**Impact of Propofol-based Total Intravenous Anesthesia Versus Inhalation Anesthesia on Long-term Survival after Cancer Surgery in a Nationwide Cohort**

Susie Yoon, MD, PhD1; Sun-Young Jung, PhD2\*, Myo-Song Kim, BS2, Danbi Yoon, MS3, Younghae Cho, MS3, Yunseok Jeon, MD, PhD1\*

1 Department of Anesthesiology and Pain Medicine, Seoul National University Hospital, Seoul National University College of Medicine, Seoul, Republic of Korea; 2 College of Pharmacy, Chung-Ang University, Seoul, Republic of Korea; 3 College of Statistics, Sungkyunkwan University, Seoul, Republic of Korea.

**\*Corresponding Authors:** These two authors equally contributed to this work as co-corresponding authors.

\*Yunseok Jeon, MD, PhD.

Address: Department of Anesthesiology and Pain Medicine, Seoul National University Hospital, 101 Daehak-ro, Jongno-gu, Seoul 03080, Korea

Phone: 82-2-2072-2465, Fax: 82-2-747-5639

E-mail: jeonyunseok@gmail.com

\*Sun-Young Jung, PhD.

Address: College of Pharmacy, Chung-Ang University, 84 Heukseok-ro, Dongjak-gu, Seoul 06974, Korea

Phone: 82-2-820-5678, Fax: 82-2-816-7338

E-mail: jsyoung@cau.ac.kr

**List of Supplement Files**

|  |  |  |
| --- | --- | --- |
| Number | Title | Page |
|  **Table S1** | Summary of International Classification of Disease, 10th revision (ICD-10) codes and the Korean Classification of Disease, 7th edition (KCD-7) of cancer diseases and surgical procedures | 1 |
|  **Table S2** | Summary ofmajor independent variables | 2 |
|  **Table S3** | Baseline characteristics of patients underwent breast and gastric cancer | 3–4 |
|  **Table S4** | Baseline characteristics of patients underwent lung and liver cancer | 5–6 |
|  **Table S5** | Baseline characteristics of patients underwent kidney and colon cancer | 7–8 |
|  **Table S6** | Baseline characteristics of patients underwent pancreas and esophageal cancer | 9–10 |
|  **Table S7** | Baseline characteristics of patients underwent bladder cancer | 11–12 |
|  **Table S8** | The median and person-year follow-up duration for each cancer surgery | 13 |
|  **Table S9** | Univariable and multivariable Cox regression models in the weighted cohorts (Breast, gastric and lung cancer) | 14 |
|  **Table S10** | Univariable and multivariable Cox regression models in the weighted cohorts (Liver, kidney and colon cancer) | 15 |
|  **Table S11** | Univariable and multivariable Cox regression models in the weighted cohorts (Pancreas, esophageal and bladder cancer) | 16 |
|  **Table S12** | The references of included studies | 17 |
|  **Table S13** | The characteristics of included studies | 19 |
|  **Table S14** | Quality assessments based on Newcastle‐Ottawa Quality Assessment Scale | 21 |

**Table S1.** Summary ofInternational Classification of Disease, 10th revision (ICD-10) codes and the Korean Classification of Disease, 7th edition (KCD-7) of cancer diseases and surgical procedures.

|  |  |  |
| --- | --- | --- |
|  | **Disease codes** | **Procedure codes** |
| Breast cancer | C50 | N7131‒5 |
| Gastric cancer | C16 | QA536, Q2533, Q2534, Q2536, Q2537Q0251‒9, Q2594, Q2598 |
| Lung cancer | C34 | O1401, O1402O1410O1421‒4O1431, O1432 |
| Liver cancer | C22 | Q7221‒4, Q7230 |
| Kidney cancer | C64, C65, C66 | R3271, R3274, R3273, R3290 |
| Colorectal cancer | C18, C19, C20 | Q2671‒3, Q2679Q2890‒3Q2921‒4, Q2927Q2925, Q2926 |
| Pancreatic cancer | C25 | Q7561‒6Q7571, Q7572 |
| Esophageal cancer | C15 | Q2346‒8, Q2365‒9, Q2401‒3 |
| Bladder cancer | C67 | R3470R3481, R3482 |

**Table S2.** Summary of major independent variables

|  |
| --- |
| **Variables** |
| **Preoperative medical history and other variables** |
| Demographics | Age, sex |
| Comorbidities | Hypertension (I10, I15), diabetes mellitus (E10–4), coronary artery disease (I20–5), cerebral vascular disease (I60–6), chronic obstructive pulmonary disease (J44), chronic liver disease (K72, K74), chronic kidney disease/end-stage renal disease (N18), other cancer disease (C\*), metastatic cancer (C77–80) |
| Preoperative anesthetic exposure |  |
| Chemotherapy or Radiation therapy | Chemotherapy (AP502, AP602, AP702, AP802, KK151–8)Radiation therapy (HD051–9, HD091, HD092, HZ271, HD080–9) |
| Medications | Angiotensin converting enzyme inhibitor/angiotensin receptor blocker, beta blocker, calcium channel blocker, oral hypoglycemic agent, insulin, statin, aspirin, clopidogrel, diuretics |
| Facility types | Tertiary, General, Semi-hospital, Local clinic |
| Operative years | 2007 to 2016 |
| **Intraoperative anesthetics and other variables**  |
| Sedatives | Propofol, Thiopental, Midazolam, Ketamine, Etomidate |
| Inhalational agents | Sevoflurane, Desflurane, Isoflurane, Enflurane, N2O |
| Opioids | Remifentanil, Fentanyl, Sufentanil, Alfentanil |
| Others | Transfusion amount, surgical duration |
| **Postoperative variables** |
| Epidural analgesia | Epidural analgesia (L1214, L1224, LA222–7) |
| Chemotherapy or Radiation therapy | Chemotherapy (AP502, AP602, AP702, AP802, KK151–8)Radiation therapy (HD051–9, HD091, HD092, HZ271, HD080–9) |
| Length of stay | Intensive care unit, in-hospital |

