University Chikushi Hospital

continued

Institutions

Fukuoka University Hospital
Fukushima Medical University Hospital
Fukuyama City Hospital
Fussa Hospital
Gifu Prefectural General Center
Gifu University Hospital
Gunma Prefectural Cancer Center
Gunma Saiseikai Maebashi Hospital
Gunma University Hospital
Hachinohe City Hospital
Hagi City Hospital
Hakodate City Hospital
Hakodate Goryokaku Hospital
Hakodate National Hospital
Hamamatsu University Hospital
Hannan Chuo Hospital
Hasuda Hospital
Heartlife Hospital
Higashiosaka City Medical Center
Hiraka General Hospital
Hiratsuka City Hospital
Hirosaki University Hospital
Hiroshima City Asa Hospital
Hiroshima City Hospital
Hiroshima Prefectural Hospital
Hiroshima Red Cross Hospital & Atomic-Bomb Survivors Hospital
Hiroshima University Hospital
Hospital of the University of Occupational and Environmental Health, Japan
Hyogo Cancer Center
Hyogo Prefectural Amagasaki General Medical Center
Hyogo Prefectural Nishinomiya Hospital
Ibaraki Prefectural Central Hospital
Iizuka Hospital
Ikeda City Hospital
Imari Arita Kyoritsu Hospital
International University of Health and Welfare Atami Hospital
International University of Health and Welfare Hospital
International University of Health and Welfare Mita Hospital
Isehara Kyodo Hospital
Iseikai Hospital
Ishikawa Prefectural Central Hospital
Itami City Hospital
Iwata City Hospital
Iwate Medical University Hospital
| Institutions |
|--------------|
| Iwate Prefectural Central Hospital |
| Iwate Prefectural Chubu Hospital |
| JA Hiroshima General Hospital |
| JA Kouseiren Enshu Hospital |
| JA Onomichi General Hospital |
| Japanese Red Cross Ashikaga Hospital |
| Japanese Red Cross Fukuoaka Hospital |
| Japanese Red Cross Ishinomaki Hospital |
| Japanese Red Cross Kitami Hospital |
| Japanese Red Cross Kyoto Daichi Hospital |
| Japanese Red Cross Maebashi Hospital |
| Japanese Red Cross Medical Center |
| Japanese Red Cross Musashino Hospital |
| Japanese Red Cross Nagoya Daichi Hospital |
| Japanese Red Cross Nagoya Daini Hospital |
| Japanese Red Cross Saitama Hospital |
| JCHO Gunma Chuo Hospital |
| JCHO Kyushu Hospital |
| JCHO Osaka Hospital |
| JCHO Saitama Medical Center |
| Jichi Medical University Hospital |
| Jichi Medical University Saitama Medical Center |
| Juntendo University Hospital |
| Juntendo University Nerima Hospital |
| Juntendo University Shizuka Hospital |
| Junwakai Memorial Hospital |
| Kagawa Prefectural Central Hospital |
| Kagawa Rosai Hospital |
| Kagawa University Hospital |
| Kagoshima City Hospital |
| Kagoshima University Hospital |
| Kakogawa Central City Hospital |
| Kanagawa Cancer Center |
| Kanagawa Prefectural Ashigarakami Hospital |
| Kanazawa Medical University Hospital |
| Kanazawa University Hospital |
| Kansai Dennyoku Hospital |
| Kansai Medical University Hospital |
| Kansai Medical University Medical Center |
| Kansai Rosai Hospital |
| Kashiwa Kousei General Hospital |
| Kasugai Municipal Hospital |
| Kawakita General Hospital |
| Kawasaki Medical School Hospital |
| Kawasaki Medical School Kawasaki Hospital |
| Kawasaki Municipal Hospital |
| continued |
| continued |
| Institutions |
| Kawasaki Municipal Ida Hospital |
| Kawasaki Saiwa Hospital |
| Keio University Hospital |
| Keiyukai Sapporo Hospital |
| Kindai University Hospital |
| Kindai University Nara Hospital |
| Kinki Central Hospital |
| Kiryu Kousei General Hospital |
| Kishiwada City Hospital |
| Kitaakita Municipal Hospital |
| Kitaharima Medical Center |
| Kitakyushu Municipal Medical Center |
| Kitano Hospital |
| Kitasato University Hospital |
| Kobe City Medical Center General Hospital |
| Kobe University Hospital |
| Kochi Health Science Center |
| Kochi University Hospital |
| Kokura Memorial Hospital |
| Kosei Hospital |
| Kouseiren Takaoka Hospital |
| Kumagai General Hospital |
| Kumamoto University Hospital |
| Kumamoto Regional Medical Center |
| Kurashiki Central Hospital |
| Kurume University Hospital |
| Kyonan Medical Center Fujikawa Hospital |
| Kyorin University Hospital |
| Kyoto University Hospital |
| Kyoto-Katsura Hospital |
| Kyushu Central Hospital |
| Kyushu University Hospital |
| Machida Municipal Hospital |
| Matsudo City General Hospital |
| Matsushita Memorial Hospital |
| Matsuyama Red Cross Hospital |
| Mie University Hospital |
| Minamiosaka Hospital |
| Minoh City Hospital |
| Mito Red Cross Hospital |
| Mitsui Memorial Hospital |
| Miyazaki University Hospital |
| Moriguchi Keijinkai Hospital |
| Nagahama City Hospital |
| Nagahama Red Cross Hospital |
| Nagano Municipal Hospital |
| Nagaoka Chuo General Hospital |
| Nagasaki University Hospital |
| Nagoya City University Hospital |
| Nagoya City West Medical Center |
| Institutions |
|--------------|
| Nagoya Tokushukai General Hospital |
| Nagoya University Hospital |
| Nanpuh Hospital |
| Nara City Hospital |
| Nara Medical University Hospital |
| Nasu Red Cross Hospital |
| National Cancer Center Hospital |
| National Cancer Center Hospital East |
| National Center for Global Health and Medicine |
| National Defence Medical College Hospital |
| Nerima Hikarigaoka Hospital |
| New Tokyo Hospital |
| NHO Beppu Medical Center |
| NHO Chiba Medical Center |
| NHO Iwakuni Clinical Center |
| NHO Kure Medical Center |
| NHO Kyoto Medical Center |
| NHO Kyushu Cancer Center |
| NHO Kyushu Medical Center |
| NHO Matsumoto Medical Center |
| NHO Mito Medical Center |
| NHO Miyakonojo Medical Center |
| NHO Nagasaki Medical Center |
| NHO Nagoya Medical Center |
| NHO Okayama Medical Center |
| NHO Osaka Medical Center |
| NHO Saga Hospital |
| NHO Saitama Hospital |
| NHO Sendai Medical Center |
| NHO Shikoku Cancer Center |
| NHO Takasaki General Medical Center |
| NHO Tokyo Medical Center |
| NHO Yokohama Medical Center |
| Nihonkai General Hospital |
| Niigata Cancer Center Hospital |
| Niigata City General Hospital |
| Niigata Prefectural Shibata Hospital |
| Niigata University Medical & Dental Hospital |
| Nikko Memorial Hospital |
| Nippon Medical School Chiba Hokusou Hospital |
| Nippon Medical School Hospital |
| Nippon Medical School Musashi Kosugi Hospital |
| Nippon Medical School Tama Nagayama Hospital |
| Nishi Kobe Medical Center |
| Northern Okinawa Medical Center |
| NTT Medical Center Tokyo |
| Numazu City Hospital |
| Ohihiro Kousei Hospital |
| Ogaki Municipal Hospital |
| Ogikabo Hospital |

