OKAYAMA UNIVERSITY
Department of
Gastroenterological
Surgery since1922

第60回　関西胸部外科学会
教育講演：胸部外科この10年の進歩

2017年6月22日

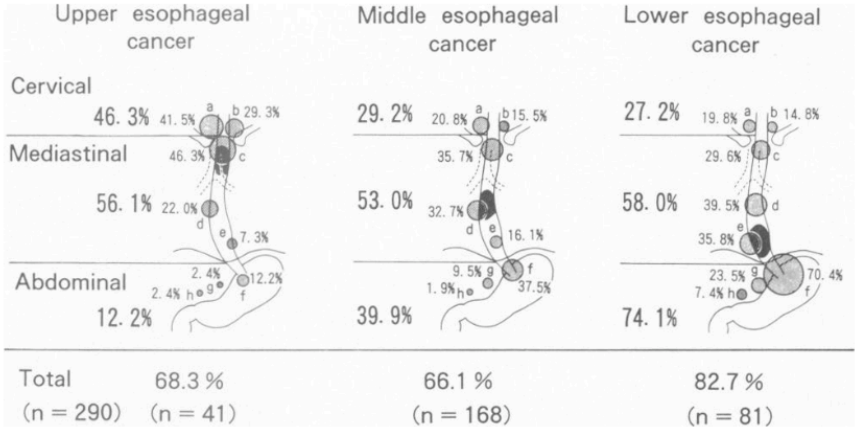
食道癌手術・郭清における
この10年の進歩

岡山大学　消化器外科学
白川靖博

Radical Lymph Node Dissection for Cancer of the Thoracic Esophagus

Hiroshi Akiyama, M.D., F.A.C.S.(Hon.), F.R.C.S.(Eng., Hon.),
Masahiko Tsurumaru, M.D., F.A.C.S., Harushi Udagawa, M.D., F.A.C.S.,
and Yoshiaki Kajiyama, M.D.

ANNALS OF SURGERY Vol.220, No. 3, 364-373, 1994



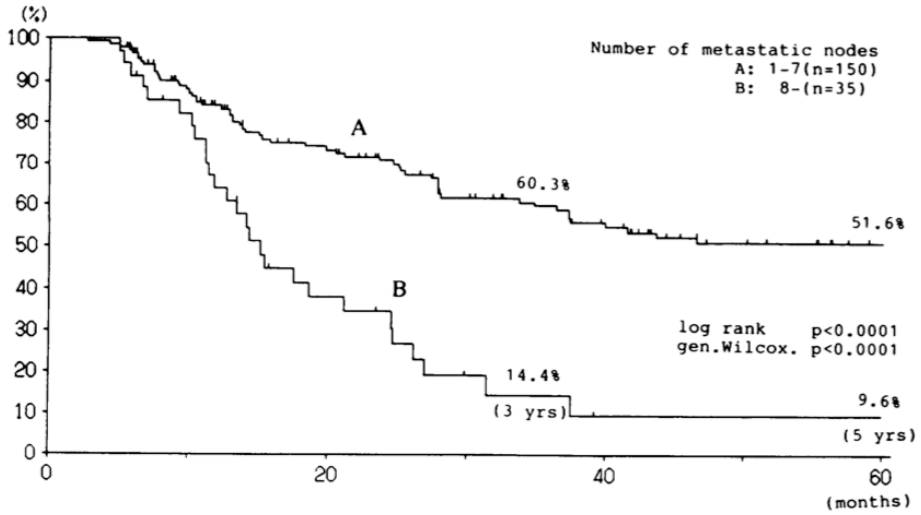


Figure 3. Number of positive nodes most significantly dividing the outcome into favorable and unfavorable cnes (three-field dissection).

秋山らは胸部食道癌は局在に関わらず頸胸腹部のリンパ節に転移に一定の割合で転移しており，転移個数が多い方が予後不良であることを示した

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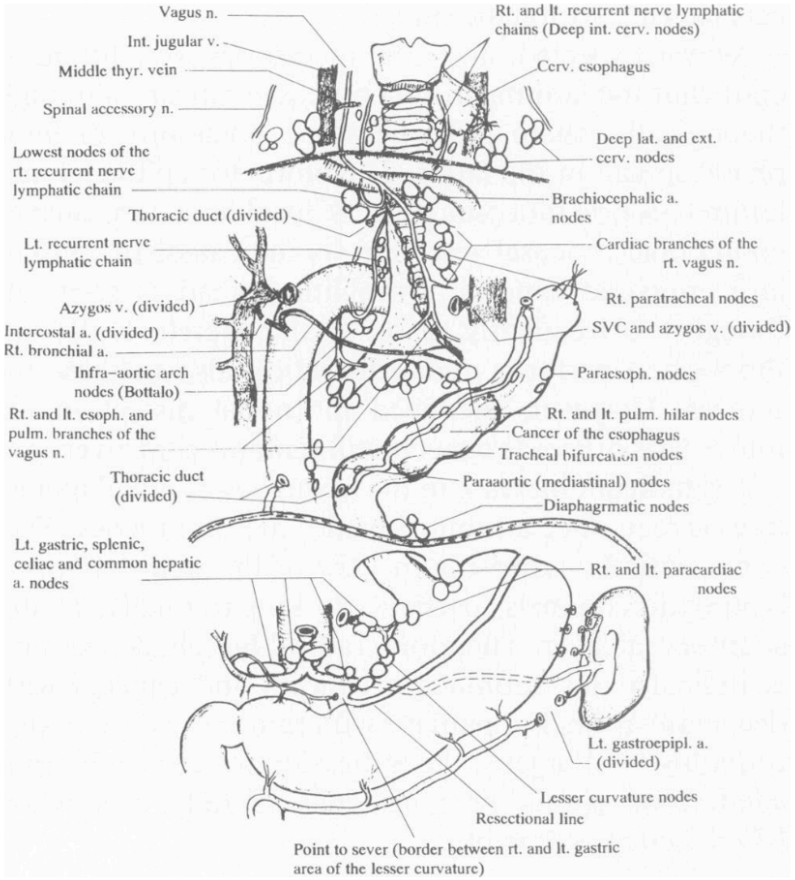

Figure 1. Extent of esophageal and gastric resection and systematic radical lymph node dissection. Extent of extensive three-field dissection is shown. In two-field dissection, no cervical dissection is carned out.

秋山らの想定した
3領域リンパ節郭清

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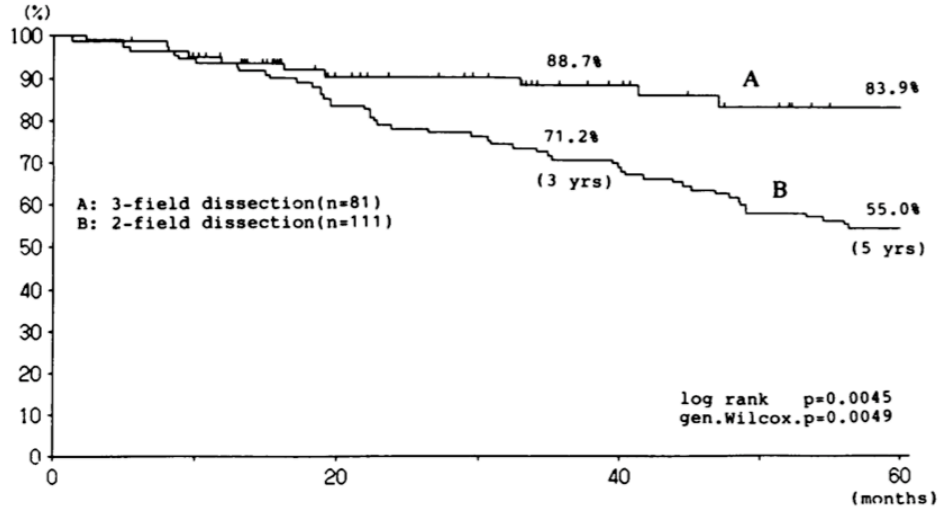

Figure 6. Comparison of survival in patients with negative nodes between two- and three-field dissections.

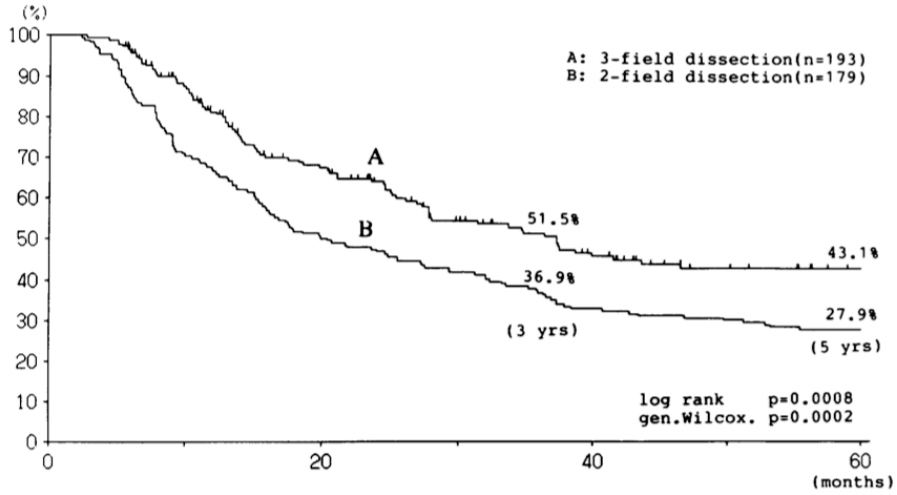

Figure 7. Comparison of survival in patients with positive nodes between two- and three-field dissections.

