Appendix 1 Search keywords

("brain metastatic tumor" OR "brain metastatic tumour" OR "brain tumor metastasis" OR "brain tumour metastasis" OR "cerebral metastasis" OR "metastasis, brain" OR "brain metastasis") AND ("esophageal mass (tumor)" OR "esophageal masses (tumor)" OR "esophageal neoplasms" OR "esophageal tumor" OR "esophageal tumorigenesis" OR "esophagus neoplasm" OR "esophagus tumour" OR "neoplasia of the esophagus" OR "neoplasia of the oesophagus" OR "neoplasm of the esophagus" OR "neoplastic esophageal" OR "neoplastic esophagus" OR "neoplastic oesophageal" OR "oesophageal neoplasms" OR "oesophageal tumor" OR "oesophageal tumour" OR "oesophagus tumor" OR "oesophagus tumour" OR "tumor of the esophagus" OR "tumor, esophagus" OR "tumors of the esophagus" OR "tumour of the oesophagus" OR "tumour, esophagus" OR "tumours of the oesophagus" OR "esophagus tumor")
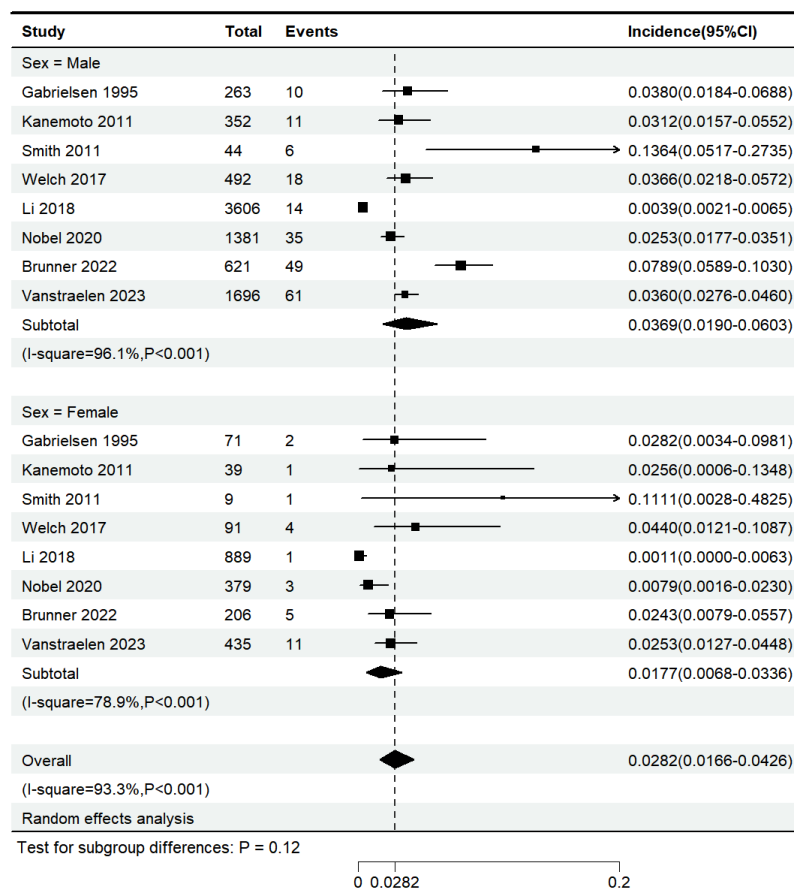