| Institutions |
|--------------|
| Ogori Daichi General Hospital |
| Ohta Hospital |
| Ohta Nishinouchi Hospital |
| Oita Prefectural Hospital |
| Oita Red Cross Hospital |
| Oita University Hospital |
| Okayama City Hospital |
| Okayama Red Cross General Hospital |
| Okayama Saiseikai General Hospital |
| Okayama University Hospital |
| Okitama Public General Hospital |
| Onomichi Municipal Hospital |
| Osaka City General Hospital |
| Osaka City University Hospital |
| Osaka General Medical Center |
| Osaka International Cancer Institute |
| Osaka Medical College Hospital |
| Osaka Police Hospital |
| Osaka Red Cross Hospital |
| Osaka University Hospital |
| Osaki City Hospital |
| Otemae Hospital |
| Otsu City Hospital |
| Rinku General Medical Center |
| Saga Prefectural Hospital Koseikan |
| Saga University Hospital |
| Saiseikai Fukuoka General Hospital |
| Saiseikai Karatsu Hospital |
| Saiseikai Kyoto Hospital |
| Saiseikai Noe Hospital |
| Saiseikai Utsunomiya Hospital |
| Saiseikai Yamaguchi General Hospital |
| Saiseikai Yokohama Tobu Hospital |
| Saitama Medical University International Medical Center |
| Saitama Medical University Saitama Medical Center |
| Sakai City Medical Center |
| Saku Central Hospital |
| Sapporo Medical University Hospital |
| Seikei-ki Chiba Medical Center |
| Seirei Hamamatsu General Hospital |
| Sendai City Hospital |
| Sendai Kosei Hospital |
| Shiga General Hospital |
| Shiga University of Medical Science Hospital |
| Shimane University Hospital |
| Shin Takeo Hospital |
| Shinko Hospital |
| Shinshu University Hospital |
| Shizuoka Cancer Center |
| Shizuoka City Shizuoka Hospital |
Institutions

Shizuoka General Hospital
Showa University Hospital
Southern Tohoku General Hospital
St. Luke's International Hospital
St. Marianna University School of Medicine Hospital
St. Mary's Hospital
Steel Memorial Yawata Hospital
Suita Municipal Hospital
Tachikawa Hospital
Tagawa Municipal Hospital
Takatsuki Red Cross Hospital
Teikyo University Chiba Medical Center
Teikyo University Hospital
Teikyo University Hospital Mizonokuchi
Teine Keijinkai Hospital
Tenri Hospital
The Hospital of Hyogo College of Medicine
The Jikei University Daisan Hospital
The Jikei University Hospital
Tochigi Cancer Center
Toda Central General Hospital
Toho University Ohashi Medical Center
Toho University Omori Medical Center
Toho University Sakura Medical Center
Tohoku University Hospital
Tokai University Hachioji Hospital
Tokai University Hospital
Tokai University Tokyo Hospital
Tokushima Red Cross Hospital
Tokushima University Hospital
Tokyo Dental College Ichikawa General Hospital
Tokyo Medical and Dental University Hospital
Tokyo Medical University Hachioji Medical Center
Tokyo Medical University Hospital
Tokyo Medical University Ibaraki Medical Center
Tokyo Metropolitan Cancer and Infectious Diseases Center Komagome Hospital
Tokyo Metropolitan Tama Medical Center
Tokyo University Hospital
Tokyo Women's Medical University Hospital
Tokyo Women's Medical University Medical Center East
Tokyo Women's Medical University Yachiyo Medical Center
Tonan Hospital
Toshiba Hospital
Tottori Prefectural Central Hospital
Tottori University Hospital
Toyama Prefectural Central Hospital
Toyama University Hospital
Toyonaka Municipal Hospital
Toyota Kosei Hospital

(Total 344 institutions)

Patient background

Tables 1, 2, 3, 4, 5, 6, 7, 8.

Table 1  Age and gender

| Age | Male | Female | Cases (%) |
|-----|------|--------|-----------|
| ≤29 | 20   | 4      | 24 (0.3)  |
| 30–39 | 22   | 7      | 29 (0.3)  |
| 40–49 | 179  | 74     | 253 (2.8) |
| 50–59 | 995  | 230    | 1225 (13.6)|
| 60–69 | 2908 | 482    | 3390 (37.6)|
| 70–79 | 2788 | 432    | 3220 (35.7)|
| 80–89 | 685  | 148    | 833 (9.2) |
| 90 ≤  | 34   | 18     | 52 (0.6)  |
| Total | 7631 | 1395   | 9026      |

Table 2  Performed treatment

| Treatments | Cases (%) |
|------------|-----------|
| Surgery    | 5355 (59.3)|
| Esophagectomy | 5204 (57.7)|
| Palliative surgery | 151 (1.7)|
| Chemotherapy and/or radiotherapy | 4835 (53.6)|
| Endoscopic treatment | 1529 (16.9)|
### Table 3  Tumor location

| Location of tumor | Endoscopic treatment (%) | Surgery Esophagectomy (%) | Palliative surgery (%) | Chemotherapy and/or radiotherapy (%) | Total (%) |
|-------------------|---------------------------|---------------------------|------------------------|-------------------------------------|-----------|
| Cervical          | 43 (2.8)                  | 185 (3.6)                 | 6 (4.0)                | 305 (6.3)                           | 436 (4.8) |
| Upper thoracic    | 164 (10.7)                | 598 (11.5)                | 36 (23.8)              | 738 (15.3)                          | 1160 (12.9)|
| Middle thoracic   | 838 (54.7)                | 2386 (45.8)               | 66 (43.7)              | 2180 (45.1)                         | 4200 (46.5)|
| Lower thoracic    | 378 (24.7)                | 1528 (29.4)               | 35 (23.2)              | 1296 (26.8)                         | 2451 (27.2)|
| EG                | 68 (4.4)                  | 378 (7.3)                 | 7 (4.6)                | 214 (4.4)                           | 531 (5.9) |
| E=G               | 24 (1.6)                  | 64 (1.2)                  | 30 (0.6)               | 94 (1.0)                            | 119 (1.3) |
| GE                | 7 (0.5)                   | 62 (1.2)                  | 40 (0.8)               | 85 (0.9)                            | 92 (0.8)  |
| Unknown           | 7 (0.5)                   | 3 (0.1)                   | 1 (0.7)                | 32 (0.7)                            | 69 (0.8)  |
| Total             | 1529                      | 5204                      | 151                    | 4835                                | 9026      |