秋山らはリンパ節転移陽性症例だけでなくリンパ節転移陰性症例においても3領域リンパ節郭清を行った方が予後か良好であることを示した

Improved Survival for Patients With Upper and/or Middle Mediastinal Lymph Node Metastasis of Squamous Cell Carcinoma of the Lower Thoracic Esophagus Treated With 3-Field Dissection

Hiroyasu Igaki, MD, Yuji Tachimori, MD, and Hoichi Kato, MD

Ann Surg 2004;239: 483-490

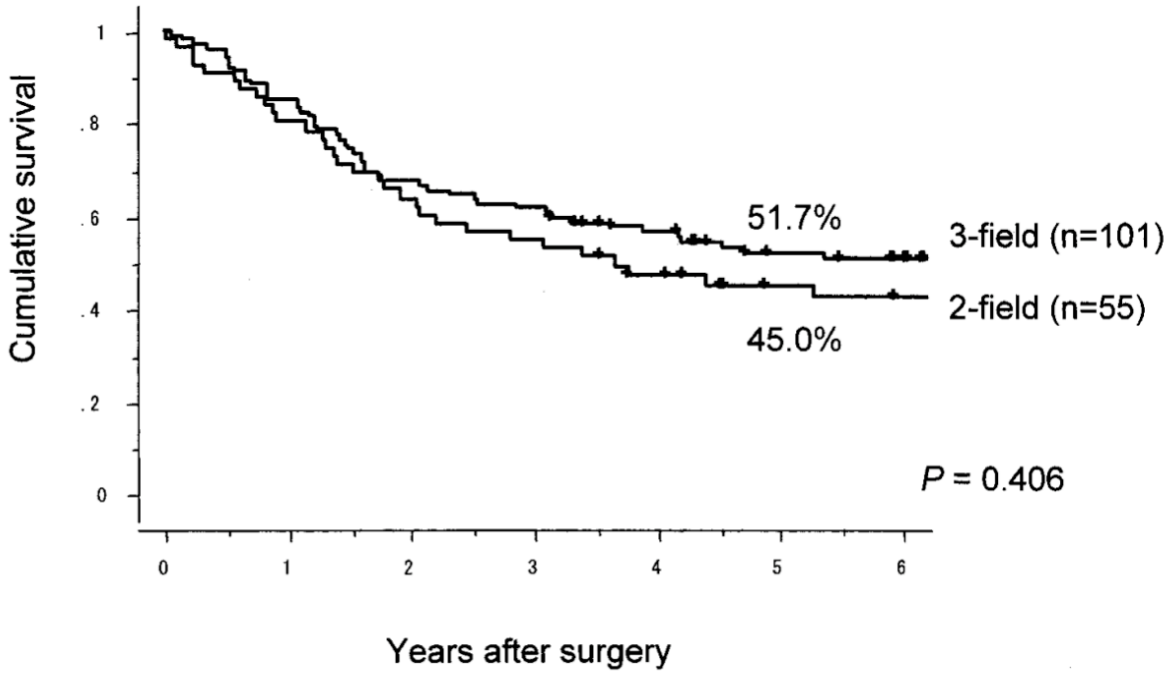

FIGURE 1. Survival curves of patients with squamous cell carcinomas of the lower thoracic esophagus after 2-field or 3-field lymph node dissection.

井垣らは検討では3領域郭清群と2領域郭清群において予後の差は認めなかったと報告している

Improved Survival for Patients With Upper and/or Middle Mediastinal Lymph Node Metastasis of Squamous Cell Carcinoma of the Lower Thoracic Esophagus Treated With 3-Field Dissection

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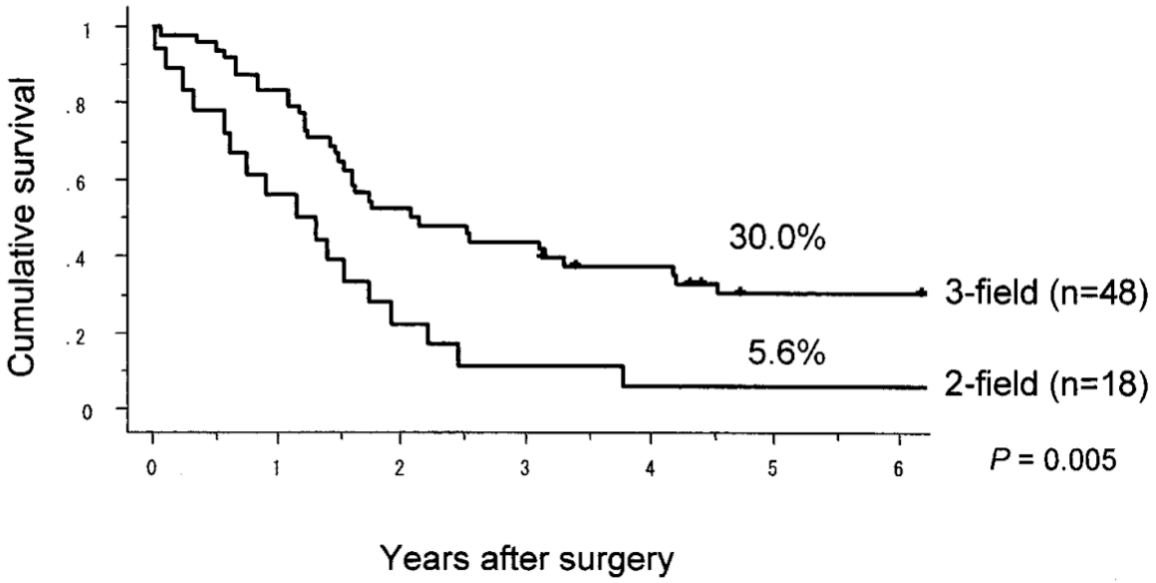

FIGURE 2. Survival curves of patients with lymph node metastases of the upper and/or middle mediastinum treated with 2-field and 3-field lymph node dissection.

しかし，リンパ節転移陽性症例においてはやはり3領域リンパ節郭清群の法が予後が良好であったと報告している

胸腔鏡下食道手術の歴史

Western country	Japan
1991, Dallemagne B. introduced the right thoracoscopic approach in lateral position left lateral decubitus position	
1992, Cuschieri A. reported the cases of left lateral decubitus position	
1994, Cuschieri A. reported the first experience of prone position	
	1995, Akaishi T reported the first experience in Japan (left lateral decubitus position)
	2003, Osugi H reported the benefits (left lateral decubitus position)
2006, Palanivelu C. reported the experience of 130 cases (prone position)	
2007, 2008, Fabian T. reported the benefits (prone position)	2007, Uyama I reported the first experience of prone position
	2010, Noshiro H (Saga) reported the benefits (prone position)
	2013, Ozawa S reported the benefits (prone position)

胸腔鏡下食道手術の最初の報告は左側臥位であり，やや遅れて腹臥位の手技が報告された．わが国では当初，左側臥位が主流であった

胸腔鏡下手術と開胸手術の比較
（本邦からの初期の報告）

胸壁破壊が軽減されることにより，呼吸機能温存され，肺合併症が少ない．根治性については同等

Osugi H., et al. *Surg Endosc, 2003. 17(3): p. 515-9.*
Akaishi T., et al. *J Thorac Cardiovasc Surg, 1996. 112(6): p. 1533-40*
Taguchi S., et al.*Surg Endosc, 2003. 17(9): p. 1445-50.*

Original article

A comparison of video-assisted thoracoscopic oesophagectomy and radical lymph node dissection for squamous cell cancer of the oesophagus with open operation

H. Osugi, M. Takemura, M. Higashino, N. Takada, S. Lee and H. Kinoshita

Department of Gastroenterological Surgery, Osaka City University Graduate School of Medicine, 1-4-3 Asahimachi, Abenoku, Osaka 545-8586, Japan
Correspondence to: Dr H. Osugi (e-mail: m9940141@msic.med.osaka-cu.ac.jp)

Background: A direct comparison of open operation and video-assisted thoracoscopic surgery (VATS) for radical oesophagectomy has yet to be published.
Methods: Medical records of 149 patients with oesophageal squamous cell carcinoma who underwent oesophagectomy and three-field lymphadenectomy were reviewed. Seventy-seven patients had the thoracic procedure performed via a 5-cm minithoracotomy and four ports (VATS group); the others were operated on by conventional posterolateral thoracotomy (open group).
Results: The mean number of retrieved mediastinal nodes, blood loss and morbidity were similar in the VATS and open groups (33·9 *versus* 32·8 nodes, 284 *versus* 310 g, and 32 *versus* 38 per cent respectively). The thoracic procedure took longer in patients having VATS than in the control group (227 *versus* 186 min; $P = 0{\cdot}031$). Vital capacity reduction was less with VATS than in the open group (15 *versus* 22 per cent; $P = 0{\cdot}016$). The 3- and 5-year survival rates were similar: 70 and 55 per cent respectively for VATS compared with 60 and 57 per cent for the open procedure.
Conclusion: VATS provides comparable results to open radical oesophagectomy, with less surgical trauma.

Paper accepted 20 August 2002
Published online in Wiley InterScience (www.bjs.co.uk). **DOI:** 10.1002/bjs.4022

British Journal of Surgery 2003;90: 108-113

Table 3 Comparison of complications in patients undergoing radical oesophagectomy by video-assisted thoracoscopic surgery or open operation

Complication	Control group ($n = 72$)	P*	VATS group			
			Total ($n = 77$)	First 36 patients	Later 41 patients	P†
Pneumonia and atelectasis	14	0·667	12	10	2‡	0·008
Recurrent laryngeal nerve palsy	9	0·813	11	5	6	0·999
Chylothorax	0	0·246	3	2	1	0·596
Stroke	0	0·999	1	0	1	0·999
Arrhythmia	3	0·354	1	0	1	0·999
Angina pectoris	0	0·999	1	1	0	0·468
Anastomotic leakage	2	0·610	1	1	0	0·468
Wound infection	4	0·198	1	1	0	0·468

VATS, video-assisted thoracoscopic surgery; n.s., not significant. *Control *versus* total VATS group; †first *versus* later patients; ‡$P = 0·047$ *versus* control (all χ^2 test).