**Table S3.** Baseline characteristics of patients underwent breast and gastric cancer

|  | **Breast cancer** | **Gastric cancer** |
| --- | --- | --- |
|  | **Unweighted cohort** | **IPTW-weighted cohort** | **Unweighted cohort** | **IPTW-weighted cohort** |
|  | TIVA(n=17,042) | IA(n-81,057) | SMD | TIVA(n=13,100) | IA(n=65,311) | SMD | TIVA(n=7,549) | IA(n=88,122) | SMD | TIVA(n=4,938) | IA(n=71,552) | SMD |
| Age, yr | 52.7 (10.7) | 53.4 (11.2) | -0.07 | 53.3 (10.5) | 53.0 (11.0) | 0.03 | 61.4 (11.9) | 63.4 (11.8) | -0.17 | 63.4 (11.5) | 63.2 (11.7) | 0.01 |
| Male, n | 65 (0.4) | 336 (0.4) | 0.01 | 53 (0.4) | 247 (0.4) | 0 | 4976 (65.9) | 59773 (67.8) | 0.04 | 3312 (67.1) | 48389 (67.6) | 0.01 |
| Preoperative comorbidity |  |  |  |  |  |  |  |  |  |  |  |  |
| Hypertension | 4639 (27.2) | 24404 (30.1) | -0.06 | 3813 (29.1) | 18064 (27.7) | 0.03 | 3518 (46.6) | 44168 (50.1) | -0.07 | 2487 (50.4) | 35359 (49.4) | 0.02 |
| Diabetes  | 3799 (22.3) | 19384 (23.9) | -0.04 | 3008 (23.0) | 14649 (22.4) | 0.01 | 4477 (59.3) | 50473 (57.3) | -0.04 | 2146 (43.5) | 30313 (42.4) | 0.02 |
| Coronary artery disease | 1931 (11.3) | 9694 (12.0) | -0.02 | 1521 (11.6) | 7276 (11.1) | 0.01 | 2039 (27.0) | 19694 (22.3) | 0.11 | 1074 (21.7) | 15730 (22.0) | -0.01 |
| Cerebrovascular accident | 824 (4.8) | 4059 (5.0) | -0.01 | 627 (4.8) | 2997 (4.6) | 0.01 | 816 (10.8) | 9775 (11.1) | -0.01 | 559 (11.3) | 7686 (10.7) | 0.02 |
| COPD | 1895 (11.1) | 4803 (5.9) | 0.19 | 623 (4.8) | 3135 (4.8) | 0 | 1450 (19.2) | 13360 (15.2) | 0.11 | 759 (15.4) | 10833 (15.1) | 0.01 |
| Chronic liver disease | 388 (2.3) | 1552 (1.9) | 0.03 | 245 (1.9) | 1188 (1.8) | 0 | 325 (4.3) | 3371 (3.8) | 0.02 | 198 (4.0) | 2733 (3.8) | 0.01 |
| Chronic kidney disease | 133 (0.8) | 808 (1.0) | -0.02 | 113 (0.9) | 522 (0.8) | 0.01 | 160 (2.1) | 2151 (2.4) | -0.02 | 120 (2.4) | 1687 (2.4) | 0 |
| Other malignancy | 542 (3.2) | 3092 (3.8) | -0.03 | 460 (3.5) | 2272 (3.5) | 0 | 283 (3.7) | 3872 (4.4) | -0.03 | 219 (4.4) | 3055 (4.3) | 0.01 |
| Metastasis  | 3299 (19.4) | 15522 (19.1) | 0.01 | 2143 (16.4) | 11921 (18.3) | -0.05 | 1097 (14.5) | 13614 (15.4) | -0.03 | 667 (13.5) | 11112 (15.5) | -0.06 |
| Preoperative medication |  |  |  |  |  |  |  |  |  |  |  |  |
| ACE inhibitor | 96 (0.6) | 677 (0.8) | -0.03 | 84 (0.6) | 386 (0.6) | 0.01 | 254 (3.4) | 2856 (3.2) | 0.01 | 167 (3.4) | 2341 (3.3) | 0.01 |
| Angiotensin receptor blocker | 332 (1.9) | 2596 (3.2) | -0.08 | 292 (2.2) | 1309 (2.0) | 0.02 | 587 (7.8) | 7226 (8.2) | -0.02 | 411 (8.3) | 5680 (7.9) | 0.01 |
| Beta-blocker | 732 (4.3) | 4240 (5.2) | -0.04 | 642 (4.9) | 3011 (4.6) | 0.01 | 602 (8.0) | 7423 (8.4) | -0.02 | 433 (8.8) | 5930 (8.3) | 0.02 |
| Calcium channel blocker | 685 (4.0) | 3950 (4.9) | -0.04 | 558 (4.3) | 2538 (3.9) | 0.02 | 880 (11.7) | 10150 (11.5) | 0 | 580 (11.7) | 8105 (11.3) | 0.01 |
| Oral hypoglycemic agent | 279 (1.6) | 1944 (2.4) | -0.05 | 237 (1.8) | 1081 (1.7) | 0.01 | 458 (6.1) | 5785 (6.6) | -0.02 | 335 (6.8) | 4523 (6.3) | 0.02 |
| Insulin | 387 (2.3) | 2487 (3.1) | -0.05 | 340 (2.6) | 1548 (2.4) | 0.01 | 484 (6.4) | 6831 (7.8) | -0.05 | 398 (8.1) | 5390 (7.5) | 0.02 |
| Statin | 418 (2.5) | 2755 (3.4) | -0.06 | 367 (2.8) | 1691 (2.6) | 0.01 | 596 (7.9) | 6947 (7.9) | 0 | 410 (8.3) | 5516 (7.7) | 0.02 |
| Aspirin | 151 (0.9) | 658 (0.8) | 0.01 | 100 (0.8) | 492 (0.8) | 0 | 146 (1.9) | 1496 (1.7) | 0.02 | 82 (1.7) | 1221 (1.7) | 0 |
| Clopidogrel | 208 (1.2) | 1285 (1.6) | -0.03 | 180 (1.4) | 816 (1.2) | 0.01 | 407 (5.4) | 4909 (5.6) | -0.01 | 280 (5.7) | 3857 (5.4) | 0.01 |
| Diuretics | 515 (3.0) | 3689 (4.6) | -0.08 | 486 (3.7) | 2185 (3.3) | 0.02 | 681 (9.0) | 5958 (6.8) | 0.08 | 319 (6.5) | 4711 (6.6) | -0.01 |
| Preoperative anesthetic exposure | 2111 (12.3) | 11020 (13.6) | -0.04 | 1705 (13.0) | 8275 (12.7) | 0.01 | 885 (11.7) | 10250 (11.6) | 0 | 586 (11.9) | 8203 (11.5) | 0.01 |
| Preoperative chemotherapy | 2359 (13.8) | 9581 (11.8) | 0.06 | 1567 (12.0) | 7877 (12.1) | 0 | 136 (1.8) | 1882 (2.1) | -0.02 | 108 (2.2) | 1523 (2.1) | 0 |
| Preoperative radiation | 159 (0.9) | 540 (0.7) | 0.03 | 82 (0.6) | 390 (0.6) | 0 | 20 (0.3) | 336 (0.4) | -0.02 | 14 (0.3) | 245 (0.3) | -0.01 |
| Year of surgery |  |  |  |  |   |  |  |  |  |  |  |  |
| 2007 | 1386 (8.1) | 4575 (5.6) | 0.1 | 964 (7.4) | 4283 (6.6) | 0.03 | 177 (2.3) | 1634 (1.9) | 0.03 | 97 (2.0) | 1571 (2.2) | -0.02 |
| 2008 | 1931 (11.3) | 4425 (5.5) | 0.21 | 566 (4.3) | 2714 (4.2) | 0.01 | 499 (6.6) | 7260 (8.2) | -0.06 | 478 (9.7) | 7073 (9.9) | -0.01 |
| 2009 | 1953 (11.5) | 4236 (5.2) | 0.23 | 356 (2.7) | 1713 (2.6) | 0.01 | 861 (11.4) | 6781 (7.7) | 0.13 | 431 (8.7) | 6235 (8.7) | 0 |
| 2010 | 1731 (10.2) | 4632 (5.7) | 0.16 | 730 (5.6) | 3625 (5.5) | 0 | 1083 (14.3) | 6426 (7.3) | 0.23 | 319 (6.5) | 4627 (6.5) | 0 |
| 2011 | 1675 (9.8) | 5905 (7.3) | 0.09 | 1070 (8.2) | 5440 (8.3) | -0.01 | 873 (11.6) | 6232 (7.1) | 0.16 | 445 (9.0) | 5470 (7.6) | 0.06 |
| 2012 | 1571 (9.2) | 6159 (7.6) | 0.06 | 1137 (8.7) | 5765 (8.8) | -0.01 | 1565 (20.7) | 5984 (6.8) | 0.41 | 158 (3.2) | 2334 (3.3) | 0 |
| 2013 | 1892 (11.1) | 12301 (15.2) | -0.12 | 2155 (16.4) | 10950 (16.8) | -0.01 | 961 (12.7) | 13787 (15.6) | -0.08 | 918 (18.6) | 13398 (18.7) | 0 |
| 2014 | 1802 (10.6) | 13709 (16.9) | -0.18 | 2280 (17.4) | 11614 (17.8) | -0.01 | 539 (7.1) | 13638 (15.5) | -0.27 | 709 (14.4) | 10501 (14.7) | -0.01 |
| 2015 | 1932 (11.3) | 14180 (17.5) | -0.18 | 2427 (18.5) | 12153 (18.6) | 0 | 588 (7.8) | 12588 (14.3) | -0.21 | 723 (14.6) | 10596 (14.8) | 0.02 |
| 2016 | 1169 (6.9) | 10935 (13.5) | -0.22 | 1416 (10.8) | 7054 (10.8) | 0 | 403 (5.3) | 13792 (15.7) | -0.34 | 659 (13.3) | 9746 (13.6) | -0.02 |
| Facility type |  |  |  |  |  |  |  |  |  |  |  |  |
| Tertiary hospital | 11310 (66.4) | 55118 (68.0) | -0.03 | 9275 (70.8) | 46935 (71.9) | -0.02 | 6458 (85.5) | 59566 (67.6) | 0.3 | 3679 (74.5) | 52689 (73.6) | 0.02 |
| General hospital | 5730 (33.6) | 21683 (26.8) | 0.15 | 3825 (29.2) | 18376 (28.1) | 0.02 | 1091 (14.5) | 27744 (31.5) | -0.41 | 1260 (25.5) | 18863 (26.4) | -0.02 |
| Semi-hospital | 2 (0.0) | 2787 (3.4) | -0.19 |  |  |  | 794 (10.5) | 0 | -0.02 |  |  |  |
| Local clinic | 0 (0.0) | 1469 (1.8) | -0.27 |  |  |  | 18 (0.2) | 0 | -0.13 |  |  |  |

The values are presented as the mean (SD) or number (%). IPTW, inverse probability of treatment weight; TIVA, total intravenous anesthesia; IA, inhalational anesthesia; SMD, standardized mean difference; COPD, chronic obstructive pulmonary disease; ACE, angiotensin-converting enzyme.