*E* esophageal, *G* gastric

### Table 4  Histologic type of biopsy specimens

| Histologic types                     | Endoscopic treatment (%) | Surgery Esophagectomy (%) | Palliative surgery (%) | Chemotherapy and/or radiotherapy (%) | Total (%) |
|--------------------------------------|--------------------------|---------------------------|------------------------|-------------------------------------|-----------|
| Squamous cell carcinoma              | 1314 (85.9)              | 4567 (87.8)               | 143 (94.7)             | 4450 (92.0)                         | 7938 (87.9)|
| Squamous cell carcinoma              | 993 (64.2)               | 2484 (47.7)               | 93 (61.6)              | 2601 (53.8)                         | 4819 (53.4)|
| Well differentiated                   | 104 (6.8)                | 427 (8.2)                 | 12 (7.9)               | 320 (6.6)                           | 640 (7.1) |
| Moderately differentiated             | 172 (11.2)               | 1234 (23.7)               | 29 (19.2)              | 1098 (22.7)                         | 1807 (20.0)|
| Poorly differentiated                 | 45 (2.9)                 | 422 (8.1)                 | 9 (6.0)                | 431 (8.9)                           | 672 (7.4) |
| Adenocarcinoma                       | 41 (2.7)                 | 372 (7.1)                 | 3 (2.0)                | 199 (4.1)                           | 492 (5.5) |
| Barrett's carcinoma                  | 42 (2.7)                 | 96 (1.8)                  | 1 (0.7)                | 25 (0.5)                            | 144 (1.6) |
| Adenosquamous carcinoma              | 1 (0.1)                  | 10 (0.2)                  | 7 (0.1)                | 18 (0.2)                            | 18 (0.2)  |
| Mucoepidermoid carcinoma             | 2 (0.0)                  | 1 (0.0)                   | 1 (0.0)                | 3 (0.0)                             | 3 (0.0)   |
| Basaloid carcinoma                   | 4 (0.3)                  | 32 (0.6)                  | 19 (0.4)               | 41 (0.5)                            | 41 (0.5)  |
| Neuroendocrine tumor                 | 1 (0.1)                  | 16 (0.3)                  | 4 (0.1)                | 5 (0.3)                             | 5 (0.3)   |
| Neuroendocrine carcinoma             | 1 (0.1)                  | 16 (0.3)                  | 4 (0.1)                | 5 (0.3)                             | 5 (0.3)   |
| Undifferentiated carcinoma           | 1 (0.1)                  | 18 (0.3)                  | 4 (0.1)                | 2 (0.0)                             | 2 (0.0)   |
| Malignant melanoma                   | 1 (0.1)                  | 22 (0.4)                  | 12 (0.2)               | 28 (0.3)                            | 28 (0.3)  |
| Carcinosarcoma                       | 1 (0.1)                  | 7 (0.1)                   | 2 (0.0)                | 8 (0.1)                             | 8 (0.1)   |
| GIST                                 | 1 (0.0)                  | 1 (0.0)                   | 1 (0.0)                | 1 (0.0)                             | 1 (0.0)   |
| Adenoid cystic carcinoma             | 2 (0.1)                  | 3 (0.1)                   | 3 (0.1)                | 6 (0.1)                             | 6 (0.1)   |
| Nonepithelial tumors                 | 36 (2.4)                 | 8 (0.2)                   | 9 (0.2)                | 58 (0.6)                            | 58 (0.6)  |
| Other tumors                         | 26 (1.7)                 | 15 (0.3)                  | 5 (0.1)                | 47 (0.5)                            | 47 (0.5)  |
| Unknown                              | 60 (3.9)                 | 31 (0.6)                  | 4 (2.6)                | 57 (2.1)                            | 171 (1.9) |
| Total                                | 1529                     | 5204                      | 151                    | 4835                                | 9026      |
Table 5  Depth of tumor invasion, cT (UICC TNM 7th)

| Clinical T | Endoscopic treatment (%) | Surgery | Chemotherapy and/or radiotherapy (%) | Total (%) |
|------------|--------------------------|---------|--------------------------------------|-----------|
|            |                          | Esophagectomy (%) | Palliative surgery (%)               | Total (%) |
| cTX        | 28 (1.8)                 | 17 (0.3)          | 4 (2.6)                              | 57 (1.2)  |
| cT0        | 17 (1.1)                 | 7 (0.1)           | 3 (0.1)                              | 30 (0.3)  |
| cT1a       | 173 (76.7)               | 240 (4.6)         | 112 (2.3)                            | 1469 (16.3)|
| cT1b       | 205 (13.4)               | 1409 (27.1)       | 2 (1.3)                              | 644 (13.3) |
| cT2        | 9 (0.6)                  | 867 (16.7)        | 5 (3.3)                              | 667 (13.8) |
| cT3        | 46 (3.0)                 | 2310 (44.4)       | 62 (41.1)                            | 2367 (49.0)|
| cT4a       | 10 (0.7)                 | 164 (3.2)         | 13 (8.6)                             | 317 (6.6) |
| cT4b       | 41 (2.7)                 | 190 (3.7)         | 65 (43.0)                            | 668 (13.8) |
| Total      | 1529                     | 5204              | 151                                  | 4835      |

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

| Clinical N | Endoscopic treatment (%) | Surgery | Chemotherapy and/or radiotherapy (%) | Total (%) |
|------------|--------------------------|---------|--------------------------------------|-----------|
|            |                          | Esophagectomy (%) | Palliative surgery (%)               | Total (%) |
| cN0        | 1426 (93.3)              | 2390 (45.9)       | 20 (13.2)                            | 1310 (27.1)|
| cN1        | 50 (3.3)                 | 1825 (35.1)       | 60 (39.7)                            | 1914 (39.6)|
| cN2        | 33 (2.2)                 | 867 (16.7)        | 56 (37.1)                            | 1257 (26.0)|
| cN3        | 20 (1.3)                 | 122 (2.3)         | 15 (9.9)                             | 354 (7.3) |
| Total      | 1529                     | 5204              | 151                                  | 4835      |