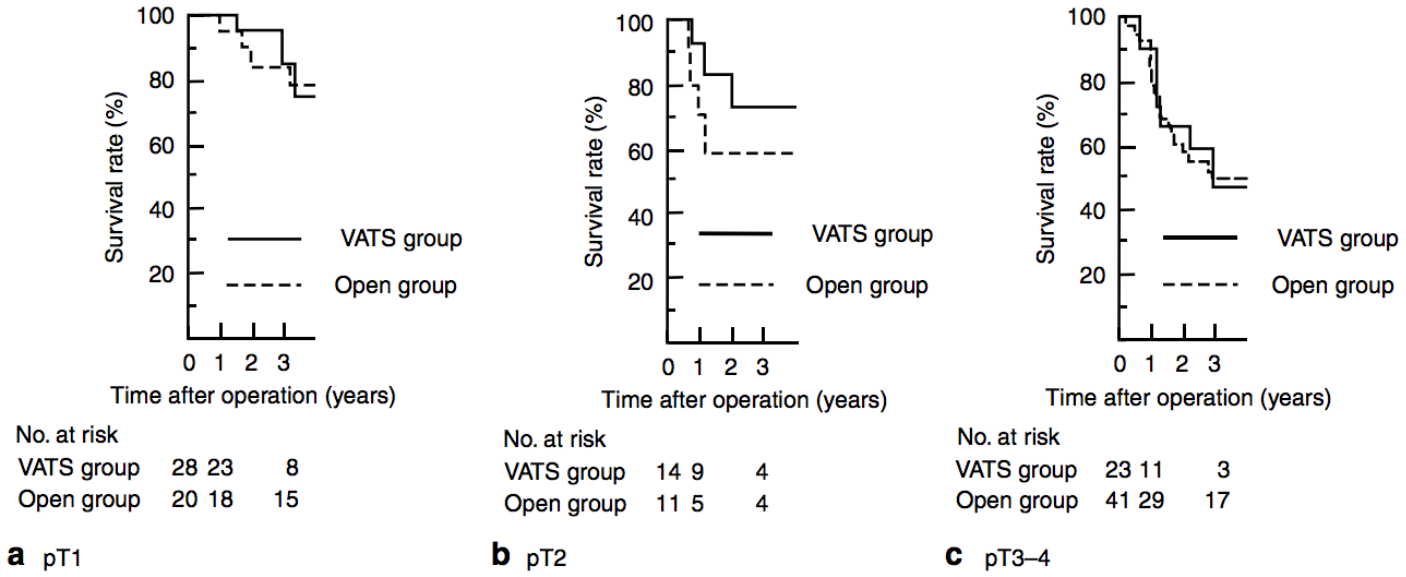

Fig. 2 Comparison of survival after radical oesophagectomy by video-assisted thoracoscopic surgery (VATS group) or open operation (control group) stratified according to depth of invasion, classified according to the guidelines of the Japanese Society for Esophageal Disease[17]. **a** Pathological tumour (pT) stage 1; **b** pT2; **c** pT3–4. There were no significant differences between the groups (log rank test)

Table 3 Comparison of complications in patients undergoing radical oesophagectomy by video-assisted thoracoscopic surgery or open operation

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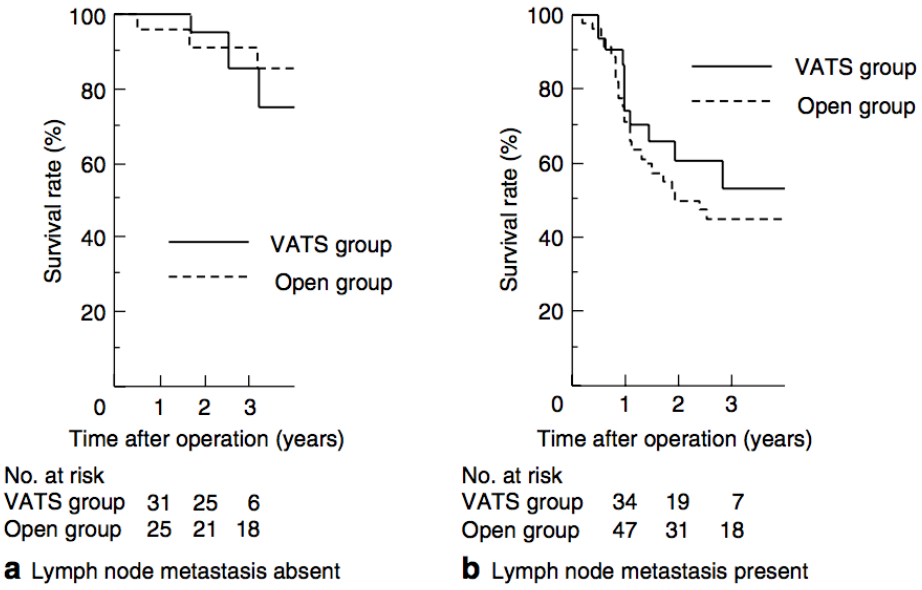

Fig. 1 Comparison of survival after radical oesophagectomy by video-assisted thoracoscopic surgery (VATS group) or open operation (control group) stratified according to **a** absence and **b** presence of lymph node metastasis. There were no significant differences between the groups (log rank test)

胸腔鏡下食道手術の歴史

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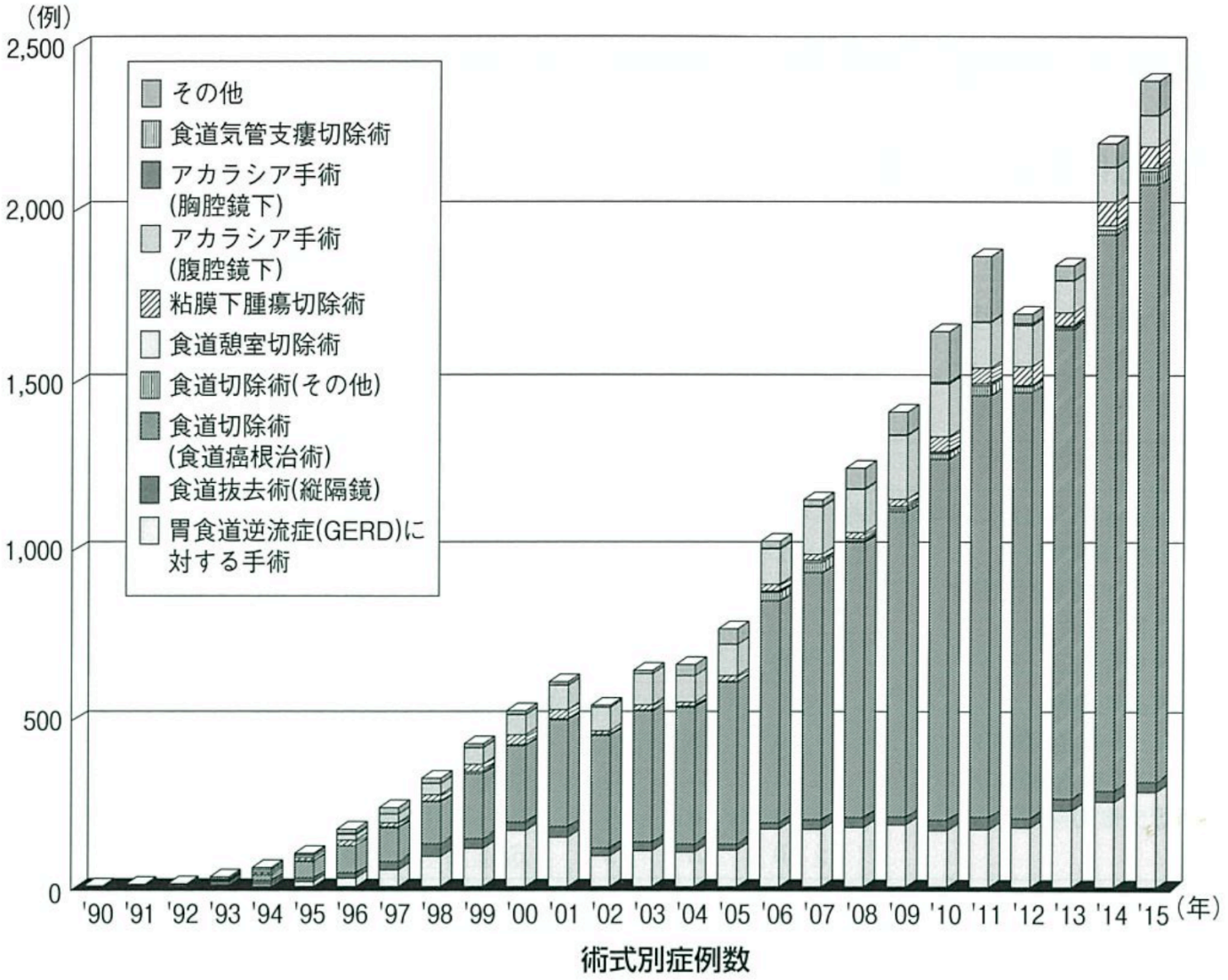
Palaniveluの130例の腹臥位胸腔鏡下食道手術の報告を受け，わが国にも腹臥位の主義が導入され，急速に広がっている