**Table S4.** Baseline characteristics of patients underwent lung and liver cancer

|  | **Lung cancer** | **Liver cancer** |
| --- | --- | --- |
|  | **Unweighted cohort** | **IPTW-weighted cohort** | **Unweighted cohort** | **IPTW-weighted cohort** |
|  | **TIVA****(n=8,515)** | **IA****(n=28,142)** | SMD | **TIVA****(n=6,188)** | **IA****(n=23,151)** | SMD | **TIVA****(n=1,227))** | **IA****(n=28,512)** | SMD | **TIVA****(n=870)** | **IA****(n=22,926)** | SMD |
| Age, yr | 65.1 (10.0) | 65.5 (9.8) | -0.04 | 65.3 (9.9) | 65.3 (9.8) | 0 | 59.8 (10.6) | 60.2 (10.5) | -0.04 | 59.9 (10.7) | 60.0 (10.5) | -0.01 |
| Male, n | 5357 (62.9) | 18211 (64.7) | 0.04 | 3957 (63.9) | 14816 (64.0) | 0 | 945 (77.0) | 22017 (77.2) | 0 | 671 (77.1) | 17618 (76.8) | -0.01 |
| Preoperative comorbidity |  |  |  |  |  |  |  |  |  |  |  |  |
| Hypertension | 4909 (57.7) | 15835 (56.3) | 0.03 | 3453 (55.8) | 12859 (55.5) | 0.01 | 588 (47.9) | 13931 (48.9) | -0.02 | 403 (46.4) | 10963 (47.8) | -0.03 |
| Diabetes  | 4485 (52.7) | 14474 (51.4) | -0.02 |  |  | 0 | 580 (47.3) | 13441 (47.1) | 0 | 397 (45.7) | 10660 (46.5) | -0.02 |
| Coronary artery disease | 2678 (31.5) | 8294 (29.5) | 0.04 |  |  | 0.01 | 268 (21.8) | 5732 (20.1) | 0.04 | 175 (20.1) | 4480 (19.5) | 0.01 |
| Cerebrovascular accident | 1288 (15.1) | 4057 (14.4) | 0.02 | 881 (14.2) | 3284 (14.2) | 0 | 111 (9) | 2304 (8.1) | 0.03 | 70 (8) | 1782 (7.8) | 0.01 |
| COPD | 3252 (38.2) | 8256 (29.3) | 0.19 | 1811 (29.3) | 6870 (29.7) | -0.01 | 191 (15.6) | 3159 (11.1) | 0.13 | 88 (10.1) | 2336 (10.2) | 0 |
| Chronic liver disease | 427 (5) | 1297 (4.6) | 0.02 | 277 (4.5) | 1037 (4.5) | 0 | 579 (47.2) | 14287 (50.1) | -0.06 | 439 (50.4) | 11446 (49.9) | 0.01 |
| Chronic kidney disease | 241 (2.8) | 818 (2.9) | 0 | 181 (2.9) | 668 (2.9) | 0 | 29 (2.4) | 648 (2.3) | 0.01 | 20 (2.3) | 520 (2.3) | 0 |
| Other malignancy | 1262 (14.8) | 4232 (15) | -0.01 | 947 (15.3) | 3554 (15.4) | 0 | 76 (6.2) | 1890 (6.6) | -0.02 | 53 (6.1) | 1503 (6.6) | -0.02 |
| Metastasis  | 2426 (28.5) | 7881 (28) | 0.01 | 1611 (26) | 6181 (26.7) | -0.01 | 188 (15.3) | 3887 (13.6) | 0.05 | 108 (12.4) | 3109 (13.6) | -0.03 |
| Preoperative medication |  |  |  |  |  |  |  |  |  |  |  |  |
| ACE inhibitor | 323 (3.8) | 1028 (3.7) | 0.01 | 226 (3.6) | 802 (3.5) | 0.01 | 60 (4.9) | 780 (2.7) | 0.11 | 16 (1.9) | 455 (2) | -0.01 |
| Angiotensin receptor blocker | 1173 (13.8) | 3496 (12.4) | 0.04 | 758 (12.3) | 2826 (12.2) | 0 | 117 (9.5) | 2976 (10.4) | -0.03 | 81 (9.3) | 2215 (9.7) | -0.01 |
| Beta-blocker | 1106 (13) | 3377 (12) | 0.03 | 731 (11.8) | 2691 (11.6) | 0.01 | 135 (11) | 2823 (9.9) | 0.04 | 80 (9.2) | 2201 (9.6) | -0.01 |
| Calcium channel blocker | 1605 (18.8) | 4997 (17.8) | 0.03 | 1097 (17.7) | 4020 (17.4) | 0.01 | 192 (15.6) | 4467 (15.7) | 0 | 118 (13.6) | 3277 (14.3) | -0.02 |
| Oral hypoglycemic agent | 899 (10.6) | 2766 (9.8) | 0.02 | 611 (9.9) | 2252 (9.7) | 0.01 | 145 (11.8) | 3057 (10.7) | 0.03 | 87 (10.1) | 2349 (10.2) | -0.01 |
| Insulin | 821 (9.6) | 0 (0) | -0.03 | 623 (10.1) | 2307 (10) | 0 | 190 (15.5) | 3565 (12.5) | 0.09 | 102 (11.7) | 2759 (12) | -0.01 |
| Statin | 1211 (14.2) | 3707 (13.2) | 0.03 | 821 (13.3) | 3029 (13.1) | 0.01 | 77 (6.3) | 1806 (6.3) | 0 | 51 (5.9) | 1342 (5.9) | 0 |
| Aspirin | 192 (2.3) | 575 (2) | 0.01 | 124 (2) | 451 (1.9) | 0 | 21 (1.7) | 374 (1.3) | 0.03 | 8 (1) | 271 (1.2) | -0.02 |
| Clopidogrel | 647 (7.6) | 2066 (7.3) | 0.01 | 451 (7.3) | 1649 (7.1) | 0.01 | 50 (4.1) | 1020 (3.6) | 0.03 | 28 (3.2) | 739 (3.2) | 0 |
| Diuretics | 1576 (18.5) | 2574 (9.1) | 0.27 | 454 (7.3) | 1724 (7.4) | 0 | 153 (12.5) | 3474 (12.2) | 0.01 | 95 (10.9) | 2794 (12.2) | -0.04 |
| Preoperative anesthetic exposure | 1846 (21.7) | 6036 (21.4) | 0.01 | 1326 (21.4) | 4948 (21.4) | 0 | 160 (13) | 4179 (14.7) | -0.05 | 116 (13.4) | 3066 (13.4) | 0 |
| Preoperative chemotherapy | 643 (7.6) | 2583 (9.2) | -0.06 | 522 (8.4) | 2021 (8.7) | -0.01 | 76 (6.2) | 1403 (4.9) | 0.06 | 39 (4.5) | 1077 (4.7) | -0.01 |
| Preoperative radiation | 188 (2.2) | 593 (2.1) | 0.01 | 135 (2.2) | 509 (2.2) | 0 | 8 (0.7) | 216 (0.8) | -0.01 | 7 (0.8) | 167 (0.7) | 0.01 |
| Year of surgery |  |  |  |  |  |  |  |  |  |  |  |  |
| 2007 | 413 (4.9) | 1221 (4.3) | 0.02 | 291 (4.7) | 1003 (4.3) | 0.02 | 124 (10.1) | 1885 (6.6) | 0.13 | 51 (5.9) | 1386 (6) | -0.01 |
| 2008 | 433 (5.1) | 1468 (5.2) | -0.01 | 323 (5.2) | 1194 (5.2) | 0 | 157 (12.8) | 2100 (7.4) | 0.18 | 55 (6.4) | 1438 (6.3) | 0 |
| 2009 | 567 (6.7) | 1396 (5) | 0.07 | 343 (5.5) | 1195 (5.2) | 0.02 | 167 (13.6) | 2121 (7.4) | 0.2 | 50 (5.8) | 1377 (6) | -0.01 |
| 2010 | 669 (7.9) | 1578 (5.6) | 0.09 | 377 (6.1) | 1333 (5.8) | 0.01 | 135 (11) | 2278 (8) | 0.1 | 69 (7.9) | 1876 (8.2) | -0.01 |
| 2011 | 708 (8.3) | 1823 (6.5) | 0.07 | 448 (7.2) | 1535 (6.6) | 0.02 | 129 (10.5) | 2752 (9.7) | 0.03 | 92 (10.6) | 2595 (11.3) | -0.02 |
| 2012 | 909 (10.7) | 1850 (6.6) | 0.15 | 403 (6.5) | 1503 (6.5) | 0 | 118 (9.6) | 3011 (10.6) | -0.03 | 105 (12) | 2930 (12.8) | -0.02 |
| 2013 | 1313 (15.4) | 3944 (14) | 0.04 | 832 (13.5) | 3321 (14.3) | -0.03 | 115 (9.4) | 3429 (12) | -0.09 | 131 (15) | 3343 (14.6) | 0.01 |
| 2014 | 875 (10.3) | 4559 (16.2) | -0.18 | 883 (14.3) | 3399 (14.7) | -0.01 | 74 (6) | 3499 (12.3) | -0.22 | 51 (5.9) | 1328 (5.8) | 0 |
| 2015 | 1194 (14) | 4666 (16.6) | -0.07 | 1015 (16.4) | 3898 (16.8) | -0.01 | 100 (8.1) | 3585 (12.6) | -0.15 | 126 (14.5) | 3182 (13.9) | 0.02 |
| 2016 | 1434 (16.8) | 5637 (20) | -0.08 | 1269 (20.5) | 4769 (20.6) | 0 | 108 (8.8) | 3852 (13.5) | -0.15 | 140 (16) | 3470 (15.1) | 0.02 |
| Facility type |  |  |  |  |  |  |  |  |  |  |  |  |
| Tertiary hospital | 7399 (86.9) | 20298 (72.1) | 0.37 | 5020 (81.1) | 18932 (81.8) | -0.02 | 837 (68.2) | 22670 (79.5) | -0.26 | 728 (83.7) | 19013 (82.9) | 0.02 |
| General hospital | 1116 (13.1) | 7837 (27.8) | -0.37 | 1165 (18.8) | 4220 (18.2) | 0.02 | 390 (31.8) | 5824 (20.4) | 0.26 | 142 (16.3) | 3913 (17.1) | -0.02 |
| Semi-hospital | 0 (0) | 7 (0) | -0.02 |  |  |  | 0 (0) | 18 (0.1) | -0.04 |  |  |  |
| Local clinic |  |  |  |  |  |  |  |  |  |  |  |  |

The values are presented as the mean (SD) or number (%). IPTW, inverse probability of treatment weight; TIVA, total intravenous anesthesia; IA, inhalational anesthesia; SMD, standardized mean difference; COPD, chronic obstructive pulmonary disease; ACE, angiotensin-converting enzyme.