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

| Clinical M | Endoscopic treatment (%) | Surgery | Chemotherapy and/or radiotherapy (%) | Total (%) |
|------------|--------------------------|---------|--------------------------------------|-----------|
|            |                          | Esophagectomy (%) | Palliative surgery (%)               | Total (%) |
| cM0        | 1494 (97.7)              | 5036 (96.8)       | 108 (71.5)                           | 4210 (85.2)|
| cM1        | 35 (2.3)                 | 168 (3.2)        | 43 (28.5)                            | 715 (14.8) |
| Total      | 1529                     | 5204              | 151                                  | 4835      |

Table 8  Clinical Stage (UICC TNM 7th)

| Clinical stage | Endoscopic treatment (%) | Surgery | Chemotherapy and/or radiotherapy (%) | Total (%) |
|----------------|--------------------------|---------|--------------------------------------|-----------|
|                |                          | Esophagectomy (%) | Palliative surgery (%)               | Total (%) |
| Stage IA       | 1363 (89.1)              | 1307 (25.1)       | 2 (1.3)                              | 471 (9.7) |
| Stage IB       | 5 (0.3)                  | 458 (8.8)         | 2 (1.3)                              | 282 (5.8) |
| Stage IIA      | 10 (0.7)                 | 531 (10.2)        | 6 (4.0)                              | 400 (8.3) |
| Stage IIB      | 15 (1.0)                 | 577 (11.1)        | 1 (0.7)                              | 449 (9.3) |
| Stage IIIA     | 14 (0.9)                 | 1195 (23.0)       | 21 (13.9)                            | 1078 (22.3)|
| Stage IIIB     | 8 (0.5)                  | 560 (10.8)        | 16 (10.6)                            | 567 (11.7) |
| Stage IIIC     | 35 (2.3)                 | 385 (7.4)         | 57 (37.7)                            | 839 (17.4)|
| Stage IV       | 35 (2.3)                 | 168 (3.2)         | 43 (28.5)                            | 715 (14.8)|
| Unknown        | 44 (2.9)                 | 23 (0.4)          | 3 (2.0)                              | 34 (0.7)  |
| Total          | 1529                     | 5204              | 151                                  | 4835      |
I. Results of endoscopically treated patients in 2014

Tables 9, 10, 11, and Figs. 1, 2, 3.

Table 9  Details of endoscopic treatment for curative intent

| Treatment details | Cases (%) |
|-------------------|-----------|
| EMR               | 104 (7.1) |
| EMR + YAG laser   | 1 (0.1)   |
| EMR + MCT/RFA     |           |
| ESD               | 1265 (86.0)|
| ESD + EMR         | 80 (5.4)  |
| ESD + PDT         |           |
| ESD + YAG laser   | 2 (0.1)   |
| PDT               | 3 (0.2)   |
| YAG laser         | 16 (1.1)  |
| Total             | 1471      |

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

Table 10  Complications of EMR/ESD

| Complications of EMR/ESD | Cases (%) |
|--------------------------|-----------|
| None                     | 1384 (95.8)|
| Perforation              | 12 (0.8)  |
| Bleeding                 | 3 (0.2)   |
| Mediastinitis            | 5 (0.3)   |
| Stenosis                 | 41 (2.8)  |
| Others                   |           |
| Unknown                  |           |
| Total                    | 1445      |

Table 11  Pathologic depth of tumor invasion of MER/ESD specimens

| Pathological depth of tumor invasion (pT) | Cases (%) |
|------------------------------------------|-----------|
| pTX                                      | 17 (1.2)  |
| pT0                                      | 68 (0.5)  |
| pT1a                                     | 1127 (82.8)|
| pT1b                                     | 238 (15.0)|
| pT2                                      |           |
| pT3                                      | 2 (0.1)   |
| Total                                    | 1452      |

Fig. 1  Survival of patients treated with EMR/ESD

| Years after EMR/ESD | Total (n= 1431) | Complete resection (n= 1341) | Incomplete resection (n= 90) |
|---------------------|-----------------|-------------------------------|-------------------------------|
| 1                   | 98.5%           | 95.6%                         | 100.0%                        |
| 2                   | 98.4%           | 95.2%                         | 95.2%                         |
| 3                   | 98.3%           | 95.3%                         | 88.9%                         |
| 4                   | 98.2%           | 95.3%                         | 86.2%                         |
| 5                   | 98.1%           | 95.3%                         | 83.1%                         |

| Years after EMR/ESD | Total | Complete resection | Incomplete resection |
|---------------------|-------|--------------------|----------------------|
| 1                   | 98.5% | 95.5%              | 100.0%               |
| 2                   | 98.4% | 95.6%              | 95.2%                |
| 3                   | 98.3% | 92.4%              | 88.9%                |
| 4                   | 98.2% | 89.0%              | 86.2%                |
| 5                   | 98.1% | 87.1%              | 83.1%                |
**Fig. 2** Survival of patients treated with EM/ESD according to the pathological depth of tumor invasion, pT (JES 10th)

![Graph showing survival rates for patients treated with EMR/ESD based on pT1a and pT1b](image)

| Years after EMR/ESD | 1    | 2    | 3    | 4    | 5    |
|--------------------|------|------|------|------|------|
| pT1a (n= 1114)     | 98.4%| 95.4%| 92.6%| 89.9%| 88.5%|
| pT1b (n= 237)      | 98.2%| 94.6%| 88.8%| 82.8%| 77.9%|

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

![Graph showing survival rates for patients treated with EMR/ESD based on lymphatic and venous invasion](image)

| Years after EMR/ESD | 1    | 2    | 3    | 4    | 5    |
|--------------------|------|------|------|------|------|
| ly- and v- (n= 1227) | 98.9%| 95.9%| 93.0%| 90.0%| 88.2%|
| ly1-3 or v1-3 (n= 168) | 95.7%| 92.4%| 87.6%| 81.9%| 78.8%|
| Unknown (n= 43)      | 97.6%| 97.6%| 95.6%| 89.2%| 89.2%|
II. Results in patients treated with chemotherapy and/or radiotherapy in 2014

Tables 12, 13 and Figs. 4, 5, 6.