内視鏡外科学会のアンケートによれば，現在は食道癌手術の約4割が胸腔鏡下の行われているようである

胸腔鏡下手術と開胸手術の比較
（本邦よりの報告：観察研究）

- 胸腔鏡下手術のほうが出血量は少ないが手術時間は長い
- 術後30日死亡に関する有意差は認めれないが,
  胸腔鏡下手術は在院日数を短縮させる可能性がある
- 長期予後に関する結論を導くことは困難

Komine O., et al. *Esophagus, 2014. 11(1): p. 54-63.*
Miyasaka D., et al. *Asian J Endosc Surg, 2013. 6(1): p. 26-32*
Daiko H., et al. *Surg Endosc, 2012. 26(3): p. 673-80.*
Kinjo Y., et al. *Surg Endosc, 2012. 26(2): p. 381-90.*
Kubo N., et al. *Anticancer Res, 2014. 34(5):p. 2399-404*
Tujimoto H., et al. *Surgery, 2012. 151(5):p. 667-73*

当科での胸腔鏡下手術と開胸手術の比較

胸腔鏡下のほうが反回神経麻痺がやや多い傾向

Complications

	TEPP (n=300)	OE (n=69)	P-value
Morbidity	53 (17.6%)	10 (14.5%)	0.691
Pneumonia (Grade IIIa～)	16 (5.3%)	5 (7.2%)	0.536
Recurrent laryngeal nerve palsy	34 (17.0%)	5 (7.2%)	0.319
Chylothorax (Grade IIIa～)	4 (1.3%)	1 (1.4%)	0.940
Anastomotic leakage (Grade II～)	43 (14.3%)	8 (11.6%)	0.552
Mortality	0 (0.0%)	1 (1.4%)	0.220

＊Complications are described on the Clavien-Dindo classification,

Clinical outcomes

	TEPP (n=300)	OE (n=69)	P-value
Estimated blood loss (g)	178 ± 165	478 ± 308	0.001
Thoracic operative time (min.)	266± 46	168 ± 63	0.011
Number of dissected mediastinal LNs	33.8 ± 12.2	30.7 ± 12.2	0.734
Postoperative hospital stay (day)	18	24	

胸腔鏡下手術と開胸手術の比較
（本邦よりの報告：大規模データ）

A Risk Model for Esophagectomy Using Data of 5354 Patients Included in a Japanese Nationwide Web-Based Database

Hiroya Takeuchi, MD, PhD, Hiroaki Miyata, PhD,†‡ Mitsukazu Gotoh, MD, PhD,†‡ Yuko Kitagawa, MD, PhD,† Hideo Baba, MD, PhD,† Wataru Kimura, MD, PhD,† Naohiro Tomita, MD, PhD,† Tohru Nakagoe, MD, PhD,† Mitsuo Shimada, MD, PhD,† Kenichi Sugihara, MD, PhD,§ and Masaki Mori, MD, PhD§*

Ann Surg 2014;260: 259-266

竹内らの本邦のNCDデータを用いた解析によると，縫合不全等を含めた全合併症発生率高く，術後再手術率も高い

Takeuchi H. *et al. Ann Surg, 2014. 260(2):p.259-66*

胸腔鏡下手術と開胸手術の比較
（本邦よりの報告：大規模データ）

Ann Surg Oncol (2017) 24:1821–1827
DOI 10.1245/s10434-017-5808-4

Annals of
SURGICAL ONCOLOGY
OFFICIAL JOURNAL OF THE SOCIETY OF SURGICAL ONCOLOGY

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ORIGINAL ARTICLE – GASTROINTESTINAL ONCOLOGY

さらに背景をそろえた
検討も行われた

Comparison of Short-Term Outcomes Between Open and Minimally Invasive Esophagectomy for Esophageal Cancer Using a Nationwide Database in Japan

Hiroya Takeuchi, MD, PhD[1,3], Hiroaki Miyata, PhD[2,5], Soji Ozawa, MD, PhD[3], Harushi Udagawa, MD[3], Harushi Osugi, MD, PhD[3], Hisahiro Matsubara, MD, PhD[3], Hiroyuki Konno, MD, PhD[4], Yasuyuki Seto, MD,PhD[4], and Yuko Kitagawa, MD, PhD[1,3]

[1]Department of Surgery, Keio University School of Medicine, Tokyo, Japan; [2]Department of Health Policy and Management, Keio University School of Medicine, Tokyo, Japan; [3]The Japan Esophageal Society, Tokyo, Japan; [4]The Japanese Society of Gastroenterological Surgery, Tokyo, Japan; [5]National Clinical Database, Tokyo, Japan

Comparison of Short-Term Outcomes Between Open and Minimally Invasive Esophagectomy for Esophageal Cancer Using a Nationwide Database in Japan

TABLE 1 Patient clinical parameters and preoperative variables

Variables	Unmatched groups [$N = 9584$]			Matched groups [$N = 7030$]		
	OE [$n = 5995$] (%)	MIE [$n = 3589$] (%)	p value	OE [$n = 3515$] (%)	MIE [$n = 3515$] (%)	p value
Mean age (years)	66.2	65.8	0.057	66.1	65.8	0.111
Mean BMI (kg/m^2)	21.0	21.3	<0.001	21.1	21.2	0.094
Male	5094 (85.0)	3003 (83.7)	0.091	2984 (84.9)	2941 (83.7)	0.169
Emergency operation	31 (0.5)	19 (0.5)	1.000	15 (0.4)	19 (0.5)	0.607
ADL, any assistance	100 (1.7)	48 (1.3)	0.231	51 (1.5)	46 (1.3)	0.683
Weight loss >10%	614 (10.2)	274 (7.6)	<0.001	260 (7.4)	274 (7.8)	0.558
Smoking within 1 year	2542 (42.4)	1544 (43.0)	0.565	1508 (42.9)	1511 (43.0)	0.942
Harbitual alcohol use	3653 (60.9)	2209 (61.5)	0.559	2162 (61.5)	2170 (61.7)	0.845
Respiratory distress	99 (1.7)	42 (1.2)	0.065	56 (1.6)	41 (1.2)	0.152
COPD	357 (6.0)	234 (6.5)	0.273	216 (6.1)	227 (6.5)	0.624
Pneumonia	52 (0.9)	27 (0.8)	0.641	24 (0.7)	26 (0.7)	0.887
Hypertension	1891 (31.5)	1110 (30.9)	0.539	1059 (30.1)	1083 (30.8)	0.551
Congestive heart failure	18 (0.3)	7 (0.2)	0.410	9 (0.3)	7 (0.2)	0.803
Myocardial infarction	17 (0.3)	7 (0.2)	0.528	7 (0.2)	7 (0.2)	1.000
Angina	46 (0.8)	26 (0.7)	0.903	29 (0.8)	26 (0.7)	0.787
Preoperative cardiovascular surgery	47 (0.8)	14 (0.4)	0.023	22 (0.6)	14 (0.4)	0.242
Preoperative dialysis	16 (0.3)	5 (0.1)	0.260	8 (0.2)	5 (0.1)	0.581
Diabetes mellitus	789 (13.2)	421 (11.7)	0.042	457 (13.0)	408 (11.6)	0.081
Cerebrovascular disease	152 (2.5)	88 (2.5)	0.840	83 (2.4)	87 (2.5)	0.816
ASA physical status						
Grade 3–5	453 (7.6)	184 (5.1)	<0.001	187 (5.3)	183 (5.2)	0.873
Grade 4–5	14 (0.2)	9 (0.3)	0.833	6 (0.2)	9 (0.3)	0.454
Grade 5	8 (0.1)	3 (0.1)	0.553	4 (0.1)	3 (0.1)	1.000
Preoperative chemotherapy	1220 (20.4)	705 (19.6)	0.414	645 (18.3)	698 (19.9)	0.108
Preoperative radiotherapy	465 (7.8)	164 (4.6)	<0.001	133 (3.8)	164 (4.7)	0.075
Disseminated cancer	93 (1.6)	26 (0.7)	<0.001	28 (0.8)	26 (0.7)	0.892

OE open esophagectomy, *MIE* minimally invasive esophagectomy, *BMI* body mass index, *ADL* activities of daily living, *COPD* chronic obstructive pulmonary disease, *ASA* American Society of Anesthesiologists

Comparison of Short-Term Outcomes Between Open and Minimally Invasive Esophagectomy for Esophageal Cancer Using a Nationwide Database in Japan

TABLE 2 Surgical variables

Variables	Unmatched groups [$N = 9584$]			Matched groups [$N = 7030$]		
	OE [$n = 5995$] (%)	MIE [$n = 3589$] (%)	p value	OE [$n = 3515$] (%)	MIE [$n = 3515$] (%)	p value
Mean operating time (min)	461	527	<0.001	461	526	<0.001
Mean bleeding (ml)	616	442	<0.001	608	442	<0.001
Operation time >6 h	4656 (77.7)	3159 (88.0)	<0.001	2734 (77.8)	3089 (87.9)	<0.001
Bleeding 1000–2000 mL	741 (12.4)	214 (6.0)	<0.001	420 (11.9)	206 (5.9)	<0.001
Bleeding >2000 ml	158 (2.6)	68 (1.9)	0.022	89 (2.5)	66 (1.9)	0.074
Transfusion (any)	551 (9.2)	274 (7.6)	0.047	310 (8.8)	271 (7.7)	0.100
Transfusion >5 units	207 (3.5)	97 (2.7)	0.008	112 (3.2)	96 (2.7)	0.291

OE open esophagectomy, *MIE* minimally invasive esophagectomy

背景をそろえたNCDデータの検討でも，胸腔鏡群のほうが
出血量は有意に少ないが，手術時間は有意に長かった

Comparison of Short-Term Outcomes Between Open and Minimally Invasive Esophagectomy for Esophageal Cancer Using a Nationwide Database in Japan