**Table S5.** Baseline characteristics of patients underwent kidney and colon cancer

|  | **Kidney cancer** | **Colorectal cancer** |
| --- | --- | --- |
|  | **Unweighted cohort** | **IPTW-weighted cohort** | **Unweighted cohort** | **IPTW-weighted cohort** |
|  | **TIVA****(n=870)** | **IA****(n=22,913)** | SMD | **TIVA****(n=582)** | **IA****(n=19,287)** | SMD | **TIVA****(n=479)** | **IA****(n=9,400)** | SMD | **TIVA****(n=350)** | **IA****(n=7,551)** | SMD |
| Age, yr | 60.2 (12.1) | 59.6 (12.4) | 0.05 | 60.0 (12.1) | 59.4 (12.4) | 0.05 | 64.7 (12.5) | 66.6 (12.5) | -0.14 | 66.8 (11.8) | 66.5 (12.5) | 0.02 |
| Male, n | 595 (68.4) | 15793 (68.9) | 0.01 | 410 (70.4) | 13242 (68.7) | -0.04 | 271 (56.6) | 5562 (59.2) | 0.05 | 214 (61) | 4449 (58.9) | -0.04 |
| Preoperative comorbidity |  |  |  |  |  |  |  |  |  |  |  |  |
| Hypertension | 509 (58.5) | 13212 (57.7) | 0.02 | 333 (57.2) | 10757 (55.8) | 0.03 | 256 (53.4) | 5238 (55.7) | -0.05 | 194 (55.5) | 4184 (55.4) | 0 |
| Diabetes  | 379 (43.6) | 10383 (45.3) | -0.04 | 261 (44.8) | 8224 (42.6) | 0.04 | 207 (43.2) | 4141 (44.1) | -0.02 | 149 (42.7) | 3287 (43.5) | -0.02 |
| Coronary artery disease | 232 (26.7) | 5708 (24.9) | 0.04 | 147 (25.3) | 4654 (24.1) | 0.03 | 106 (22.1) | 2196 (23.4) | -0.03 | 75 (21.4) | 1745 (23.1) | -0.04 |
| Cerebrovascular accident | 108 (12.4) | 2510 (11) | 0.05 | 57 (9.8) | 2000 (10.4) | -0.02 | 66 (13.8) | 1298 (13.8) | 0 | 49 (13.9) | 1043 (13.8) | 0 |
| COPD | 141 (16.2) | 3714 (16.2) | 0 | 100 (17.3) | 3023 (15.7) | 0.04 | 90 (18.8) | 1358 (14.4) | 0.12 | 47 (13.3) | 1085 (14.4) | -0.03 |
| Chronic liver disease | 38 (4.4) | 1162 (5.1) | -0.03 | 27 (4.6) | 863 (4.5) | 0 | 41 (8.6) | 432 (4.6) | 0.16 | 11 (3) | 266 (3.5) | -0.03 |
| Chronic kidney disease | 43 (4.9) | 1434 (6.3) | -0.06 | 31 (5.4) | 1028 (5.3) | 0 | 18 (3.8) | 287 (3.1) | 0.04 | 11 (3.3) | 227 (3) | 0.01 |
| Other malignancy | 75 (8.6) | 2037 (8.9) | -0.01 | 48 (8.2) | 1660 (8.6) | -0.01 | 28 (5.8) | 584 (6.2) | -0.02 | 22 (6.3) | 475 (6.3) | 0 |
| Metastasis  | 129 (14.8) | 3742 (16.3) | -0.04 | 88 (15.1) | 2981 (15.5) | -0.01 | 152 (31.7) | 2826 (30.1) | 0.04 | 103 (29.4) | 2277 (30.1) | -0.02 |
| Preoperative medication |  |  |  |  |  |  |  |  |  |  |  |  |
| ACE inhibitor | 45 (5.2) | 787 (3.4) | 0.09 | 19 (3.3) | 549 (2.8) | 0.03 | 29 (6.1) | 352 (3.7) | 0.11 | 10 (3) | 245 (3.2) | -0.02 |
| Angiotensin receptor blocker | 116 (13.3) | 2463 (10.7) | 0.08 | 54 (9.3) | 1857 (9.6) | -0.01 | 43 (9) | 956 (10.2) | -0.04 | 30 (8.7) | 749 (9.9) | -0.04 |
| Beta-blocker | 98 (11.3) | 2472 (10.8) | 0.02 | 59 (10.1) | 1914 (9.9) | 0.01 | 47 (9.8) | 903 (9.6) | 0.01 | 29 (8.2) | 702 (9.3) | -0.04 |
| Calcium channel blocker | 152 (17.5) | 3352 (14.6) | 0.08 | 83 (14.2) | 2628 (13.6) | 0.02 | 82 (17.1) | 1523 (16.2) | 0.02 | 48 (13.8) | 1197 (15.8) | -0.06 |
| Oral hypoglycemic agent | 82 (9.4) | 1501 (6.6) | 0.11 | 31 (5.3) | 1073 (5.6) | -0.01 | 49 (10.2) | 840 (8.9) | 0.04 | 28 (7.9) | 674 (8.9) | -0.04 |
| Insulin | 92 (10.6) | 1881 (8.2) | 0.08 | 40 (6.9) | 1407 (7.3) | -0.01 | 66 (13.8) | 1145 (12.2) | 0.05 | 39 (11.1) | 926 (12.3) | -0.03 |
| Statin | 98 (11.3) | 2055 (9) | 0.08 | 48 (8.3) | 1577 (8.2) | 0 | 44 (9.2) | 773 (8.2) | 0.03 | 28 (7.9) | 624 (8.3) | -0.01 |
| Aspirin | 25 (2.9) | 400 (1.7) | 0.08 | 9 (1.6) | 276 (1.4) | 0.01 | 13 (2.7) | 186 (2) | 0.05 | 7 (1.9) | 141 (1.9) | 0 |
| Clopidogrel | 48 (5.5) | 1197 (5.2) | 0.01 | 30 (5.1) | 914 (4.7) | 0.02 | 25 (5.2) | 508 (5.4) | -0.01 | 17 (5) | 393 (5.2) | -0.01 |
| Diuretics | 75 (8.6) | 1648 (7.2) | 0.05 | 45 (7.8) | 1252 (6.5) | 0.05 | 61 (12.7) | 979 (10.4) | 0.07 | 32 (9.1) | 786 (10.4) | -0.04 |
| Preoperative anesthetic exposure | 136 (15.6) | 3532 (15.4) | 0.01 | 86 (14.8) | 2870 (14.9) | 0 | 112 (23.4) | 2390 (25.4) | -0.05 | 87 (24.9) | 1911 (25.3) | -0.01 |
| Preoperative chemotherapy | 13 (1.5) | 365 (1.6) | -0.01 | 7 (1.3) | 273 (1.4) | -0.01 | 68 (14.2) | 1396 (14.9) | -0.02 | 49 (14.1) | 1140 (15.1) | -0.03 |
| Preoperative radiation | 2 (0.2) | 155 (0.7) | -0.07 | 1 (0.2) | 65 (0.3) | -0.03 | 26 (5.4) | 522 (5.6) | -0.01 | 17 (4.9) | 410 (5.4) | -0.02 |
| Year of surgery |  |  |  |  |  |  |  |  |  |  |  |  |
| 2007 | 53 (6.1) | 1619 (7.1) | -0.04 | 47 (8.1) | 1579 (8.2) | 0 | 60 (12.5) | 1327 (14.1) | -0.05 | 50 (14.4) | 1177 (15.6) | -0.03 |
| 2008 | 76 (8.7) | 1715 (7.5) | 0.05 | 45 (7.8) | 1496 (7.8) | 0 | 73 (15.2) | 948 (10.1) | 0.16 | 27 (7.7) | 608 (8.1) | -0.01 |
| 2009 | 111 (12.8) | 1875 (8.2) | 0.15 | 43 (7.4) | 1482 (7.7) | -0.01 | 63 (13.2) | 743 (7.9) | 0.17 | 19 (5.3) | 425 (5.6) | -0.01 |
| 2010 | 125 (14.4) | 1833 (8) | 0.2 | 43 (7.4) | 1386 (7.2) | 0.01 | 31 (6.5) | 734 (7.8) | -0.05 | 31 (8.8) | 622 (8.2) | 0.02 |
| 2011 | 128 (14.7) | 2006 (8.8) | 0.19 | 45 (7.8) | 1539 (8) | -0.01 | 45 (9.4) | 666 (7.1) | 0.08 | 29 (8.4) | 514 (6.8) | 0.06 |
| 2012 | 129 (14.8) | 2190 (9.6) | 0.16 | 52 (8.9) | 1737 (9) | -0.01 | 32 (6.7) | 614 (6.5) | 0.01 | 34 (9.7) | 540 (7.2) | 0.09 |
| 2013 | 86 (9.9) | 2904 (12.7) | -0.09 | 88 (15.1) | 2837 (14.7) | 0.01 | 53 (11.1) | 1030 (11) | 0 | 52 (14.7) | 937 (12.4) | 0.07 |
| 2014 | 50 (5.7) | 2898 (12.6) | -0.24 | 68 (11.7) | 2221 (11.5) | 0.01 | 45 (9.4) | 1070 (11.4) | -0.07 | 38 (10.8) | 939 (12.4) | -0.05 |
| 2015 | 49 (5.6) | 2818 (12.3) | -0.23 | 66 (11.4) | 2216 (11.5) | 0 | 38 (7.9) | 1070 (11.4) | -0.12 | 35 (10.1) | 875 (11.6) | -0.05 |
| 2016 | 63 (7.2) | 3055 (13.3) | -0.2 | 85 (14.6) | 2793 (14.5) | 0 | 39 (8.1) | 1198 (12.7) | -0.15 | 35 (10.1) | 913 (12.1) | -0.06 |
| Facility type |  |  |  |  |  |  |  |  |  |  |  |  |
| Tertiary hospital | 551 (63.3) | 17584 (76.7) | -0.3 | 475 (81.6) | 15780 (81.8) | -0.01 | 353 (73.7) | 4577 (48.7) | 0.53 | 179 (51) | 3777 (50) | 0.02 |
| General hospital | 319 (36.7) | 5291 (23.1) | 0.3 | 107 (18.4) | 3506 (18.2) | 0.01 | 124 (25.9) | 4336 (46.1) | -0.43 | 171 (49) | 3773 (50) | -0.02 |
| Semi-hospital | 0 (0) | 38 (0.2) | -0.06 |  |  |  | 2 (0.4) | 460 (4.9) | -0.08 | 0 (0) | 1 (0) | -0.02 |
| Local clinic |  |  |  |  |  |  | 0 (0) | 27 (0.3) | -0.28 |  |  |  |

The values are presented as the mean (SD) or number (%). IPTW, inverse probability of treatment weight; TIVA, total intravenous anesthesia; IA, inhalational anesthesia; SMD, standardized mean difference; COPD, chronic obstructive pulmonary disease; ACE, angiotensin-converting enzyme.