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

| Dose of irradiation (Gy) | Definitive Radiation alone (%) | Radiation alone (%) | With chemotherapy (%) | Total (%) |
|--------------------------|-------------------------------|---------------------|-----------------------|-----------|
| -29                      | 2 (1.2)                       | 16 (1.7)            | 26 (8.4)              | 49 (3.3)  |
| 30–39                    | 3 (1.8)                       | 17 (1.8)            | 53 (17.1)             | 78 (5.6)  |
| 40–49                    | 5 (3.0)                       | 34 (3.5)            | 56 (18.1)             | 101 (6.8) |
| 50–59                    | 26 (15.8)                     | 246 (25.5)          | 77 (24.8)             | 359 (24.2)|
| 60–69                    | 124 (75.2)                    | 620 (64.4)          | 90 (29.0)             | 849 (57.3)|
| 70-                      | 4 (2.4)                       | 28 (2.9)            | 5 (1.6)               | 39 (2.6)  |
| Unknown                  | 1 (0.6)                       | 2 (0.2)             | 3 (1.0)               | 6 (0.4)   |
| Total                    | 165                           | 963                 | 310                   | 1481      |
| Median (min—max)         | 60.0 (10.0–70.0)              | 60.0 (2.0–92.0)     | 50.0 (2.0–90.0)       | 60.0 (2.0–92.0) |

### Table 13  Dose of irradiation (surgically treated cases)

| Dose of irradiation (Gy) | Preoperative irradiation (%) | Postoperative irradiation (%) |
|--------------------------|-------------------------------|-------------------------------|
| -29                      | 12 (3.7)                      |                               |
| 30–39                    | 55 (16.9)                     | 3 (5.0)                       |
| 40–49                    | 199 (61.0)                    | 9 (15.0)                      |
| 50–59                    | 40 (12.3)                     | 20 (33.3)                     |
| 60–69                    | 16 (4.9)                      | 24 (40.0)                     |
| 70-                      | 1 (0.3)                       | 3 (5.0)                       |
| Unknown                  | 3 (0.9)                       | 1 (1.7)                       |
| Total                    | 326                           | 60                             |
| Median (min—max)         | 40.0 (1.8–70.0)               | 54.0 (30.0–97.5)              |
Fig. 4 Survival of patients treated with chemotherapy and/or radiotherapy

| Years after treatment | Chemoradiotherapy (n= 1153) | Radiotherapy alone (n= 311) | Chemotherapy alone (n= 352) | Palliative Radiotherapy (n= 93) |
|-----------------------|-----------------------------|-----------------------------|-----------------------------|-------------------------------|
| 1                     | 67.2%                       | 57.0%                       | 56.3%                       | 61.8%                        |
| 2                     | 48.6%                       | 42.7%                       | 35.8%                       | 29.7%                        |
| 3                     | 41.1%                       | 33.4%                       | 24.5%                       | 17.5%                        |
| 4                     | 36.5%                       | 27.6%                       | 22.0%                       | 9.9%                         |
| 5                     | 33.7%                       | 25.3%                       | 19.7%                       | 1.7%                         |
Fig. 5 Survival of patients treated with definitive chemoradiotherapy according to the clinical stage (UICC TNM 7th):

| Stage   | Survival Rate (%) | Years after Treatment |
|---------|-------------------|-----------------------|
| IA      | 94.2%             | 1                     |
|         | 88.0%             | 2                     |
|         | 82.8%             | 3                     |
|         | 77.8%             | 4                     |
|         | 75.3%             | 5                     |
| IB      | 85.0%             | 1                     |
|         | 72.9%             | 2                     |
|         | 66.4%             | 3                     |
|         | 61.6%             | 4                     |
|         | 56.3%             | 5                     |
| IIA     | 78.1%             | 1                     |
|         | 63.3%             | 2                     |
|         | 50.4%             | 3                     |
|         | 36.5%             | 4                     |
|         | 32.4%             | 5                     |
| IIB     | 93.2%             | 1                     |
|         | 85.9%             | 2                     |
|         | 82.0%             | 3                     |
|         | 77.5%             | 4                     |
|         | 77.5%             | 5                     |
| IIIA    | 81.1%             | 1                     |
|         | 61.0%             | 2                     |
|         | 51.1%             | 3                     |
|         | 45.4%             | 4                     |
|         | 39.4%             | 5                     |
| IIIB    | 64.7%             | 1                     |
|         | 44.2%             | 2                     |
|         | 37.3%             | 3                     |
|         | 32.9%             | 4                     |
|         | 31.4%             | 5                     |
| IIIC    | 60.8%             | 1                     |
|         | 41.2%             | 2                     |
|         | 30.6%             | 3                     |
|         | 27.6%             | 4                     |
|         | 25.6%             | 5                     |
| IV      | 61.5%             | 1                     |
|         | 36.2%             | 2                     |
|         | 24.5%             | 3                     |
|         | 19.5%             | 4                     |
|         | 19.5%             | 5                     |
III. Results in patients who underwent esophagectomy in 2014

Tables 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, and Figs. 7, 8, 9, 10, 11, 12, 13, 14, 15
### Table 15  Tumor location

| Locations      | Cases (%) |
|----------------|-----------|
| Cervical       | 209 (3.8) |
| Upper thoracic | 655 (12.0)|
| Middle thoracic| 2448 (44.9)|
| Lower thoracic | 1570 (28.8)|
| EG             | 380 (7.0) |
| E = G          | 98 (1.8)  |
| GE             | 80 (1.5)  |
| Unknown        | 11 (0.2)  |
| **Total**      | 5451      |

### Table 16  Approaches to tumor resection

| Approaches                                | Cases (%) |
|-------------------------------------------|-----------|
| Cervical                                  | 176 (3.4) |
| Right thoracic                            | 4492 (86.3)|
| Left thoracic                             | 54 (1.0)  |
| Left thoracoabdominal                     | 82 (1.6)  |
| Abdominal                                 | 187 (3.6) |
| Transhiatal lower esophagectomy            | 133 (2.6) |
| Transhiatal thoracic esophagectomy         | 64 (1.2)  |
| Sternotomy                                | 6 (0.1)   |
| Others                                    | 7 (0.1)   |
| Unknown                                   | 3 (0.1)   |
| **Total**                                 | 5204      |

Thoracic includes thoracotomy and thoracoscopic. Abdominal includes laparotomy and laparoscopic

### Table 17  Video-assisted surgery

| Video-assisted surgery                           | Cases (%) |
|-------------------------------------------------|-----------|
| None                                            | 2330 (44.6)|
| Thoracotomy                                     | 1206 (23.2)|
| Thoracotomy + laparoscopy                       | 1281 (24.6)|
| Thoracotomy + laparoscopy + mediastinoscopy     | 9 (0.2)   |
| Thoracotomy + laparoscopy + other               | 7 (0.1)   |
| Thoracotomy + mediastinoscopy                   | 1 (0.0)   |
| Thoracotomy + other                             | 4 (0.1)   |
| Laparoscopy                                     | 265 (5.1) |
| Laparoscopy + mediastinoscopy                   | 41 (0.8)  |
| Laparoscopy + mediastinoscopy + other           | 1 (0.0)   |
| Mediastinoscopy                                 | 49 (0.9)  |
| Laparoscopy + other                             | 1 (0.0)   |
| Others                                          | 15 (0.3)  |
| Unknown                                         | 1 (0.0)   |
| **Total**                                       | 5204      |