TABLE 3 Postoperative variables and mortality

Variables	Unmatched groups [$N = 9584$]			Matched groups [$N = 7030$]		
	OE [$n = 5995$] (%)	MIE [$n = 3589$] (%)	p value	OE [$n = 3515$] (%)	MIE [$n = 3515$] (%)	p value
Surgical complications						
Surgical site infection						
Superficial incision	485 (8.1)	238 (6.6)	0.009	283 (8.1)	235(6.7)	0.032
Deep incision	253 (4.2)	127 (3.5)	0.105	150 (4.3)	127 (3.6)	0.177
Organ space	516 (8.6)	316 (8.8)	0.736	313 (8.9)	313 (8.9)	1.000
Anastomotic leak	746 (12.4)	457 (12.7)	0.679	445 (12.7)	451 (12.8)	0.858
Wound dehiscence	122 (2.0)	65 (1.8)	0.492	75 (2.1)	65 (1.8)	0.442
Recurrent laryngeal nerve palsy	493 (8.2)	363 (10.1)	0.002	285 (8.1)	361 (10.3)	0.002
Pyothorax	90 (1.5)	54 (1.5)	1.000	62 (1.8)	53 (1.5)	0.452
Chylothorax	145 (2.4)	78 (2.2)	0.484	79 (2.2)	77 (2.2)	0.936
Necrosis of trachea or bronchus	13 (0.2)	7 (0.2)	1.000	7 (0.2)	7 (0.2)	1.000
Necrosis of gastric conduit	26 (0.4)	27 (0.8)	0.047	15 (0.4)	27 (0.8)	0.087
Intra-abdominal abscess	22 (0.4)	12 (0.3)	0.861	7 (0.2)	11 (0.3)	0.480
Non-surgical complications						
Pneumonia	921 (15.4)	498 (13.9)	0.050	533 (15.2)	490 (13.9)	0.155
Atelectasis	293 (4.9)	131 (3.7)	0.005	180 (5.1)	125 (3.6)	0.002
Unplanned intubation	432 (7.2)	248 (6,9)	0.593	253 (7.2)	240 (6.8)	0.575
Prolonged ventilation over 48 h	645 (10.8)	321 (8.9)	0.005	382 (10.9)	312 (8.9)	0.006
Pulmonary embolism	21 (0.4)	12 (0.3)	1.000	9 (0.3)	12 (0.3)	0.663
Renal failure	122 (2.0)	67 (1.9)	0.596	60 (1.7)	67 (1.9)	0.591
CNS events	91 (1.5)	40 (1.1)	0.103	51 (1.5)	40 (1.1)	0.291
Cardiac events	64 (1.1)	24 (0.7)	0.059	36 (1.0)	24 (0.7)	0.153
Septic shock	102 (1.7)	63 (1.8)	0.871	56 (1.6)	63 (1.8)	0.579
Overall morbidity	2599 (43.4)	1503 (41.9)	0.159	1515 (43.1)	1478 (42.0)	0.385
30-day mortality	64 (1.1)	31 (0.9)	0.394	38 (1.1)	30 (0.9)	0.394
Operative mortality	189 (3.2)	88 (2.5)	0.051	99 (2.8)	87 (2.5)	0.414
Mean ICU stay, days	5.1	4.9	0.581	5.0	4.9	0.931
Mean hospital stay, days	41.7	40.5	0.056	41.2	40.6	0.425
Readmission within 30 days	120 (2.0)	79 (2.2)	0.506	64 (1.8)	78 (2.2)	0.270
Reoperation, any	476 (7.9)	322 (9.0)	0.079	277 (7.9)	318 (9.0)	0.086
Reoperation within 30 days	313 (5.2)	252 (7.0)	<0.001	188 (5.3)	247 (7.0)	0.004

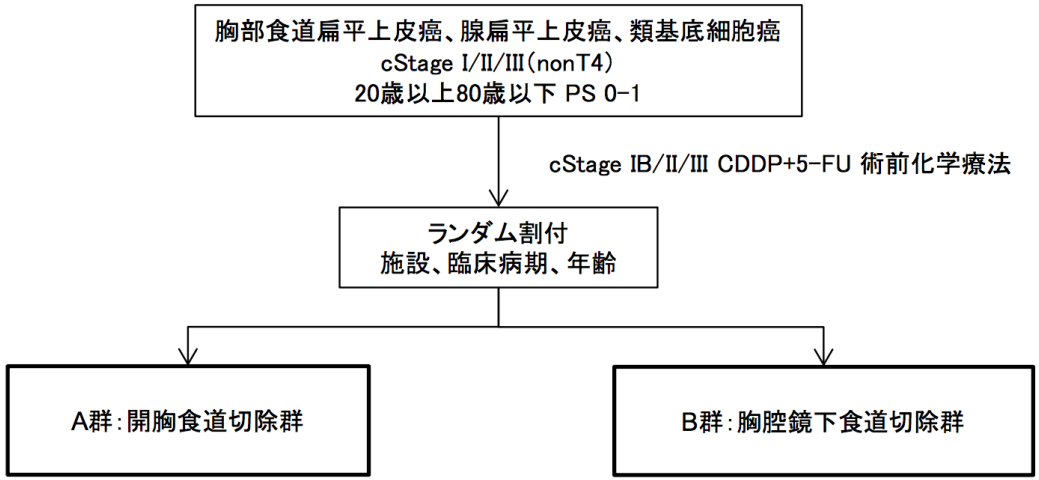
OE open esophagectomy, *MIE* minimally invasive esophagectomy, *CNS* central nervous system, *ICU* intensive care unit

竹内らの背景を揃えたNCDデータの検討でも，胸腔鏡群のほうが表層のSSI，無気肺，48時間以上の人工呼吸管理の割合は有意に低いが，反回神経麻痺率，再手術率は有意に高かった

胸腔鏡下手術と開胸手術の比較（本邦よりの報告：RCT）

JCOG1409 (MONET)試験が進行中

シェーマ



目的

臨床病期 I/II/III（T4 を除く）期胸部食道癌患者を対象に、標準治療である開胸食道切除術に対して、試験治療である胸腔鏡下食道切除術が全生存期間で劣っていないことを第 III 相試験にて検証する。

Primary endpoint: 全生存期間

Secondary endpoints: 無再発生存期間、根治切除割合、周術期合併症発生割合、再手術割合、術後晩期合併症発生割合、術後呼吸機能低下割合、QOL スコア（EORTC QLQ-C30）、開胸移行割合（B 群のみ）

胸腔鏡下手術と開胸手術の比較（海外からの報告：RCT）

Minimally invasive versus open oesophagectomy for patients with oesophageal cancer: a multicentre, open-label, randomised controlled trial

Surya S A Y Biere, Mark I van Berge Henegouwen, Kirsten W Maas, Luigi Bonavina, Camiel Rosman, Josep Roig Garcia, Suzanne S Gisbertz, Jean H G Klinkenbijl, Markus W Hollmann, Elly S M de Lange, H Jaap Bonjer, Donald L van der Peet, Miguel A Cuesta

Summary

Background Surgical resection is regarded as the only curative option for resectable oesophageal cancer, but pulmonary complications occurring in more than half of patients after open oesophagectomy are a great concern. We assessed whether minimally invasive oesophagectomy reduces morbidity compared with open oesophagectomy.

Methods We did a multicentre, open-label, randomised controlled trial at five study centres in three countries between June 1, 2009, and March 31, 2011. Patients aged 18–75 years with resectable cancer of the oesophagus or gastro-oesophageal junction were randomly assigned via a computer-generated randomisation sequence to receive either open transthoracic or minimally invasive transthoracic oesophagectomy. Randomisation was stratified by centre. Patients, and investigators undertaking interventions, assessing outcomes, and analysing data, were not masked to group assignment. The primary outcome was pulmonary infection within the first 2 weeks after surgery and during the whole stay in hospital. Analysis was by intention to treat. This trial is registered with the Netherlands Trial Register, NTR TC 2452.

Findings We randomly assigned 56 patients to the open oesophagectomy group and 59 to the minimally invasive oesophagectomy group. 16 (29%) patients in the open oesophagectomy group had pulmonary infection in the first 2 weeks compared with five (9%) in the minimally invasive group (relative risk [RR] 0·30, 95% CI 0·12–0·76; p=0·005). 19 (34%) patients in the open oesophagectomy group had pulmonary infection in-hospital compared with seven (12%) in the minimally invasive group (0·35, 0·16–0·78; p=0·005). For in-hospital mortality, one patient in the open oesophagectomy group died from anastomotic leakage and two in the minimally invasive group from aspiration and mediastinitis after anastomotic leakage.

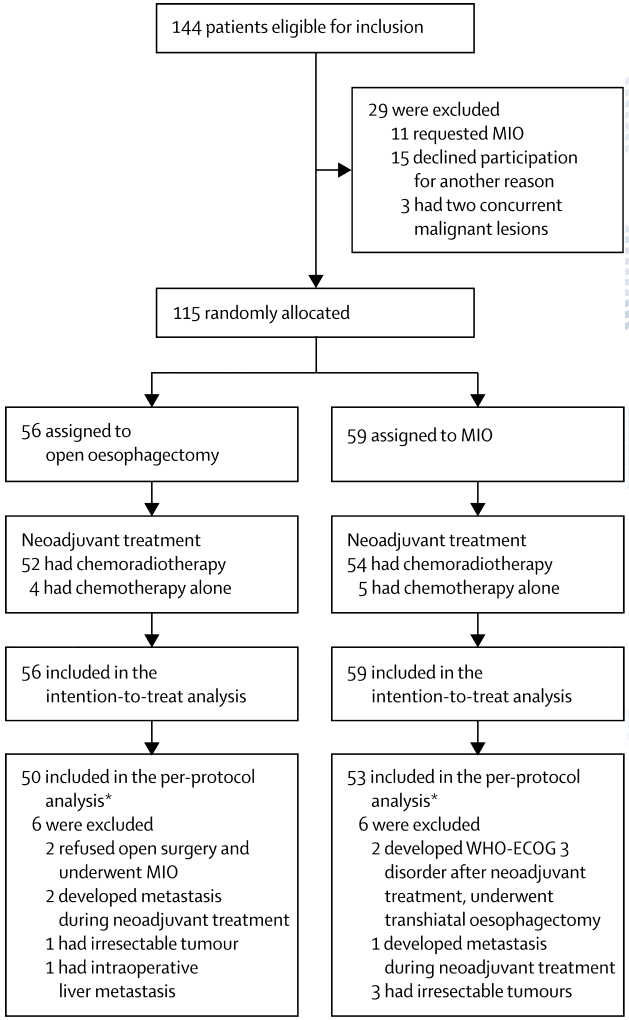
Interpretation These findings provide evidence for the short-term benefits of minimally invasive oesophagectomy for patients with resectable oesophageal cancer.