**Table S6.** Baseline characteristics of patients underwent pancreas and esophageal cancer

|  | **Pancreas cancer** | **Esophageal cancer** |
| --- | --- | --- |
|  | **Unweighted cohort** | **IPTW-weighted cohort** | **Unweighted cohort** | **IPTW-weighted cohort** |
|  | **TIVA****(n=360)** | **IA****(n=8,672)** | SMD | **TIVA****(n=246)** | **IA****(n=6,985)** | SMD | **TIVA****(n=907)** | **IA****(n=4,599)** | SMD | **TIVA****(n=584)** | **IA****(n=3,821)** | SMD |
| Age, yr | 64.4 (10.8) | 64.7 (10.8) | -0.03 | 64.4 (11.6) | 64.4 (11.0) | 0 | 65.2 (8.3) | 65.8 (8.5) | -0.07 | 65.4 (8.5) | 65.5 (8.4) | -0.02 |
| Male, n | 224 (62.2) | 5003 (57.7) | -0.09 | 136 (55.3) | 4096 (58.6) | 0.07 | 839 (92.5) | 4245 (92.3) | -0.01 | 542 (92.8) | 3526 (92.3) | -0.01 |
| Preoperative comorbidity |  |  |  |  |  |  |  |  |  |  |  |  |
| Hypertension | 204 (56.7) | 4976 (57.4) | -0.01 | 146 (59.5) | 3882 (55.6) | 0.08 | 505 (55.7) | 2498 (54.3) | 0.03 | 299 (51.2) | 2012 (52.7) | -0.03 |
| Diabetes  | 217 (60.3) | 5404 (62.3) | -0.04 | 161 (65.4) | 4312 (61.7) | 0.08 | 432 (47.6) | 2048 (44.5) | 0.06 | 255 (43.7) | 1664 (43.6) | 0 |
| Coronary artery disease | 119 (33.1) | 2364 (27.3) | 0.13 | 69 (28.2) | 1874 (26.8) | 0.03 | 227 (25) | 1110 (24.1) | 0.02 | 130 (22.2) | 861 (22.5) | -0.01 |
| Cerebrovascular accident | 58 (16.1) | 1078 (12.4) | 0.11 | 35 (14.4) | 866 (12.4) | 0.06 | 107 (11.8) | 552 (12) | -0.01 | 69 (11.7) | 444 (11.6) | 0 |
| COPD | 70 (19.4) | 1264 (14.6) | 0.13 | 48 (19.5) | 1016 (14.5) | 0.13 | 262 (28.9) | 899 (19.5) | 0.22 | 111 (19.1) | 793 (20.8) | -0.04 |
| Chronic liver disease | 34 (9.4) | 622 (7.2) | 0.08 | 16 (6.5) | 478 (6.8) | -0.01 | 64 (7.1) | 319 (6.9) | 0 | 42 (7.1) | 234 (6.1) | 0.04 |
| Chronic kidney disease | 7 (1.9) | 222 (2.6) | -0.04 | 6 (2.4) | 146 (2.1) | 0.02 | 15 (1.7) | 115 (2.5) | -0.06 | 10 (1.8) | 68 (1.8) | 0 |
| Other malignancy | 29 (8.1) | 790 (9.1) | -0.04 | 18 (7.4) | 632 (9) | -0.06 | 62 (6.8) | 268 (5.8) | 0.04 | 38 (6.5) | 235 (6.1) | 0.01 |
| Metastasis  | 109 (30.3) | 2103 (24.3) | 0.14 | 55 (22.4) | 1686 (24.1) | -0.04 | 259 (28.6) | 1123 (24.4) | 0.09 | 130 (22.3) | 874 (22.9) | -0.02 |
| Preoperative medication |  |  |  |  |  |  |  |  |  |  |  |  |
| ACE inhibitor | 21 (5.8) | 261 (3) | 0.14 | 6 (2.3) | 192 (2.8) | -0.03 | 40 (4.4) | 153 (3.3) | 0.06 | 13 (2.3) | 94 (2.5) | -0.01 |
| Angiotensin receptor blocker | 34 (9.4) | 1177 (13.6) | -0.13 | 30 (12.2) | 757 (10.8) | 0.04 | 113 (12.5) | 475 (10.3) | 0.07 | 51 (8.7) | 334 (8.7) | 0 |
| Beta-blocker | 35 (9.7) | 915 (10.6) | -0.03 | 27 (11) | 677 (9.7) | 0.04 | 98 (10.8) | 472 (10.3) | 0.02 | 52 (8.9) | 320 (8.4) | 0.02 |
| Calcium channel blocker | 62 (17.2) | 1476 (17) | 0.01 | 37 (15.1) | 1108 (15.9) | -0.02 | 174 (19.2) | 749 (16.3) | 0.08 | 81 (13.9) | 550 (14.4) | -0.01 |
| Oral hypoglycemic agent | 57 (15.8) | 1445 (16.7) | -0.02 | 38 (15.5) | 1100 (15.8) | 0.01 | 82 (9) | 351 (7.6) | 0.05 | 34 (5.9) | 262 (6.9) | -0.04 |
| Insulin | 78 (21.7) | 1864 (21.5) | 0 | 56 (22.8) | 1443 (20.7) | 0.05 | 73 (8) | 428 (9.3) | -0.04 | 43 (7.3) | 298 (7.8) | -0.02 |
| Statin | 39 (10.8) | 1117 (12.9) | -0.06 | 31 (12.6) | 821 (11.8) | 0.03 | 89 (9.8) | 396 (8.6) | 0.04 | 44 (7.6) | 285 (7.4) | 0 |
| Aspirin | 6 (1.7) | 150 (1.7) | 0 | 3 (1.3) | 117 (1.7) | -0.03 | 16 (1.8) | 111 (2.4) | -0.05 | 8 (1.4) | 73 (1.9) | -0.04 |
| Clopidogrel | 21 (5.8) | 519 (6) | -0.01 | 16 (6.5) | 394 (5.6) | 0.04 | 47 (5.2) | 268 (5.8) | -0.03 | 25 (4.4) | 174 (4.6) | -0.01 |
| Diuretics | 48 (13.3) | 809 (9.3) | 0.13 | 24 (9.8) | 623 (8.9) | 0.03 | 298 (32.9) | 420 (9.1) | 0.61 | 33 (5.7) | 201 (5.3) | 0.02 |
| Preoperative anesthetic exposure | 56 (15.6) | 1450 (16.7) | -0.03 | 47 (19) | 1158 (16.6) | 0.06 | 148 (16.3) | 751 (16.3) | 0 | 94 (16.2) | 592 (15.5) | 0.02 |
| Preoperative chemotherapy | 22 (6.1) | 536 (6.2) | 0 | 15 (6.3) | 429 (6.1) | 0.01 | 212 (23.4) | 825 (17.9) | 0.13 | 96 (16.5) | 645 (16.9) | -0.01 |
| Preoperative radiation | 3 (0.8) | 103 (1.2) | -0.04 | 4 (1.6) | 84 (1.2) | 0.04 | 130 (14.3) | 280 (6.1) | 0.27 | 41 (7) | 210 (5.5) | 0.06 |
| Year of surgery |  |  |  |  |  |  |  |  |  |  |  |  |
| 2007 | 22 (6.1) | 484 (5.6) | 0.02 | 16 (6.3) | 484 (6.9) | -0.02 | 75 (8.3) | 302 (6.6) | 0.06 | 56 (9.5) | 277 (7.3) | 0.08 |
| 2008 | 28 (7.8) | 506 (5.8) | 0.08 | 14 (5.6) | 499 (7.1) | -0.06 | 65 (7.2) | 345 (7.5) | -0.01 | 52 (9) | 287 (7.5) | 0.05 |
| 2009 | 50 (13.9) | 465 (5.4) | 0.29 | 8 (3.4) | 254 (3.6) | -0.01 | 105 (11.6) | 282 (6.1) | 0.19 | 47 (8) | 268 (7) | 0.04 |
| 2010 | 65 (18.1) | 461 (5.3) | 0.4 | 4 (1.7) | 92 (1.3) | 0.03 | 100 (11) | 384 (8.3) | 0.09 | 52 (9) | 341 (8.9) | 0 |
| 2011 | 40 (11.1) | 541 (6.2) | 0.17 | 14 (5.8) | 461 (6.6) | -0.03 | 79 (8.7) | 347 (7.5) | 0.04 | 47 (8.1) | 305 (8) | 0 |
| 2012 | 44 (12.2) | 603 (7) | 0.18 | 17 (7.1) | 531 (7.6) | -0.02 | 105 (11.6) | 347 (7.5) | 0.14 | 42 (7.1) | 293 (7.7) | -0.02 |
| 2013 | 38 (10.6) | 1338 (15.4) | -0.15 | 48 (19.6) | 1314 (18.8) | 0.02 | 140 (15.4) | 591 (12.9) | 0.07 | 70 (11.9) | 525 (13.7) | -0.06 |
| 2014 | 26 (7.2) | 1279 (14.7) | -0.24 | 41 (16.6) | 1191 (17.1) | -0.01 | 91 (10) | 660 (14.4) | -0.13 | 81 (13.8) | 544 (14.2) | -0.01 |
| 2015 | 18 (5) | 1459 (16.8) | -0.39 | 30 (12) | 766 (11) | 0.03 | 70 (7.7) | 667 (14.5) | 0.22 | 66 (11.3) | 475 (12.4) | -0.04 |
| 2016 | 29 (8.1) | 1536 (17.7) | -0.29 | 54 (21.8) | 1393 (19.9) | 0.05 | 77 (8.5) | 674 (14.7) | -0.19 | 74 (12.7) | 509 (13.3) | -0.02 |
| Facility type |  |  |  |  |  |  |  |  |  |  |  |  |
| Tertiary hospital | 243 (67.5) | 6704 (77.3) | -0.22 | 201 (81.9) | 5387 (77.1) | 0.12 | 778 (85.8) | 3406 (74.1) | 0.3 | 444 (76) | 3029 (79.3) | -0.08 |
| General hospital | 117 (32.5) | 1961 (22.6) | 0.22 | 45 (18.1) | 1598 (22.9) | -0.12 | 129 (14.2) | 1193 (25.9) | -0.3 | 142 (24.4) | 792 (20.7) | 0.08 |
| Semi-hospital | 0 (0) | 7 (0.1) | -0.04 |  |  |  |  |  |  |  |  |  |
| Local clinic |  |  |  |  |  |  |  |  |  |  |  |  |

The values are presented as the mean (SD) or number (%). IPTW, inverse probability of treatment weight; TIVA, total intravenous anesthesia; IA, inhalational anesthesia; SMD, standardized mean difference; COPD, chronic obstructive pulmonary disease; ACE, angiotensin-converting enzyme.