Study	Total	Events	Incidence(95%CI)
Sex = Male			
Gabrielsen 1995	263	10	0.0380(0.0184-0.0688)
Kanemoto 2011	352	11	0.0312(0.0157-0.0552)
Smith 2011	44	6	0.1364(0.0517-0.2735)
Welch 2017	492	18	0.0366(0.0218-0.0572)
Li 2018	3606	14	0.0039(0.0021-0.0065)
Nobel 2020	1381	35	0.0253(0.0177-0.0351)
Brunner 2022	621	49	0.0789(0.0589-0.1030)
Vanstraelen 2023	1696	61	0.0360(0.0276-0.0460)
Subtotal			0.0369(0.0190-0.0603)
(I-square=96.1%,P<0.001)			
Sex = Female			
Gabrielsen 1995	71	2	0.0282(0.0034-0.0981)
Kanemoto 2011	39	1	0.0256(0.0006-0.1348)
Smith 2011	9	1	0.1111(0.0028-0.4825)
Welch 2017	91	4	0.0440(0.0121-0.1087)
Li 2018	889	1	0.0011(0.0000-0.0063)
Nobel 2020	379	3	0.0079(0.0016-0.0230)
Brunner 2022	206	5	0.0243(0.0079-0.0557)
Vanstraelen 2023	435	11	0.0253(0.0127-0.0448)
Subtotal			0.0177(0.0068-0.0336)
(I-square=78.9%,P<0.001)			
Overall			0.0282(0.0166-0.0426)
(I-square=93.3%,P<0.001)			
Random effects analysis			
Test for subgroup differences: P = 0.12			

0   0.0282   0.2

Figure S1 The pooled brain metastasis from esophageal carcinoma incidence of male and female patients via random effects analysis. Subgroups are divided by different sex.
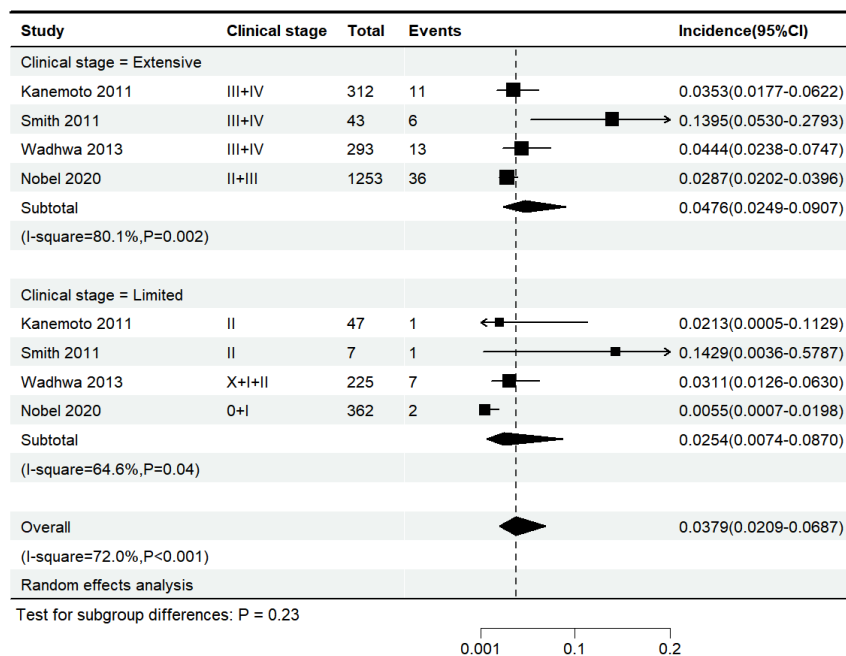
Figure S2 The pooled brain metastasis from esophageal carcinoma incidence of patients with limited and extensive clinical stage via random effects analysis. Subgroups are divided by different clinical stage of primary esophageal carcinoma.
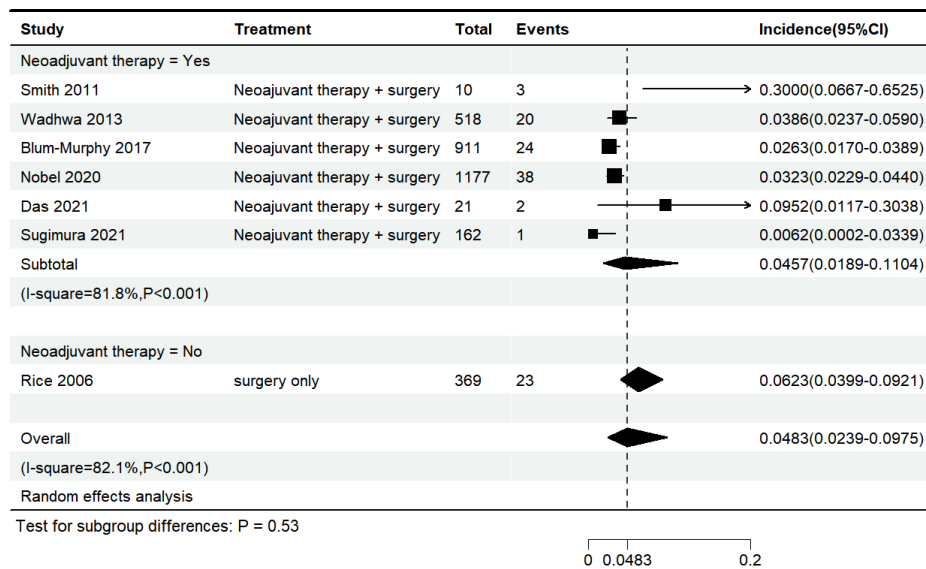