Lancet 2012;379: 1887-1892

オランダからの少数例でのRCT (TIME trial)があるのみ

術後早期の呼吸器感染と在院日数といった短期成績のみを検討

TIME trial



	OO (N=56)	MIO (N=59)
Sex		
Male	46 (82%)	43 (73%)
Female	10 (18%)	16 (27%)
Age (years)*	62 (42–75)	62 (34–75)
BMI (kg/m²)†	24 (3·7)	25 (3·6)
ASA classification		
1	15 (27%)	10 (17%)
2	32 (57%)	34 (58%)
3	8 (14%)	14 (24%)
4	1 (2%)	1 (2%)
Type of carcinoma		
Adenocarcinoma	36 (64%)	35 (59%)
Squamous cell carcinoma	19 (34%)	24 (41%)
Other	1 (2%)	0 (0%)
Location of tumour‡		
Upper third	3 (5%)	1 (2%)
Middle third	22 (39%)	26 (44%)
Lower third or gastro-oesophageal junction	31 (55%)	32 (54%)
Neoadjuvant treatment		
Chemoradiotherapy	52 (93%)	54 (92%)
Chemotherapy alone	4 (7%)	5 (8%)

Data are n (%), median (range), and mean (SD). OO=open oesophagectomy. MIO=minimally invasive oesophagectomy. BMI=body-mass index. ASA=American Association of Anesthesiologist. *Skewed distribution, Mann-Whitney test applied. †Normal distribution, Independent Samples *t* test applied. ‡American Joint Committee on Cancer site classification of thoracic and abdominal oesophagus.

Table 1: **Baseline demographic and clinical characteristics of the intention-to-treat population**

TIME trial

短期成績はMIOのほうが良好

	OO (N=56)	MIO (N=59)	p value
Primary outcomes			
Pulmonary infection within 2 weeks	16 (29%)	5 (9%)	0·005
Pulmonary infection in-hospital	19 (34%)	7 (12%)	0·005
Secondary outcomes			
Hospital stay (days)*	14 (1–120)	11 (7–80)	0·044
Short-term quality of life†			
SF 36†			
Physical component summary	36 (6; 34–39)	42 (8; 39–46)	0·007
Mental component summary	45 (11; 40–50)	46 (10; 41–50)	0·806
EORTC C30†			
Global health	51 (21; 44–58)	61 (18; 56–67)	0·020
OES 18‡			
Talking	37 (39; 25–49)	18 (26; 10–26)	0·008
Pain	19 (21; 13–26)	8 (11; 5–11)	0·002
Total lymph nodes retrieved*	21 (7–47)	20 (3–44)	0·852
Resection margin§			0·080
R0	47 (84%)	54 (92%)	..
R1	5 (9%)	1 (2%)	..
pStage¶			0·943
0	0 (0%)	1 (2%)	..
I	4 (7%)	4 (7%)	..
IIa	16 (29%)	17 (29%)	..
IIb	6 (11%)	9 (15%)	..
III	14 (25%)	11 (19%)	..
IV	5 (9%)	4 (7%)	..
No residual tumour or lymph-node metastasis	7 (13%)	9 (15%)	..
Mortality‖			0·590
30-day mortality	0 (0%)	1 (2%)	..
In-hospital mortality	1 (2%)	2 (3%)	..

Data are n (%), median (range), or mean (SD, 95% CI), unless otherwise indicated. OO=open oesophagectomy. MIO=minimally invasive oesophagectomy. SF 36=Short Form 36 Health Survey (version 2). EORTC=European Organization for Research and Treatment of Cancer Quality of Life Questionnaires. *Skewed distribution, Mann-Whitney test applied. †Measures general aspects of health; scores range from 0 to 100, with higher scores representing better well-being. ‡Assesses several aspects of oesophageal function; scores range from 0 to 100, with lower scores indicating better function. Only statistically significant domains presented. §Defined as >1 mm from a resection margin. ¶Staging based on the American Joint Committee on Cancer, 6th edn; four patients in each group did not undergo resection due to metastasis or irresectability of the tumour. ‖Death from any cause.

***Table 2*: Primary and secondary outcomes for the intention-to-treat population**

	OO (N=56)	MIO (N=59)	p value
Intraoperative data			
Operative time (min)*†	299 (66–570)	329 (90–559)	0·002
Blood loss (mL)†	475 (50–3000)	200 (20–1200)	<0·001
Conversions‡	NA	8 (14%)	..
Level of anastomosis§			0·970
Cervical	37 (66%)	38 (64%)	
Thoracic	15 (27%)	17 (29%)	
Postoperative data			
ICU stay (days)†	1 (0–106)	1 (0–50)	0·706
VAS (10 days)¶	3 (2)	2 (2)	0·001
Epidural failure‖	11 (20%)	10 (17%)	0·734
Other complications			
Anastomotic leakage	4 (7%)	7 (12%)	0·390
Thoracic complications without anastomotic leakage**	2 (4%)	2 (3%)	0·958
Vocal-cord paralysis††	8 (14%)	1 (2%)	0·012
Pulmonary embolism	0 (0%)	1 (2%)	0·328
Reoperations	6 (11%)	8 (14%)	0·641

Data are median (range), n (%), or mean (SD), unless otherwise indicated. OO=open oesophagectomy. MIO=minimally invasive oesophagectomy. NA=not applicable. ICU=intensive-care unit. VAS= Visual Analogue Scale pain score. *Time from skin incision to skin closure. †Skewed distribution, Mann-Whitney test applied. ‡Six patients were converted to thoracotomy and two to laparotomy. §Four patients in the OO group and four in the MIO group did not undergo resection with subsequent anastomosis because of metastasis or irresectability of the tumour. ¶Linear mixed model. ‖In the first 2 days after surgery. **Thoracic complications not related to leakage were mediastinitis, empyema, chylous leakage needing reoperation, and hiatal herniation. ††Confirmed by laryngoscopy.

***Table 3*: Other outcomes of the intention-to-treat population**

胸腔鏡下手術と開胸手術の比較（海外からの報告：Meta-Analysis）

最近，中国からの報告が多い

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ORIGINAL RESEARCH

Minimally invasive esophagectomy versus open esophagectomy for esophageal cancer: a meta-analysis

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Background and objectives: The safety and effectiveness of minimally invasive esophagectomy (MIE) in comparison with the open esophagectomy (OE) remain uncertain in esophageal cancer treatment. The purpose of this meta-analysis is to compare the outcomes of the two surgical modalities.

Methods: Searches were conducted in MEDLINE, EMBASE, and ClinicalTrials.gov with the following index words: "esophageal cancer", "VATS", "MIE", "thoracoscopic esophagectomy", and "open esophagectomy" for relative studies that compared the effects between MIE and OE. Random-effect models were used, and heterogeneity was assessed.

Results: A total of 20 studies were included in the analysis, consisting of four randomized controlled trials and 16 prospective studies. MIE has reduced operative blood loss (P=0.0009) but increased operation time (P=0.009) in comparison with OE. Patients get less respiratory complications (risk ratio =0.74, 95% CI =0.58–0.94, P=0.01) and better overall survival (hazard ratio =0.54, 95% CI =0.42–0.70, P<0.00001) in the MIE group than the OE group. No statistical difference was observed between the two groups in terms of lymph node harvest, R0 resection, and other major complications.

Conclusion: MIE is a better choice for esophageal cancer because patients undergoing MIE may benefit from reduced blood loss, less respiratory complications, and also improved overall survival condition compared with OE. However, more randomized controlled trials are still needed to verify these differences.