**Table S7.** Baseline characteristics of patients underwent bladder cancer

|  | **Bladder cancer** |
| --- | --- |
|  | **Unweighted cohort** | **IPTW-weighted cohort** |
|  | **TIVA****(n=114)** | **IA****(n=4,505)** | **SMD** | **TIVA****(n=62)** | **IA****(n=3,624)** | **SMD** |
| Age, yr | 65.3 (10.4) | 67.6 (10.5) | -0.13 | 66.6 (9.1) | 67.5 (10.5) | -0.09 |
| Male, n | 98 (86) | 3726 (82.7) | 0.09 | 54 (87.8) | 3007 (83) | 0.08 |
| Preoperative comorbidity |  |  |  |  |  |  |
| Hypertension | 63 (55.3) | 2720 (60.4) | -0.06 | 37 (59.6) | 2164 (59.7) | -0.01 |
| Diabetes  | 53 (46.5) | 2274 (50.5) | -0.06 | 29 (46.1) | 1794 (49.5) | -0.07 |
| Coronary artery disease | 43 (37.7) | 1314 (29.2) | 0.2 | 18 (28.6) | 997 (27.5) | 0.02 |
| Cerebrovascular accident | 7 (6.1) | 579 (12.9) | 0.19 | 7 (11.9) | 456 (12.6) | -0.02 |
| COPD | 37 (32.5) | 1135 (25.2) | 0.15 | 20 (32.2) | 896 (24.7) | 0.17 |
| Chronic liver disease | 6 (5.3) | 199 (4.4) | 0.02 | 1 (1.7) | 161 (4.4) | -0.16 |
| Chronic kidney disease | 10 (8.8) | 371 (8.2) | 0.02 | 7 (12) | 283 (7.8) | 0.14 |
| Other malignancy | 5 (4.4) | 332 (7.4) | -0.08 | 3 (5.6) | 260 (7.2) | -0.06 |
| Metastasis  | 23 (20.2) | 1208 (26.8) | -0.14 | 16 (25.4) | 960 (26.5) | -0.03 |
| Preoperative medication |  |  |  |  |  |  |
| ACE inhibitor | 8 (7) | 204 (4.5) | 0.08 | 3 (4.9) | 155 (4.3) | 0.03 |
| Angiotensin receptor blocker | 19 (16.7) | 629 (14) | 0.05 | 9 (14) | 487 (13.4) | 0.02 |
| Beta-blocker | 16 (14) | 563 (12.5) | 0.04 | 8 (12.4) | 447 (12.3) | 0 |
| Calcium channel blocker | 25 (21.9) | 1017 (22.6) | -0.02 | 14 (23.1) | 806 (22.2) | 0.02 |
| Oral hypoglycemic agent | 8 (7) | 481 (10.7) | -0.06 | 11 (18.5) | 391 (10.8) | 0.22 |
| Insulin | 24 (21.1) | 717 (15.9) | 0.08 | 11 (17.3) | 572 (15.8) | 0.04 |
| Statin | 12 (10.5) | 548 (12.2) | -0.04 | 6 (9.2) | 425 (11.7) | -0.08 |
| Aspirin | 4 (3.5) | 105 (2.3) | 0.04 | 0 (0.7) | 78 (2.2) | -0.12 |
| Clopidogrel | 7 (6.1) | 310 (6.9) | -0.03 | 4 (6.3) | 244 (6.7) | -0.02 |
| Diuretics | 12 (10.5) | 455 (10.1) | 0.02 | 5 (8.7) | 366 (10.1) | -0.05 |
| Preoperative anesthetic exposure | 64 (56.1) | 2585 (57.4) | -0.04 | 34 (54.3) | 2061 (56.9) | -0.05 |
| Preoperative chemotherapy | 18 (15.8) | 722 (16) | -0.01 | 7 (12.1) | 605 (16.7) | -0.13 |
| Preoperative radiation | 2 (1.8) | 58 (1.3) | 0.04 | 1 (1.7) | 44 (1.2) | 0.04 |
| Year of surgery |  |  |  |  |  |  |
| 2007 | 9 (7.9) | 236 (5.2) | 0.09 | 5 (8.2) | 212 (5.8) | 0.09 |
| 2008 | 6 (5.3) | 249 (5.5) | -0.01 | 6 (9.9) | 246 (6.8) | 0.11 |
| 2009 | 19 (16.7) | 268 (5.9) | 0.38 | 4 (6.3) | 150 (4.1) | 0.1 |
| 2010 | 16 (14) | 267 (5.9) | 0.32 | 3 (5.5) | 182 (5) | 0.02 |
| 2011 | 19 (16.7) | 264 (5.9) | 0.39 | 3 (5.3) | 134 (3.7) | 0.08 |
| 2012 | 13 (11.4) | 278 (6.2) | 0.14 | 4 (6.5) | 230 (6.4) | 0.01 |
| 2013 | 9 (7.9) | 654 (14.5) | -0.23 | 9 (14) | 643 (17.7) | -0.1 |
| 2014 | 15 (13.2) | 719 (16) | -0.11 | 13 (21.5) | 708 (19.5) | 0.05 |
| 2015 | 7 (6.1) | 732 (16.2) | -0.34 | 10 (16.3) | 721 (19.9) | -0.09 |
| 2016 | 1 (0.9) | 838 (18.6) | -0.42 | 4 (6.7) | 397 (11) | -0.15 |
| Facility type |  |  |  |  |  |  |
| Tertiary hospital | 76 (66.7) | 3281 (72.8) | -0.13 | 46 (74.5) | 2670 (73.7) | 0.02 |
| General hospital | 38 (33.3) | 1175 (26.1) | 0.17 | 16 (25.7) | 954 (26.3) | -0.02 |
| Semi-hospital | 0 (0) | 49 (1.1) | -0.31 |  |  |  |
| Local clinic |  | 0 (0) |  |  |  |  |

The values are presented as the mean (SD) or number (%). IPTW, inverse probability of treatment weight; TIVA, total intravenous anesthesia; IA, inhalational anesthesia; SMD, standardized mean difference; COPD, chronic obstructive pulmonary disease; ACE, angiotensin-converting enzyme.

**Table S8**. The median and person-year follow-up duration for each cancer surgery

|  |  |  |
| --- | --- | --- |
|  | Median follow-up duration (days) | Person-year follow-up |
|  | Unweighted cohort | IPTW-weighted cohort | Unweighted cohort | IPTW-weighted cohort |
|  | TIVA | IA | TIVA | IA | TIVA | IA | TIVA | IA |
| Breast cancer | 1642 (881‒2717) | 1236 (719‒1925) | 1306 (776‒1958) | 1263 (763‒1897) | 84372 | 320252 | 53087 | 258085 |
| Gastric cancer | 1652 (809‒2291) | 1111 (583‒1798) | 1222 (654‒1796) | 1132 (605‒1779) | 34097 | 318458 | 18642 | 264578 |
| Lung cancer | 917 (500‒1664) | 871 (481‒1477) | 844 (488‒1473) | 868 (483‒1502) | 27248 | 83423 | 18527 | 69176 |
| Liver cancer | 1003 (433‒2046) | 951 (476‒1769) | 884 (430‒1715) | 922 (473‒1818) | 4461 | 95076 | 2799 | 76454 |
| Kidney cancer | 1642 (690‒2496) | 1254 (616‒2149) | 1273 (622‒2106) | 1271 (614‒2135) | 4015 | 92015 | 2348 | 78007 |
| Colorectal cancer | 776 (267‒1833) | 685 (219‒1651.5) | 776 (245‒1695) | 679 (219‒1585) | 1612 | 28310 | 1115 | 22150 |
| Pancreatic cancer | 650.5 (352‒1304.5) | 541 (310‒955.5) | 468 (343‒1023) | 535 (314‒978) | 945 | 18077 | 524 | 14673 |
| Esophageal cancer | 898 (365‒1847) | 704 (347‒1412) | 781 (338‒1559) | 742 (365‒1522) | 3067 | 12517 | 1821 | 10938 |
| Bladder cancer | 1250 (568‒2040) | 657 (344‒1332) | 942 (357‒1554) | 741 (349‒1364) | 435 | 11709 | 195 | 9591 |

IPTW, inverse probability of treatment weight; TIVA, total intravenous anesthesia; IA, inhalational anesthesia.

**Table S9**. Univariable and multivariable Cox regression models in the weighted cohorts (Breast, gastric and lung cancer).

|  |  |  |  |
| --- | --- | --- | --- |
|  | Univariable |  | Multivariable |
|  | HR (95% CI) | P value |  | HR (95% CI) | P value |
| **Breast cancer** |  |  |  |  |  |
| IA (vs TIVA) | 1.37 (1.15–1.63) | <0.01 |  | 1.08 (0.9–1.29) | 0.43 |
| Transfusion | 4.27 (3.88–4.72) | <0.01 |  | 2.84 (2.49–3.24) | <0.01 |
| Epidural analgesia | 1.32 (1.23–1.42) | <0.01 |  | 1.06 (0.97–1.16) | 0.19 |
| Adjuvant chemotherapy | 1.45 (1.36–1.55) | <0.01 |  | 1.47 (1.36–1.59) | <0.01 |
| Adjuvant radiotherapy | 0.59 (0.56–0.63) | <0.01 |  | 0.63 (0.58–0.67) | <0.01 |
| Opioid use | 0.88 (0.82–0.95) | <0.01 |  | 0.9 (0.82–0.99) | 0.03 |
| Anesthesia time | 1.18 (1.16–1.19) | <0.01 |  | 1.09 (1.06–1.11) | <0.01 |
| **Gastric cancer** |  |  |  |  |  |
| IA (vs TIVA) | 1.17 (1.05–1.30) | <0.01 |  | 1.04 (0.93–1.16) | 0.53 |
| Transfusion | 4.10 (3.97–4.24) | <0.01 |  | 2.92 (2.81–3.03) | <0.01 |
| Epidural analgesia | 1.06 (1.03–1.1) | <0.01 |  | 1.03 (0.99–1.06) | 0.13 |
| Adjuvant chemotherapy | 3.65 (3.53–3.76) | <0.01 |  | 2.92 (2.81–3.02) | <0.01 |
| Adjuvant radiotherapy | 3.61 (3.33–3.92) | <0.01 |  | 1.69 (1.55–1.86) | <0.01 |
| Opioid use | 0.99 (0.95–1.03) | 0.62 |  | 1.01 (0.96–1.06) | 0.71 |
| Anesthesia time | 1.19 (1.18–1.2) | <0.01 |  | 1.06 (1.04–1.07) | <0.01 |
| **Lung cancer** |  |  |  |  |  |
| IA (vs TIVA) | 0.98 (0.90–1.07) | 0.62 |  | 0.92 (0.84–1.00) | 0.06 |
| Transfusion | 2.79 (2.67–2.92) | <0.01 |  | 2.28 (2.14–2.43) | <0.01 |
| Epidural analgesia | 1.15 (1.1–1.2) | <0.01 |  | 1.01 (0.96–1.06) | 0.73 |
| Adjuvant chemotherapy | 2.38 (2.28–2.49) | <0.01 |  | 2.06 (1.96–2.17) | <0.01 |
| Adjuvant radiotherapy | 2.82 (2.67–2.99) | <0.01 |  | 2.01 (1.88–2.15) | <0.01 |
| Opioid use | 0.77 (0.72–0.83) | <0.01 |  | 0.82 (0.76–0.89) | <0.01 |
| Anesthesia time | 1.02 (1.01–1.02) | <0.01 |  | 0.99 (0.98–1.01) | 0.34 |

HR, hazard ratio; CI, confidence interval; IA, inhalational anesthesia; TIVA, total intravenous anesthesia.