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

| Field of lymphadenectomy | Cervical | Upper thoracic | Middle thoracic | Lower thoracic | Abdominal | E = G | GE | Unknown | Total |
|--------------------------|----------|----------------|-----------------|---------------|-----------|-------|----|---------|-------|
| None                     | 8 (4.2)  | 15 (2.5)       | 46 (1.9)        | 26 (1.7)      | 4 (1.1)   | 1 (1.1)| 4 (6.0)| 104 (2.0)|
| C                        | 47 (24.5)| 11 (1.8)       | 33 (1.4)        | 14 (0.9)      | 1 (0.3)   | 1 (0.3)| 88 (1.7)| 105 (2.0)|
| C + UM                   | 21 (10.9)| 1 (0.2)        | 2 (0.1)         | 12 (0.8)      | 1 (0.3)   | 1 (0.3)| 88 (1.7)| 25 (0.5) |
| C + UM + MLM             | 4 (2.1)  | 21 (3.4)       | 50 (2.1)        | 12 (0.8)      | 1 (0.3)   | 1 (0.3)| 88 (1.7)| 25 (0.5) |
| C + UM + MLM + A         | 83 (43.2)| 394 (64.6)     | 1205 (64.6)     | 577 (37.7)    | 43 (12.0) | 6 (6.8)| 6 (9.0)| 1 (50.0)| 2315 (44.5)|
| C + UM + A               | 6 (3.1)  | 10 (1.6)       | 22 (0.9)        | 10 (0.7)      | 1 (0.3)   | 1 (0.3)| 49 (0.9)| 49 (0.9) |
| C + MLM                  | 1 (0.5)  | 1 (0.2)        | 1 (0.1)         | 1 (0.3)       | 1 (0.3)   | 1 (0.3)| 88 (1.7)| 2 (0.0)  |
| C + MLM + A              | 1 (0.5)  | 3 (0.5)        | 15 (0.4)        | 6 (0.4)       | 3 (0.8)   | 1 (1.1)| 29 (0.6)| 29 (0.6) |
| C + A                    | 4 (2.1)  | 1 (0.2)        | 1 (0.0)         | 2 (0.1)       | 1 (0.3)   | 1 (0.3)| 88 (1.7)| 8 (0.2)  |
| UM                       | 2 (1.0)  | 4 (0.7)        | 11 (0.5)        | 2 (0.1)       | 1 (0.3)   | 1 (0.3)| 88 (1.7)| 19 (0.4) |
| UM + MLM                 | 3 (1.6)  | 8 (1.3)        | 40 (1.7)        | 27 (1.8)      | 4 (1.1)   | 1 (0.1)| 82 (1.6)| 82 (1.6) |
| UM + MLM + A             | 5 (2.6)  | 125 (20.5)     | 847 (35.9)      | 675 (44.1)    | 115 (32.2)| 24 (27.3)| 3 (4.5)| 1 (50.0)| 1795 (34.5)|
| UM + A                   | 5 (0.8)  | 14 (0.6)       | 9 (0.6)         | 3 (0.8)       | 1 (1.1)   | 1 (1.1)| 32 (0.6)| 32 (0.6) |
| MLM                      | 2 (0.3)  | 11 (0.5)       | 15 (1.0)        | 3 (0.8)       | 1 (1.1)   | 1 (1.1)| 34 (0.7)| 34 (0.7) |
| MLM + A                  | 4 (0.7)  | 48 (2.0)       | 130 (8.5)       | 139 (38.9)    | 39 (44.3) | 33 (49.3)| 399 (7.7)| 399 (7.7)|
| A                        | 1 (0.5)  | 5 (0.8)        | 14 (0.6)        | 24 (1.6)      | 40 (11.2)| 14 (15.9)| 20 (29.9)| 118 (2.3)|
| **Total**                | 192 610  | 2359 1529      | 357 88 67       | 2 5204        |

*C* bilateral cervical nodes, *UM* upper mediastinal nodes, *MLM* middle-lower mediastinal nodes, *A* abdominal nodes
Table 19  Reconstruction route

| Route                  | Cases (%) |
|------------------------|-----------|
| None                   | 47 (0.9)  |
| Subcutaneous           | 345 (6.6) |
| Retrosternal           | 2315 (44.5) |
| Posterior mediastinal  | 1920 (36.9) |
| Intrathoracic          | 465 (8.9)  |
| Cervical               | 65 (1.2)  |
| Others                 | 41 (0.8)  |
| Unknown                | 6 (0.1)   |
| Total                  | 5204      |

Table 20  Organs used for reconstruction

| Organs                  | Cases (%) |
|-------------------------|-----------|
| None                    | 85 (1.6)  |
| Whole stomach           | 105 (2.0) |
| Gastric tube            | 4425 (84.3) |
| Jejunum                 | 272 (5.2) |
| Free jejunum            | 119 (2.3) |
| Colon                   | 197 (3.8) |
| Free colon              | 10 (0.2)  |
| Others                  | 36 (0.7)  |
| Total organs            | 5249      |
| Total cases             | 5119      |

Table 21  Histological classification

| Histological classification | Cases (%) |
|-----------------------------|-----------|
| Squamous cell carcinoma     | 4324 (83.1) |
| Squamous cell carcinoma     | 751 (14.4)  |
| Well differentiated          | 764 (14.7)  |
| Moderately differentiated    | 2172 (41.7) |
| Poorly differentiated        | 637 (12.2)  |
| Adenocarcinoma              | 347 (6.7)  |
| Barrett’s carcinoma         | 113 (2.2)  |
| Adenosquamous carcinoma     | 29 (0.6)   |
| Mucoepidermoid carcinoma    | 6 (0.1)    |
| Basaloid carcinoma          | 82 (1.6)   |
| Neuroendocrine tumor        | 2 (0.0)    |
| Neuroendocrine carcinoma    | 25 (0.5)   |
| Undifferentiated carcinoma  | 5 (0.1)    |
| Malignant melanoma          | 19 (0.4)   |
| Carcinosarcoma              | 37 (0.7)   |
| GIST                       | 7 (0.1)    |
| Adenoid cystic carcinoma   | 1 (0.0)    |
| Sarcoma                    | 2 (0.0)    |
| Other carcinomas           | 8 (0.2)    |
| Other tumors               | 54 (1.0)   |
| Unknown                    | 143 (2.7)  |
| Total                      | 5204       |