Keywords: thoracoscopic esophagectomy, laparoscopic esophagectomy, postoperative prognosis

Meta-Analysis

Study	Year	Country/ district	Design	NOS score	Intervention	Cases	Age, years median (IQ range) and mean ± SD	Sex (m/f)	TNM stage (0/I/II/III/IV)	Pathology (adeno/ spuam/other)
Bailey et al[18]	2013	UK	Prospective	7	Laparoscopically assisted esophagectomy	39	65 (37–78)	32/7	NA	31/6/2
					Open esophagectomy	31	62 (38–78)	27/4		27/3/1
Biere et al[19]	2012	the Netherlands	RCT	8	Minimally invasive esophagectomy	59	62 (34–75)	43/16	1/4/26/11/4/9	24/35/0
					Open esophagectomy	56	62 (42–75)	46/10	0/4/22/14/5/7	36/19/1
Bonavina et al[20]	2015	Italy	Prospective	6	Thoracoscopic-prone esophagectomy	80	61.5 (53–70)	46/34	0/25/25/23/7	9/68/3
					Hybrid Ivor Lewis	80	63.5 (55.4–68.5)	71/9	0/15/22/31/12	63/15/2
Guo et al[4]	2013	People's Republic of China	RCT	8	Thoracoscopy combined laparoscopy	111	57.3±11.8	68/43	0/24/7/80/0	NA
					Open transthoracic esophagectomy	110	60.8±12.4	72/38	0/31/5/74/0	
Hamouda et al[21]	2010	UK	Prospective	7	Laparoscopic of Ivor-Lewis esophagectomy	26	62	25/1	NA	21/4/1
					Open Ivor Lewis esophagectomy	24	60	23/1		21/3/0
Kinjo et al[22]	2012	Japan	Prospective	7	Thoracoscopic–laparoscopic esophagectomy	72	62.7±7.4	58/14	0/21/26/16/9	0/71/1
					Thoracoscopic esophagectomy	34	64.2±8.8	29/5	0/11/7/9/7	3/31/0
					Open esophagectomy	79	63.3±8.6	70/9	0/18/27/20/14	3/71/5
Kothari et al[23]	2011	India	Prospective	7	Minimally invasive surgery	34	NA	NA	NA	NA
					Ivor Lewis esophagectomy	28				
Law et al[24]	1997	Hong Kong	Prospective	6	Thoracoscopy	18	66 (43–80)	13/5	1/1/3/13/0	NA
					Thoracotomy	63	63 (36–84)	55/8	0/4/11/45/3	
Lee et al[25]	2011	Taiwan	Prospective	7	Total minimally invasive esophagectomy	30	59.73±10.32	30/0	2/3/11/12/2	1/29/0
					Hybrid minimally invasive esophagectomy	44	59.70±11.17	43/1	12/13/14/5/1	1/43/0
					Open esophagectomy	64	56.58±11.60	61/3	7/17/25/14/1	5/59/0
Maas et al[26]	2014	the Netherlands	RCT	8	Minimally invasive esophagectomy	14	65 (56–75)	10/4	NA	13/1/0
					Open esophagectomy	13	62 (52–74)	12/1		11/2/0
Maas et al[5]	2015	the Netherlands	RCT	8	Minimally invasive esophagectomy	59	62 (34–75)	43/16	1/4/26/11/4	35/24/0
					Open esophagectomy	56	62 (42–75)	46/10	0/4/22/14/5	36/19/1
Noble et al[27]	2013	UK	Prospective	7	Minimally invasive esophagectomy	53	66 (45–85)	43/10	NA	47/4/1
					Ivor Lewis esophagectomy	53	64 (36–81)	45/8		48/3/0
Parameswaran et al[28]	2013	UK	Prospective	7	Total minimally invasive esophagectomy	36	64 (45–84)	24/12	6/6/13/10/0	22/8/5
					Laparoscopic-assisted esophagectomy	31	67 (48–79)	23/8	1/5/12/13/0	27/3/0
					Open esophagectomy	19	64 (51–77)	15/4	0/0/8/11/0	16/3/0
Perry et al[29]	2009	USA	Prospective	6	Laparoscopic inversion esophagectomy	21	69±8	18/3	NA	NA
					Open transhiatal esophagectomy	21	61±9	17/4		
Pham et al[30]	2010	USA	Prospective	7	Thoracoscopic–laparoscopic	44	63±8.6	41/3	0/6/14/18/2	34/8/0
Safranek et al[31]	2010	UK	Prospective	6	Total minimally invasive esophagectomy	41	64 (41–74)	25/16	2/7/17/15/0	23/17/1
					Hybrid minimally invasive esophagectomy	34	63 (44–76)	28/6	2/2/14/16/0	29/3/2
					Open esophagectomy	46	60 (44–77)	38/8	0/6/11/29/0	43/3/0
Scarpa et al[32]	2015	Italy	Prospective	7	Hybrid minimally invasive esophagectomy	34	62 (52–70)	25/9	11/5/13/5/0	24/10/0
					Open esophagectomy	34	64 (56–70)	27/7	5/6/18/4/1	24/10/0
Schoppmann et al[33]	2010	Austria	Prospective	7	Minimally invasive esophagectomy	31	61.5 (35.7–74.8)	6/25	0/9/9/11/0	17/14/0
					Open esophagectomy	31	58.6 (33.7–76.8)	10/21	0/3/16/11/0	12/19/0
Sihag et al[34]	2015	USA	Prospective	6	Minimally invasive esophagectomy	814	63.3±10.7	658/156	NA	NA
					Open esophagectomy	2,966	63.2±10.2	2,492/474		
Smithers et al[35]	2007	Australia	Prospective	6	Total minimally invasive esophagectomy	23	61 (38–77)	20/3	1/3/5/10/0	16/3/4
					Thoracoscopic-assisted esophagectomy	309	64 (27–85)	248/61	21/66/96/100/8	199/74/18
					Open esophagectomy	114	62.5 (29–81)	104/10	2/6/28/73/2	100/7/4

Abbreviations: m/f, male/female; NOS, Newcastle-Ottawa quality assessment Scale; RCT, randomized controlled trial; IQ, interquartile; SD, standard deviation; TNM, tumor node metastasis; NA, not available.

(Lu Lv et al.OncoTargets and Therapy 2016:9 6751–6762)

Meta-Analysis

All outcomes of interests

Outcome	Number of studies	Cases	MD/RR/OR/ HR	95% CI	Heterogeneity	Test for overall effect	Favors group
Operative blood loss	4	491	MD =–283.61	–451.69, –115.52	$P<0.0001$, $I^2=87\%$	$Z=3.31$, $P=0.0009$	MIE
Operation time	5	561	MD =44.42	10.95, 77.88	$P=0.002$, $I^2=77\%$	$Z=2.60$, $P=0.009$	OE
Number of lymph node harvest	4	491	MD =–0.80	–4.63, 3.03	$P=0.01$, $I^2=73\%$	$Z=0.41$, $P=0.68$	None
R0 resection	7	813	RR =1.03	0.98, 1.08	$P=0.57$, $I^2=0\%$	$Z=1.25$, $P=0.21$	None
Reoperation	8	4,530	OR =1.10	0.59, 2.04	$P=0.02$, $I^2=57\%$	$Z=0.29$, $P=0.77$	None
In-hospital mortality	15	5,541	OR =0.84	0.60, 1.19	$P=0.96$, $I^2=0\%$	$Z=0.97$, $P=0.33$	None
Respiratory complication	19	5,910	RR =0.74	0.58, 0.94	$P<0.0001$, $I^2=67\%$	$Z=2.45$, $P=0.01$	MIE
Cardiovascular complication	13	5,217	OR =0.90	0.64, 1.28	$P=0.32$, $I^2=12\%$	$Z=0.56$, $P=0.57$	None
Anastomotic leakage	17	5,754	OR =0.84	0.59, 1.18	$P=0.14$, $I^2=27\%$	$Z=1.00$, $P=0.32$	None
Anastomotic stricture	7	982	OR =1.76	0.78, 3.97	$P=0.0006$, $I^2=67\%$	$Z=1.35$, $P=0.18$	None
Chyle leakage	9	1,208	OR =0.90	0.47, 1.74	$P=0.68$, $I^2=0\%$	$Z=0.30$, $P=0.76$	None
Recurrent laryngeal paralysis	6	672	OR =1.31	0.67, 2.55	$P=0.38$, $I^2=6\%$	$Z=0.80$, $P=0.43$	None
Overall survival	3	591	HR =0.54	0.42, 0.70	$P=0.76$, $I^2=0\%$	$Z=4.58$, $P<0.00001$	MIE

Abbreviations: CI, confidence interval; RR, relative ratio; OR, odds ratio; HR, hazard ratio; MD, mean difference; MIE, minimally invasive esophagectomy; OE, open esophagectomy.

(Lu Lv et al.OncoTargets and Therapy 2016:9 6751–6762)

胸腔鏡下手術と開胸手術の比較
（海外からの報告：Meta-Analysis）

Yibulayin *et al. World Journal of Surgical Oncology* (2016) 14:304
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World Journal of Surgical Oncology

REVIEW Open Access

Minimally invasive oesophagectomy versus open esophagectomy for resectable esophageal cancer: a meta-analysis

Waresijiang Yibulayin, Sikandaer Abulizi, Hongbo Lv and Wei Sun*

Abstract

Background: Open esophagectomy (OE) is associated with significant morbidity and mortality. Minimally invasive oesophagectomy (MIO) reduces complications in resectable esophageal cancer. The aim of this study is to explore the superiority of MIO in reducing complications and in-hospital mortality than OE.

Methods: MEDLINE, Embase, Science Citation Index, Wanfang, and Wiley Online Library were thoroughly searched. Odds ratio (OR)/weighted mean difference (WMD) with a 95% confidence interval (CI) was used to assess the strength of association.

Results: Fifty-seven studies containing 15,790 cases of resectable esophageal cancer were included. MIO had less intraoperative blood loss, short hospital stay, and high operative time ($P < 0.05$) than OE. MIO also had reduced incidence of total complications; (OR = 0.700, 95% CI = 0.626 ~ 0.781, $P_V < 0.05$), pulmonary complications (OR = 0. 527, 95% CI = 0431 ~ 0.645, $P_V < 0.05$), cardiovascular complications (OR = 0.770, 95% CI = 0.681 ~ 0.872, $P_V < 0.05$), and surgical technology related (STR) complications (OR = 0.639, 95% CI = 0.522 ~ 0.781, $P_V < 0.05$), as well as lower in-hospital mortality (OR = 0.668, 95% CI = 0.539 ~ 0.827, $P_V < 0.05$). However, the number of harvested lymph nodes, intensive care unit (ICU) stay, gastrointestinal complications, anastomotic leak (AL), and recurrent laryngeal nerve palsy (RLNP) had no significant difference.