**Table S10**. Univariable and multivariable Cox regression models in the weighted cohorts (Liver, kidney and colon cancer)

|  |  |  |  |
| --- | --- | --- | --- |
|  | Univariable |  | Multivariable |
|  | HR (95% CI) | P value |  | HR (95% CI) | P value |
| **Liver cancer** |  |  |  |  |  |
| IA (vs TIVA) | 0.92 (0.77–1.11) | 0.41 |  | 0.94 (0.78–1.13) | 0.50 |
| Transfusion | 2.60 (2.49–2.71) | <0.01 |  | 1.80 (1.69–1.9) | <0.01 |
| Epidural analgesia | 1.01 (0.97–1.06) | 0.55 |  | 0.97 (0.92–1.02) | 0.24 |
| Adjuvant chemotherapy | 2.75 (2.63–2.87) | <0.01 |  | 2.24 (2.12–2.36) | <0.01 |
| Adjuvant radiotherapy | 2.84 (2.66–3.04) | <0.01 |  | 1.87 (1.72–2.02) | <0.01 |
| Opioid use | 1.02 (0.96–1.08) | 0.60 |  | 0.95 (0.88–1.02) | 0.15 |
| Anesthesia time | 1.18 (1.17–1.19) | <0.01 |  | 1.09 (1.08–1.1) | <0.01 |
| **Kidney cancer** |  |  |  |  |  |
| IA (vs TIVA) | 0.83 (0.59–1.18) | 0.30 |  | 1.11 (0.78–1.57) | 0.57 |
| Transfusion | 4.57 (4.26–4.93) | <0.01 |  | 3.34 (3.04–3.69) | <0.01 |
| Epidural analgesia | 1.12 (1.04–1.2) | 0.003 |  | 1.06 (0.98–1.16) | 0.16 |
| Adjuvant chemotherapy | 5.92 (5.41–6.49) | <0.01 |  | 3.22 (2.87–3.61) | <0.01 |
| Adjuvant radiotherapy | 7.04 (6.29–7.87) | <0.01 |  | 3.64 (3.17–4.15) | <0.01 |
| Opioid use | 0.91 (0.82–1.02) | 0.10 |  | 0.97 (0.86–1.1) | 0.66 |
| Anesthesia time | 1.19 (1.18–1.21) | <0.01 |  | 1.05 (1.03–1.07) | <0.01 |
| **Colorectal cancer** |  |  |  |  |  |
| IA (vs TIVA) | 1.13 (0.86–1.48) | 0.38 |  | 1.15 (0.88–1.51) | 0.31 |
| Transfusion | 3.60 (3.33–3.89) | <0.01 |  | 2.76 (2.51–3.05) | <0.01 |
| Epidural analgesia | 1.18 (1.1–1.27) | <0.01 |  | 1.12 (1.03–1.22) | 0.01 |
| Adjuvant chemotherapy | 0.89 (0.83–0.96) | <0.01 |  | 0.80 (0.73–0.87) | <0.01 |
| Adjuvant radiotherapy | 0.98 (0.84–1.15) | 0.84 |  | 1.16 (0.97–1.39) | 0.11 |
| Opioid use | 0.88 (0.81–0.96) | <0.01 |  | 0.86 (0.78–0.95) | <0.01 |
| Anesthesia time | 1.10 (1.09–1.12) | <0.01 |  | 0.99 (0.97–1) | 0.14 |

HR, hazard ratio; CI, confidence interval; IA, inhalational anesthesia; TIVA, total intravenous anesthesia.

**Table S11**. Univariable and multivariable Cox regression models in the weighted cohorts (Pancreas, esophageal and bladder cancer)

|  |  |  |  |
| --- | --- | --- | --- |
|  | Univariable |  | Multivariable |
|  | HR (95% CI) | P value |  | HR (95% CI) | P value |
| **Pancreas cancer** |  |  |  |  |  |
| IA (vs TIVA) | 1.02 (0.77–1.34) | 0.91 |  | 1.00 (0.75–1.33) | 0.99 |
| Transfusion | 1.71 (1.62–1.81) | <0.01 |  | 1.41 (1.31–1.51) | <0.01 |
| Epidural analgesia | 0.96 (0.91–1.02) | 0.17 |  | 0.93 (0.87–0.99) | 0.03 |
| Adjuvant chemotherapy | 1.35 (1.27–1.43) | <0.01 |  | 1.44 (1.34–1.54) | <0.01 |
| Adjuvant radiotherapy | 1.06 (0.96–1.18) | 0.21 |  | 0.89 (0.8–1) | 0.05 |
| Opioid use | 0.95 (0.86–1.05) | 0.30 |  | 1.01 (0.9–1.13) | 0.88 |
| Anesthesia time | 1.11 (1.09–1.12) | <0.01 |  | 1.06 (1.05–1.08) | <0.01 |
| **Esophageal cancer** |  |  |  |  |  |
| IA (vs TIVA) | 0.94 (0.77–1.15) | 0.56 |  | 0.92 (0.75–1.13) | 0.44 |
| Transfusion | 2.65 (2.42–2.89) | <0.01 |  | 2.11 (1.88–2.36) | <0.01 |
| Epidural analgesia | 1.12 (1.02–1.22) | 0.01 |  | 0.96 (0.87–1.07) | 0.50 |
| Adjuvant chemotherapy | 1.53 (1.4–1.67) | <0.01 |  | 1.55 (1.39–1.72) | <0.01 |
| Adjuvant radiotherapy | 1.47 (1.3–1.67) | <0.01 |  | 1.24 (1.07–1.44) | <0.01 |
| Opioid use | 0.81 (0.71–0.94) | <0.01 |  | 0.84 (0.71–0.99) | 0.04 |
| Anesthesia time | 1.09 (1.08–1.11) | <0.01 |  | 1.03 (1.01–1.05) | <0.01 |
| **Bladder cancer** |  |  |  |  |  |
| IA (vs TIVA) | 0.93 (0.53–1.64) | 0.80 |  | 1.07 (0.61–1.9) | 0.81 |
| Transfusion | 2.04 (1.77–2.35) | <0.01 |  | 1.5 (1.27–1.78) | <0.01 |
| Epidural analgesia | 1.24 (1.12–1.39) | <0.01 |  | 1.19 (1.05–1.34) | 0.01 |
| Adjuvant chemotherapy | 1.81 (1.62–2) | <0.01 |  | 1.7 (1.5–1.93) | <0.01 |
| Adjuvant radiotherapy | 2.38 (2.04–2.76) | <0.01 |  | 1.8 (1.5–2.14) | <0.01 |
| Opioid use | 1.00 (0.83–1.2) | 0.96 |  | 0.86 (0.69–1.06) | 0.15 |
| Anesthesia time | 1.05 (1.03–1.07) | <0.01 |  | 1.00 (0.97–1.02) | 0.89 |

HR, hazard ratio; CI, confidence interval; IA, inhalational anesthesia; TIVA, total intravenous anesthesia.

**Table S12**. The references of included studies

|  |  |
| --- | --- |
| Author (year) | References |
| Sofra et al. (2013) | Sofra M, Fei PC, Fabrizi L, et al. Immunomodulatory effects of total intravenous and balanced inhalation anesthesia in patients with bladder cancer undergoing elective radical cystectomy: preliminary results. *J Exp Clin Cancer Res.* 2013;32:6. |
| Enlund et al. (2014) | Enlund M, Berglund A, Andreasson K, Cicek C, Enlund A, Bergkvist L. The choice of anaesthetic--sevoflurane or propofol--and outcome from cancer surgery: a retrospective analysis. *Ups J Med Sci.* 2014;119(3):251-261. |
| Lee et al. (2016) | Lee JH, Kang SH, Kim Y, Kim HA, Kim BS. Effects of propofol-based total intravenous anesthesia on recurrence and overall survival in patients after modified radical mastectomy: a retrospective study. *Korean J Anesthesiol.* 2016;69(2):126-132. |
| Wigmore (2016) | Wigmore TJ, Mohammed K, Jhanji S. Long-term Survival for Patients Undergoing Volatile versus IV Anesthesia for Cancer Surgery: A Retrospective Analysis. *Anesthesiology.* 2016;124(1):69-79. |
| Jun et al (2017) | Jun IJ, Jo JY, Kim JI, et al. Impact of anesthetic agents on overall and recurrence-free survival in patients undergoing esophageal cancer surgery: A retrospective observational study. *Sci Rep.* 2017;7(1):14020. |
| Yan (2018) | Yan T, Zhang GH, Wang BN, Sun L, Zheng H. Effects of propofol/remifentanil-based total intravenous anesthesia versus sevoflurane-based inhalational anesthesia on the release of VEGF-C and TGF-beta and prognosis after breast cancer surgery: a prospective, randomized and controlled study. *BMC Anesthesiol.* 2018;18(1):131. |
| Zhang (2018) | Zhang Y, Shan GJ, Zhang YX, et al. Propofol compared with sevoflurane general anaesthesia is associated with decreased delayed neurocognitive recovery in older adults. *Br J Anaesth.* 2018;121(3):595-604. |
| Oh et al (2018) | Oh TK, Kim K, Jheon S, et al. Long-Term Oncologic Outcomes for Patients Undergoing Volatile Versus Intravenous Anesthesia for Non-Small Cell Lung Cancer Surgery: A Retrospective Propensity Matching Analysis. *Cancer Control.* 2018;25(1):1-7. |
| Wu et al (2018) | Wu ZF, Lee MS, Wong CS, et al. Propofol-based Total Intravenous Anesthesia Is Associated with Better Survival Than Desflurane Anesthesia in Colon Cancer Surgery. *Anesthesiology.* 2018;129(5):932-941. |
| Zheng et al (2018) | Zheng X, Wang Y, Dong L, et al. Effects of propofol-based total intravenous anesthesia on gastric cancer: a retrospective study. *OncoTargets Ther.* 2018;11:1141-1148. |
| Sessler (2019) | Sessler DI, Pei L, Huang Y, et al. Recurrence of breast cancer after regional or general anaesthesia: a randomised controlled trial. *Lancet.* 2019;394(10211):1807-1815. |
| Lai et al (2019-A) | Lai HC, Lee MS, Lin C, et al. Propofol-based total intravenous anaesthesia is associated with better survival than desflurane anaesthesia in hepatectomy for hepatocellular carcinoma: a retrospective cohort study. *Br J Anaesth.* 2019;123(2):151-160. |
| Lai et al (2019-B) | Lai HC, Lee MS, Lin KT, et al. Propofol-based total intravenous anesthesia is associated with better survival than desflurane anesthesia in intrahepatic cholangiocarcinoma surgery. *Medicine.* 2019;98(51):e18472. |
| Oh et al (2019) | Oh TK, Kim H-H, Jeon Y-T. Retrospective analysis of 1-year mortality after gastric cancer surgery: Total intravenous anesthesia versus volatile anesthesia. *Acta Anaesthesiol Scand.* 2019;63(9):1169-1177. |
| Yoo et al (2019) | Yoo S, Lee HB, Han W, et al. Total Intravenous Anesthesia versus Inhalation Anesthesia for Breast Cancer Surgery: A Retrospective Cohort Study. *Anesthesiology.* 2019;130(1):31-40. |
| Dong et al (2019) | Dong J, Zeng M, Ji N, et al. Impact of Anesthesia on Long-term Outcomes in Patients With Supratentorial High-grade Glioma Undergoing Tumor Resection: A Retrospective Cohort Study. *J Neurosurg Anesthesiol.* 2019;32(3):227-233. |
| Makito et al (2020) | Makito K, Matsui H, Fushimi K, Yasunaga H. Volatile versus Total Intravenous Anesthesia for Cancer Prognosis in Patients Having Digestive Cancer Surgery: A Nationwide Retrospective Cohort Study. *Anesthesiology.* 2020;133(4):764-773. |
| Lai et al. (2020-A) | Lai HC, Lee MS, Liu YT, et al. Propofol-based intravenous anesthesia is associated with better survival than desflurane anesthesia in pancreatic cancer surgery. *PloS one.* 2020;15(5):e0233598. |
| Lai et al. (2020-B) | Lai HC, Lee MS, Lin KT, et al. Propofol-based total intravenous anesthesia is associated with better survival than desflurane anesthesia in robot-assisted radical prostatectomy. *PloS one.* 2020;15(3):e0230290. |
| Huang et al. (2019) | Huang YH, Lee MS, Lou YS, et al. Propofol-based total intravenous anesthesia did not improve survival compared to desflurane anesthesia in breast cancer surgery. *PloS one.* 2019;14(11):e0224728. |
| Huang et al. (2020) | Huang NC, Lee MS, Lai HC, et al. Propofol-based total intravenous anesthesia improves survival compared to desflurane anesthesia in gastric cancer surgery: A retrospective analysis. *Medicine.* 2020;99(25):e20714. |
| Hong et al. (2019) | Hong B, Lee S, Kim Y, et al. Anesthetics and long-term survival after cancer surgery-total intravenous versus volatile anesthesia: a retrospective study. *BMC Anesthesiol.* 2019;19(1):233. |
| Enlund et al. (2020) | Enlund M, Berglund A, Ahlstrand R, et al. Survival after primary breast cancer surgery following propofol or sevoflurane general anesthesia-A retrospective, multicenter, database analysis of 6305 Swedish patients. *Acta Anaesthesiol Scand.* 2020;64(8):1048-1054. |