Figure S3 The pooled brain metastasis from esophageal carcinoma incidence of patients with and without neoadjuvant therapy of primary tumor via random effects analysis. Subgroups are divided by the usage of neoadjuvant therapy.
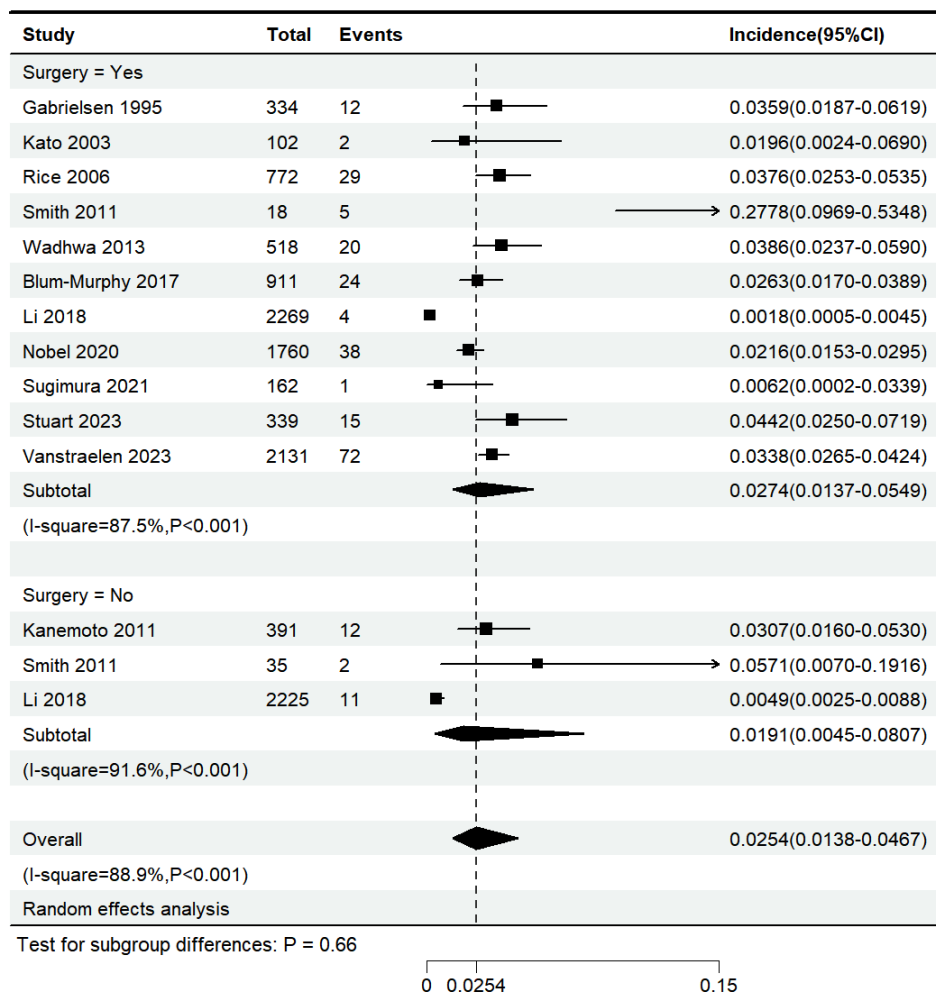
Study	Total	Events		Incidence(95%CI)
Surgery = Yes				
Gabrielsen 1995	334	12		0.0359(0.0187-0.0619)
Kato 2003	102	2		0.0196(0.0024-0.0690)
Rice 2006	772	29		0.0376(0.0253-0.0535)
Smith 2011	18	5		0.2778(0.0969-0.5348)
Wadhwa 2013	518	20		0.0386(0.0237-0.0590)
Blum-Murphy 2017	911	24		0.0263(0.0170-0.0389)
Li 2018	2269	4		0.0018(0.0005-0.0045)
Nobel 2020	1760	38		0.0216(0.0153-0.0295)
Sugimura 2021	162	1		0.0062(0.0002-0.0339)
Stuart 2023	339	15		0.0442(0.0250-0.0719)
Vanstraelen 2023	2131	72		0.0338(0.0265-0.0424)
Subtotal				0.0274(0.0137-0.0549)
(I-square=87.5%,P<0.001)				
Surgery = No				
Kanemoto 2011	391	12		0.0307(0.0160-0.0530)
Smith 2011	35	2		0.0571(0.0070-0.1916)
Li 2018	2225	11		0.0049(0.0025-0.0088)
Subtotal				0.0191(0.0045-0.0807)
(I-square=91.6%,P<0.001)				
Overall				0.0254(0.0138-0.0467)
(I-square=88.9%,P<0.001)				
Random effects analysis				