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

| Pathological depth of tumor invasion | Cases (%) |
|--------------------------------------|-----------|
| pTx                                  | 42 (0.8)  |
| pT0                                  | 227 (4.4) |
| pT1a                                 | 645 (12.4) |
| pT1b                                 | 1475 (28.3) |
| pT2                                  | 590 (11.3) |
| pT3                                  | 1962 (37.7) |
| pT4a                                 | 141 (2.7)  |
| pT4b                                 | 122 (2.3)  |
| Total                                | 5204      |

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

| Lymph-node metastasis | Cases (%) |
|-----------------------|-----------|
| pN0                   | 2568 (49.3) |
| pN1                   | 962 (18.5)  |
| pN2                   | 966 (18.6)  |
| pN3                   | 371 (7.1)   |
| pN4                   | 321 (6.2)   |
| Unknown               | 16 (0.3)    |
| Total                 | 5204       |

Table 24  Pathological grading of lymph-node metastasis, pN (UICC TNM 7th)

| Lymph-node metastasis | Cases (%) |
|-----------------------|-----------|
| pN0                   | 2611 (50.2) |
| pN1 (1–2)             | 1397 (26.8) |
| pN2 (3–6)             | 787 (15.1)  |
| pN3 (7-)              | 373 (7.2)   |
| Unknown               | 36 (0.7)    |
| Total                 | 5204       |

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

| Distant metastasis (M) | Cases (%) |
|------------------------|-----------|
| MX                     | 110 (2.1)  |
| M0                     | 4998 (96.0) |
| M1                     | 96 (1.8)   |
| Total                  | 5204       |

Table 26  Residual tumor

| Residual tumor (R) | Cases (%) |
|--------------------|-----------|
| RX                 | 95 (1.8)  |
| R0                 | 4663 (89.6) |
| R1                 | 257 (4.9)  |
| R2                 | 189 (3.6)  |
| Total              | 5204       |
Table 27  Cause of death

| Cause of death                                | Cases (%) |
|----------------------------------------------|-----------|
| Death due to recurrence                      | 1806 (62.0)|
| Death due to other cancer                    | 231 (7.9) |
| Death due to other disease (with recurrence) | 65 (2.2)  |
| Death due to other disease (without recurrence) | 402 (13.8)|
| Death due to other disease (recurrence unknown) | 12 (0.4) |
| Operative death*                             | 39 (1.3)  |
| Postoperative hospital death**               | 65 (2.2)  |
| Unknown                                      | 291 (10.0)|
| Total of death cases                         | 2911      |

Operative mortality rate: 0.75%

*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. Hospital mortality rate: 2.0%

Follow-up period (months)

Median (min.–max.) 55.29 (0.07–78.78)

Fig. 7  Survival of patients who underwent esophagectomy

|       | Years after surgery |
|-------|---------------------|
|       | 1       | 2       | 3       | 4       | 5       |
| Esophagectomy | 88.2% | 75.5% | 68.1% | 62.9% | 59.3% |
Fig. 8  Survival of patients who underwent esophagectomy according to the clinical stage (JES 10th)
Fig. 9  Survival of patients who underwent esophagectomy according to the clinical stage (UICC TNM 7th)

| Years after surgery | cStage IA (n= 1278) | cStage IB (n= 452) | cStage IIA (n= 517) | cStage IIB (n= 570) | cStage IIIA (n= 1172) | cStage IIIB (n= 552) | cStage IIIC (n= 379) | cStage IV (n= 167) |
|---------------------|---------------------|---------------------|---------------------|---------------------|-----------------------|----------------------|---------------------|---------------------|
|                     | 1                   | 2                   | 3                   | 4                   | 5                     |                      |                     |                     |
| cStage IA           | 96.7%               | 92.7%               | 88.2%               | 85.5%               | 82.4%                 |                      |                     |                     |
| cStage IB           | 91.9%               | 81.8%               | 74.4%               | 67.8%               | 62.6%                 |                      |                     |                     |
| cStage IIA          | 86.0%               | 70.3%               | 62.4%               | 56.6%               | 52.0%                 |                      |                     |                     |
| cStage IIB          | 92.5%               | 83.9%               | 76.4%               | 69.8%               | 67.5%                 |                      |                     |                     |
| cStage IIIA         | 83.8%               | 66.8%               | 58.7%               | 51.7%               | 48.1%                 |                      |                     |                     |
| cStage IIIB         | 80.8%               | 62.7%               | 53.4%               | 48.5%               | 44.3%                 |                      |                     |                     |
| cStage IIIC         | 78.1%               | 56.0%               | 45.1%               | 42.2%               | 39.1%                 |                      |                     |                     |
| cStage IV           | 82.8%               | 58.9%               | 47.7%               | 39.4%               | 35.4%                 |                      |                     |                     |
Fig. 10  Survival of patients who underwent esophagectomy according to the depth of tumor invasion, pT (JES 10th)

|       | 1   | 2   | 3   | 4   | 5   |
|-------|-----|-----|-----|-----|-----|
| pT0   | 94.2% | 89.7% | 83.7% | 79.4% | 76.8% |
| pT1a  | 98.6% | 94.5% | 90.9% | 87.5% | 83.6% |
| pT1b  | 94.1% | 88.2% | 81.8% | 77.5% | 73.8% |
| pT2   | 90.7% | 79.0% | 71.9% | 65.0% | 60.9% |
| pT3   | 82.5% | 60.8% | 50.8% | 45.0% | 41.3% |
| pT4a  | 62.1% | 47.4% | 37.3% | 28.9% | 26.9% |
| pT4b  | 53.3% | 29.3% | 24.8% | 14.9% | 14.9% |
Fig. 11 Survival of patients who underwent esophagectomy according to lymph-node metastasis (JES 10th)

|          | Years after Esophagectomy |
|----------|---------------------------|
|          | 1           | 2   | 3   | 4   | 5   |
| pN0      | 93.0%       | 86.7% | 82.3% | 78.5% | 74.7% |
| pN1      | 88.0%       | 72.9% | 63.5% | 58.2% | 54.8% |
| pN2      | 83.9%       | 61.7% | 50.6% | 43.1% | 39.7% |
| pN3      | 79.4%       | 59.2% | 47.4% | 38.7% | 36.9% |
| pN4      | 72.8%       | 52.3% | 41.2% | 34.4% | 29.3% |
Fig. 12  Survival of patients who underwent esophagectomy according to lymph-node metastasis (UICC TNM 7th)