**Table S13**. The characteristics of included studies

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Author (year) | Participants | Design | Country | Interventions (Intraoperative anesthetics) | Cancer type | Follow-up duration for overall death |
| Sofra et al. (2013) | All (28)TIVA (14) / IA (14) | RCT | Italy | Propofol vs Sevoflurane | Bladder cancer | NR |
| Enlund et al. (2014) | All (2838)Breast-TIVA (620) / IA (1217)Colon-TIVA (179) / IA (516)Rectal-TIVA (104) / IA (202) | Retrospective study | Sweden | Propofol vs Sevoflurane | Breast, colon, rectal cancer | NR |
| Lee et al. (2016) | All (325)TIVA (173) / IA (152) | Retrospective study | South Korea | Propofol vs Sevoflurane | Breast cancer | 60 months |
| Wigmore (2016) | All (7030)TIVA (3714) / IA (3316) | Retrospective study | United Kingdom | Propofol vsSevoflurane or isoflurane | Various cancera | Median 30 months (TIVA) and 35 (IA) months |
| Jun et al (2017) | All (922)TIVA (731) / IA (191) | Retrospective study | South Korea | Propofol vs Isoflurane | Esophageal cancer | Median 41 (TIVA) and 26 (IA) months |
| Yan (2018) | All (80)TIVA (40) / IA (40) | RCT | China | Propofol vs Sevoflurane | Breast cancer | 28 months |
| Zhang (2018) | All (387)TIVA (195) / IA (192) | RCT | China | Propofol vs Sevoflurane | Major cancer | 1 month |
| Oh et al (2018) | AllTIVA (749) / IA (194) | Retrospective study | South Korea | Propofol vs Sevoflurane | Lung cancer | Minimum 5 months |
| Wu et al (2018) | All (1363)TIVA (657) / IA (706) | Retrospective study | Taiwan | Propofol vs Desflurane | Colon cancer | Median 44 (TIVA) and 38 (IA) months |
| Zheng et al (2018) | All (2856)TIVA (1506) / IA (1350) | Retrospective study | China | Propofol vs Sevoflurane | Gastric cancer | Median 44 (ITVA) and 40 (IA) months |
| Sessler (2019) | All (2108)TIVA+regional (1043) / IA (1065) | RCT | Multinationalb | Regional + PPF vsSevoflurane | Breast cancer | Median 36 months |
| Lai et al (2019-A) | All (944)TIVA (452) / IA (492) | Retrospective study | Taiwan | Propofol vs Desflurane | Hepatic cellular carcinoma | Minimum 3 months |
| Lai et al (2019-B) | All (70)TIVA (34) / IA (36) | Retrospective study | Taiwan | Propofol vs Desflurane | Intrahepatic cholangiocarcinoma | Minimum 3 months |
| Oh et al (2019) | All (4607)TIVA (816) / IA (3791) | Retrospective study | South Korea | Propofol vsSevoflurane or desflurane | Gastric cancer | 12 months |
| Yoo et al (2019) | All (5331)TIVA (3085) / IA (2246) | Retrospective study | South Korea | Propofol vs Enflurane, isoflurane, sevoflurane or desflurane  | Breast cancer | Median 67 (TIVA) and 53 (IA) months |
| Dong et al (2019) | All (294)TIVA (154) / IA (140) | Retrospective study | China | Propofol vs Sevoflurane | Glioma | Median 12 months |
| Makito et al (2020) | All (196303)TIVA (166966) / IA (29337) | Retrospective study | Japan | Propofol vs Sevoflurane, desflurane or isoflurane | Digestive cancer surgery | Median 639 (TIVA) and 768 (IA) days |
| Lai et al. (2020-A) | All (147)TIVA (72) / IA (68) | Retrospective study | Taiwan | Propofol vs Desflurane | Pancreatic adenocarcinoma | NR |
| Lai et al. (2020-B) | All (657)TIVA (266) / IA (365) | Retrospective study | Taiwan | Propofol vs Desflurane | Prostate cancer | NR |
| Huang et al. (2019) | All (976)TIVA (344) / IA (632) | Retrospective study | Taiwan | Propofol vs Desflurane | Breast cancer | 60 months |
| Huang et al. (2020) | All (408)TIVA (190) / IA (218) | Retrospective study | Taiwan | Propofol vs Desflurane | Gastric cancer | NR |
| Hong et al. (2019) | All (2207)TIVA (903) / IA (1304) | Retrospective study | South Korea | Propofol vs Desflurane, sevoflurane or isoflurane | Gastric, lung, liver, colon, breast cancer | 60 months |
| Enlund et al. (2020) | All (5984)TIVA (2967) / IA (3017) | Retrospective study | Sweden | Propofol vs Sevoflurane | Breast cancer | 60 months |

a: Breast, gastrointestinal tract, gynaecology, sarcoma, urology and other tumor diagnosis, b:Argentina, Austria, China, Germany, Ireland, New Zealand, Singapore, and the USA. TIVA, total intravenous anesthesia; IA, inhalational anesthesia; RCT, randomized controlled trial; NR, not reported.

**Table S14**. Quality assessments based on Newcastle‐Ottawa Quality Assessment Scale

|  |  |  |  |
| --- | --- | --- | --- |
| Author (year) | Selection | Comparability | Outcome |
| Points (max 4) | Risk of bias | Points (max 2) | Risk of bias | Points (max 3) | Risk of bias |
| Enlund et al (2014) | 3 | Medium | 2 | Low | 2 | Medium |
| Lee et al (2016) | 4 | Low | 2 | Low | 2 | Medium |
| Wigmore et al (2016) | 3 | Medium | 2 | Low | 3 | Low |
| Jun et al (2017) | 4 | Low | 2 | Low | 3 | Low |
| Oh et al (2018) | 4 | Low | 2 | Low | 3 | Low |
| Wu et al (2018) | 4 | Low | 2 | Low | 2 | Medium |
| Zheng et al (2018) | 3 | Medium | 2 | Low | 2 | Medium |
| Lai et al (2019) | 3 | Medium | 2 | Low | 2 | Medium |
| Lai et al (2019) | 3 | Medium | 2 | Low | 2 | Medium |
| Oh et al (2019) | 3 | Medium | 2 | Low | 3 | Low |
| Yoo et al (2019) | 4 | Low | 2 | Low | 3 | Low |
| Dong et al (2019) | 3 | Medium | 2 | Low | 2 | Medium |
| Makito et al (2020) | 4 | Low | 2 | Low | 3 | Low |
| Lai et al. (2020-A) | 3 | Medium | 2 | Low | 2 | Medium |
| Lai et al. (2020-B) | 3 | Medium | 2 | Low | 2 | Medium |
| Huang et al. (2019) | 3 | Medium | 2 | Low | 2 | Medium |
| Huang et al. (2020) | 3 | Medium | 2 | Low | 2 | Medium |
| Hong et al. (2019) | 4 | Low | 2 | Low | 3 | Low |
| Enlund et al. (2020) | 4 | Medium | 2 | Low | 3 | Medium |

Selection: adequate selection and definition of groups, Comparability: comparability of two groups for a selected variable and comparability for other

Variables, Outcome: modality of assessment, enough length of follow‐up and adequacy of follow‐up.