Test for subgroup differences: P = 0.66

0   0.0254   0.15

Figure S4 The pooled brain metastasis from esophageal carcinoma incidence of patients with and without surgery of primary tumor via random effects analysis. Subgroups are divided by the usage of surgery.
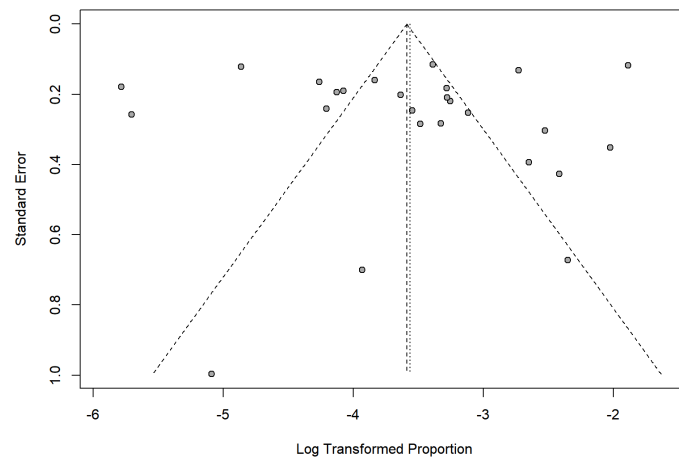
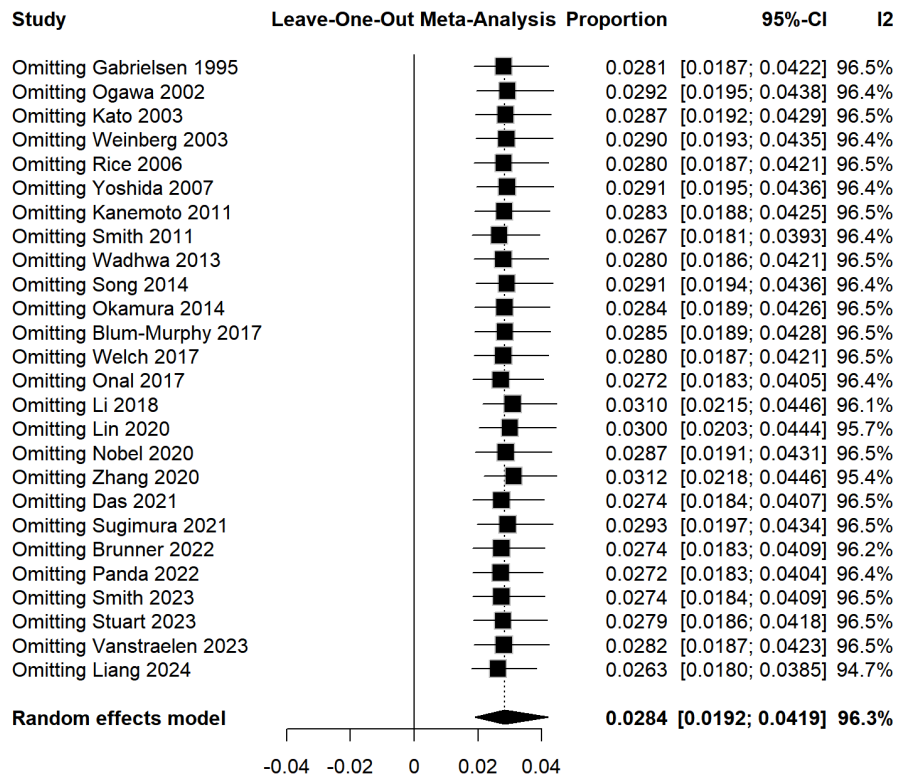**Figure S5** The funnel plot of the meta-analysis of pooled incidence.