| Years after Esophagectomy | 1   | 2   | 3   | 4   | 5   |
|--------------------------|-----|-----|-----|-----|-----|
| pN0 (n= 2567)            | 92.7% | 86.2% | 81.6% | 77.7% | 74.0% |
| pN1 (n= 1369)            | 90.0% | 75.1% | 66.5% | 60.4% | 56.6% |
| pN2 (n= 775)             | 79.2% | 57.3% | 44.1% | 36.6% | 33.4% |
| pN3 (n= 367)             | 68.4% | 37.8% | 25.3% | 18.5% | 15.4% |
Survival of patients who underwent esophagectomy according to the pathological stage (JES 10th)

| Years after Surgery | pStage 0 (n=698) | pStage I (n=942) | pStage II (n=1440) |
|---------------------|-----------------|-----------------|-------------------|
| 1                   | 97.7%           | 95.4%           | 90.7%             |
| 2                   | 94.7%           | 91.1%           | 86.5%             |
| 3                   | 91.8%           | 86.3%           | 73.3%             |
| 4                   | 88.4%           | 83.1%           | 67.7%             |
| 5                   | 85.0%           | 78.5%           | 64.6%             |

| Years after Esophagectomy | pStage III (n=1415) | pStage IVa (n=418) | pStage IVb (n=97) |
|---------------------------|---------------------|-------------------|-------------------|
| 1                         | 83.4%               | 69.3%             | 59.1%             |
| 2                         | 60.3%               | 48.5%             | 34.3%             |
| 3                         | 49.1%               | 38.1%             | 25.6%             |
| 4                         | 42.3%               | 30.0%             | 24.2%             |
| 5                         | 38.5%               | 26.3%             | 22.7%             |
**Fig. 14** Survival of patients who underwent esophagectomy according to the pathological stage (UICC TNM 7th)

Survival rate (%) over Years after surgery for different pathological stages:

- **pStage IA (n= 980)**
  - 1 year: 96.5%
  - 2 years: 93.1%
  - 3 years: 89.4%
  - 4 years: 86.3%
  - 5 years: 82.7%

- **pStage IB (n= 612)**
  - 1 year: 94.1%
  - 2 years: 88.8%
  - 3 years: 85.7%
  - 4 years: 81.9%
  - 5 years: 76.3%

- **pStage IIA (n= 764)**
  - 1 year: 88.1%
  - 2 years: 77.6%
  - 3 years: 71.5%
  - 4 years: 66.6%
  - 5 years: 63.5%

- **pStage IIB (n= 766)**
  - 1 year: 94.4%
  - 2 years: 85.2%
  - 3 years: 77.6%
  - 4 years: 72.4%
  - 5 years: 69.0%

- **pStage IIIA (n= 766)**
  - 1 year: 87.8%
  - 2 years: 68.6%
  - 3 years: 59.0%
  - 4 years: 51.7%
  - 5 years: 47.5%

- **pStage IIIB (n= 351)**
  - 1 year: 81.3%
  - 2 years: 54.7%
  - 3 years: 41.5%
  - 4 years: 34.9%
  - 5 years: 31.2%

- **pStage IIIC (n= 311)**
  - 1 year: 61.7%
  - 2 years: 34.1%
  - 3 years: 25.6%
  - 4 years: 19.9%
  - 5 years: 17.5%

- **pStage IV (n= 354)**
  - 1 year: 74.2%
  - 2 years: 51.3%
  - 3 years: 36.5%
  - 4 years: 28.5%
  - 5 years: 26.6%
Declarations

Ethical statement  All procedures followed 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.

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Authors and Affiliations

Masayuki Watanabe1, Yasushi Toh2, Ryu Ishihara3, Koji Kono4, Hisahiro Matsubara5, Kentaro Murakami5, Kei Muro6, Hodaka Numasaki7, Tsuneo Oyama8, Soji Ozawa9, Hiroshi Saeki10, Koji Tanaka11, Takahiro Tsushima12, Masaki Ueno13, Takashi Uno14, Toshiyuki Yoshio15, Shiyori Usune16, Arata Takahashi16, Hiroaki Miyata16, The Registration Committee for Esophageal Cancer of the Japan Esophageal Society

1 Department of Gastroenterological Surgery, Cancer Institute Hospital of Japanese Foundation for Cancer Research, 3-8-31 Ariake, Koto-ku, Tokyo 135-8550, Japan
2 Department of Gastroenterological Surgery, National Hospital Organization Kyushu Cancer Center, 3-1-1 Notame, Minami-ku, Fukuoka 811-1395, Japan
3 Department of Gastrointestinal Oncology, Osaka International Cancer Institute, 3-1-69 Otemae, Chuo-ku, Osaka 541-8567, Japan
4 Department of Gastrointestinal Tract Surgery, Fukushima Medical University School of Medicine, 1 Hikarigaoka, Fukushima 960-1295, Japan
5 Department of Frontier Surgery, Graduate School of Medicine, Chiba University, 1-8-1 Inohana, Chuo-ku, Chiba 260-8670, Japan
6 Department of Clinical Oncology, Aichi Cancer Center Hospital, 1-1 Kanokoden, Chikusa-ku, Nagoya 464-8681, Japan
7 Department of Medical Physics and Engineering, Graduate School of Medicine, Osaka University, 2-2 Yamadaoka, Suita 565-0871, Japan
8 Department of Endoscopy, Saku Central Hospital Advanced Care Center, 3400-28 Nakagomi, Saku 385-0051, Japan
9 Department of Gastroenterological Surgery, Tokai University School of Medicine, 143 Shimokasuya, Isehara 259-1193, Japan
10 Department of General Surgical Science, Graduate School of Medicine, Gunma University, 3-39-22 Showa-machi, Maebashi 371-8511, Japan
11 Department Gastroenterological Surgery, Graduate School of Medicine, Osaka University, 2-2 Yamadaoka, Suita 565-0871, Japan
12 Division of Gastroenterological Oncology, Shizuoka Cancer Center, 1007 Shimonagakubo, Nagaizumi-cho, Sunto-gun, Shizuoka 411-8777, Japan
13 Department of Gastroenterological Surgery, Toranomon Hospital, 2-2-2 Toranomon, Minato-ku, Tokyo 105-8470, Japan
14 Department of Diagnostic Radiology and Radiation Oncology, Graduate School of Medicine, Chiba University, 1-8-1 Inohana, Chuo-ku, Chiba 260-8670, Japan
15 Department of Upper Gastrointestinal Medicine, Cancer Institute Hospital of Japanese Foundation for Cancer Research, 3-8-31 Ariake, Koto-ku, Tokyo 135-8550, Japan
16 Department of Healthcare Quality Assessment, Graduate School of Medicine, The University of Tokyo, 7-3-1 Hongo, Bunkyo-ku, Tokyo 113-8655, Japan