Figure S6 The forest plot of the Leave-1-out meta-analysis of the pooled incidence via random effects analysis.
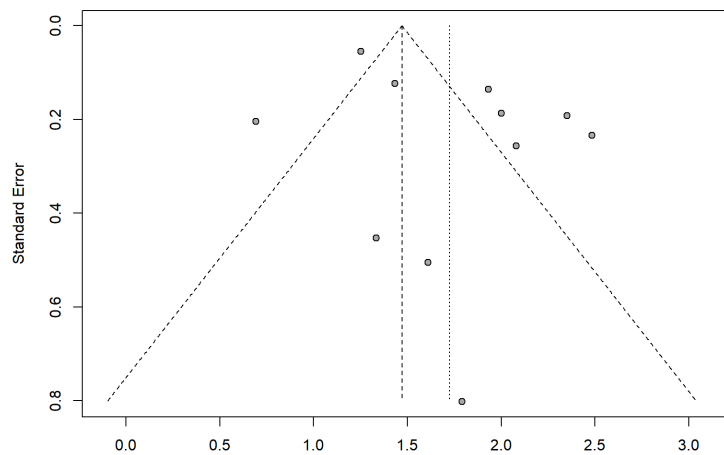
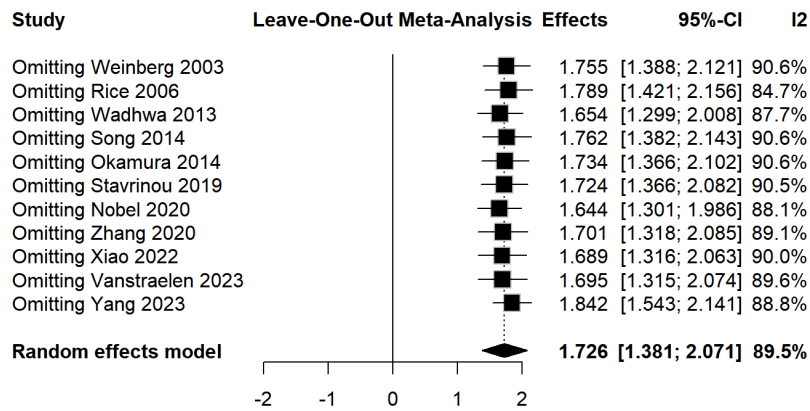**Figure S7** The funnel plot of the meta-analysis of pooled overall survival months.

Figure S8 The forest plot of the Leave-1-out meta-analysis of pooled log-transformed overall survival months via random effects analysis.