Conclusions: MIO is superior to OE in terms of perioperative complications and in-hospital mortality.

Keywords: Minimally invasive esophagectomy, Open esophagectomy, Complications, Mortality

胸腔鏡下手術と開胸手術の比較
（海外からの報告：Meta-Analysis）

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Combined thoracoscopic-laparoscopic esophagectomy versus open esophagectomy: a meta-analysis of outcomes

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Abstract
Objectives At present there is controversy regarding the optimal surgical method for esophageal cancer. Specifically, whether combined thoracoscopic-laparoscopic esophagectomy is superior to open esophagectomy with respect to the surgical wound, perioperative morbidities and mortality, and the overall survival rate is of great concern. This article aimed to compare thoracoscopic-laparoscopic esophagectomy versus open esophagectomy on the perioperative morbidities and long-term survival.
Methods PubMed, Embase, and Google Scholar databases were searched for relevant studies comparing combined thoracoscopic-laparoscopic esophagectomy with open esophagectomy using the Preferred Reporting Items for Systemic Reviews and Meta-Analyses standards. Odds ratios were extracted to give pooled estimates of the perioperative effect of the two surgical procedures. Hazard ratios were extracted to compare overall survival between the two surgical procedures.
Results Thirteen studies involving 1549 patients were included in this meta-analysis. We found that patients that underwent combined thoracoscopic-laparoscopic esophagectomy had lower total complication rates (relative risk 1.20; 95 % CI 1.08–1.34; $p = 0.0009$), wound infection rates, pulmonary complications, and less intraoperative blood loss. Moreover, our study also showed combined thoracoscopic-laparoscopic esophagectomy did not compromise the 5-year survival rate (hazard risk 0.920; 95 % CI 0.720–1.176; $p = 0.505$) and even improved 2-year survival rate. The 30-day mortality and other common morbidities, including anastomotic leakage, anastomotic stricture, pulmonary infection, chylothorax, arrhythmia, or recurrent laryngeal nerve injury, were not significantly different between combined thoracoscopic-laparoscopic esophagectomy and traditional open esophagectomy ($p > 0.05$).
Conclusions Combined thoracoscopic-laparoscopic esophagectomy is a feasible and reliable surgical procedure that can achieve uncompromising long-term survival rates and reduce perioperative complications.

Keywords Minimally invasive surgery · Esophageal cancer · Video-assisted thoracoscopic surgery · Laparoscopy · Esophagectomy · Meta-analysis

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胸腔鏡下手術と開胸手術の比較
（海外からの報告：Meta-Analysis）

著者	論文数	症例数	優越性	欠点	有意差無し	文献
Lv L	20	6025	出血量 肺合併症 Overall survival	手術時間	リンパ節郭清個数 R0切除 縫合不全 反回神経麻痺 再手術率 心血管合併症	Onco Targets Ther 2016;9: 6751-6762
Yibulayin W	57	15790	出血量 全合併症 肺合併症 心血管合併症 在院日数	手術時間	リンパ節郭清個数 ICU滞在時間 縫合不全 反回神経麻痺	World J Surg Oncol 2016;14: 304
Guo W	13	1549	出血量 全合併症 肺合併症 SSI	手術時間	縫合不全 反回神経麻痺 5年生存率	Surg Endosc 2016;30: 3873-3881

まとめて見ると胸腔鏡下手術のほうが出血量と肺合併症に関して優越

胸腔鏡下手術と開胸手術の比較
（海外からの報告：大規模データ）

イギリスからの報告がある

FEATURE

Short-Term Outcomes Following Open Versus Minimally Invasive Esophagectomy for Cancer in England

A Population-Based National Study

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Omar Faiz, MBBS, FRCS, and George B. Hanna, FRCS, PhD**

Objective: To compare short-term outcomes of open and minimally invasive esophagectomy (MIE) for cancer.

Background Data: Numerous studies have demonstrated the safety and possible advantages of MIE in selected cohorts of patients. The increasing use of MIE is not coupled with conclusive evidence of its benefits over "open" esophagectomy, especially in the absence of randomized trials.

Methods: Hospital Episode Statistics data were analyzed from April 2005 to March 2010. This is a routinely collected database of all English National Health Service Trusts. Office of Population Censuses and Surveys Classification of Surgical Operations and Procedures, 4th revision (OPCS-4), procedure codes were used to identify index resections and *International Statistical Classification of Diseases, 10th Revision* (*ICD-10*), diagnostic codes were used to ascertain comorbidity status and complications. Thirty-day in-hospital mortality, medical complications, and surgical reinterventions were analyzed. Unadjusted and risk-adjusted regression analyses were undertaken.

Results: Seven thousand five hundred and two esophagectomies were undertaken; of these, 1155 (15.4%) were MIE. In 2009-2010, 24.7% of resections were MIE. There was no difference in 30-day mortality (4.3% vs 4.0%; $P = 0.605$) and overall medical morbidity (38.0% vs 39.2%; $P = 0.457$) rates between open and MIE groups, respectively. A higher reintervention rate was associated with the MIE group than with the open group (21% vs 17.6%, $P = 0.006$; odds ratio, 1.17; 95% confidence interval, 1.00–1.38; $P = 0.040$).

Conclusions: Minimally invasive esophagectomy is increasingly performed in the United Kingdom. Although the study confirmed the safety of MIE in a population-based national data, there are no significant benefits demonstrated in mortality and overall morbidity. Minimally invasive esophagectomy is associated with higher reintervention rate. Further evidence is needed to establish the long-term survival of MIE.

(*Ann Surg* 2012;255:197–203)

colorectal cancer surgery. This increasing use of MIE is not coupled with conclusive evidence of its benefits over "open" esophagectomy. Systematic reviews of studies involving MIE have been equivocal and have failed to draw definitive conclusions in the absence of randomized controlled trials.[9,10] Meta-analyses of the available evidence have suggested a potential advantage of MIE in reducing morbidity but with no significant influence on mortality. The main drawbacks of those studies have been the lack of randomized trials with most of the studies being case series with small numbers of selected patients and different operative techniques.[11,12]

The authors have previously demonstrated the increasing uptake of MIE in English National Health Service (NHS) Trusts and described the mortality, length of stay (LOS), and emergency readmissions following open and MIE between 1996 and 2008.[8] A literature search did not reveal a population-based study that has quantified the morbidity associated with MIE. This study aims to identify and quantify morbidity and reinterventions following open and MIE for cancer in England over 5 years (2005–2009, inclusive). This recent period was selected because it is more representative of established techniques, as the MIE to open esophagectomy ratio was very small (0.6%–3.8%) between 1996 and 2004 (Ref. 8) and represented the learning curve of introducing MIE.

胸腔鏡下手術と開胸手術の比較
（海外からの報告：大規模データ）

著者	症例数	利点	欠点	有意差無し	文献
Mamidanna R	7502		再手術 再挿管	合併症 在院死亡	Ann Surg 2012;255: 197–203

胸腔鏡下手術の優越は示せなかった

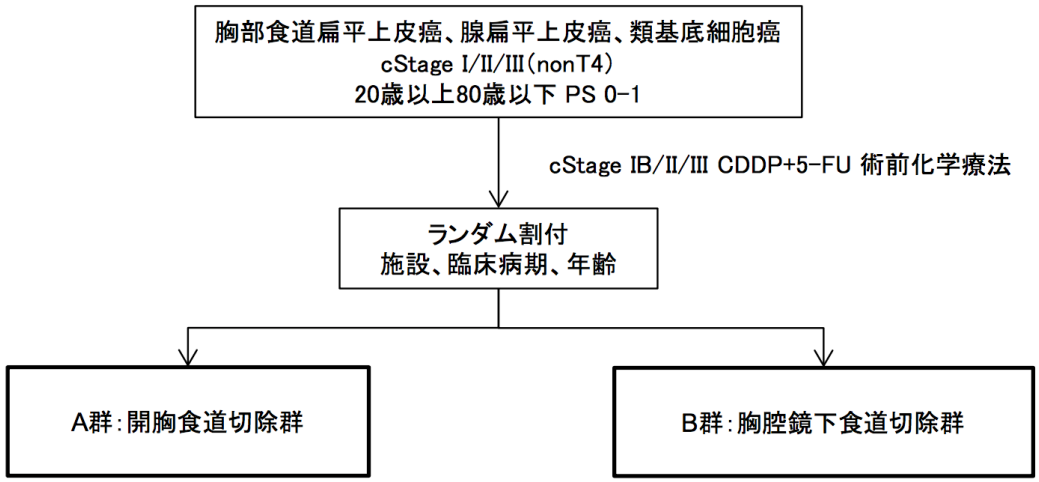
小　括

- 食道癌胸腔鏡下手術に関して本邦からの安全性，有用性，特に短期成績に関しては，エビデンスとなるような大規模でのランダム化比較試験はまだ見うけられない

- 海外からも，少数例でのランダム化比較試験やメタアナリシスの報告で，術中出血量が少なく，呼吸器合併症等の術後合併症発生率が少ないとするものがあるのみ

JCOG1409 (MONET)試験の結果に期待

本邦発の長期生存を比較するランダム化比較試験



0.2. 目的

臨床病期 I/II/III(T4 を除く)期胸部食道癌患者を対象に、標準治療である開胸食道切除術に対して、試験治療である胸腔鏡下食道切除術が全生存期間で劣っていないことを第 III 相試験にて検証する。

Primary endpoint: 全生存期間

Secondary endpoints: 無再発生存期間、根治切除割合、周術期合併症発生割合、再手術割合、術後晩期合併症発生割合、術後呼吸機能低下割合、QOL スコア(EORTC QLQ-C30)、開胸移行割合(B 群のみ)

側臥位胸腔鏡と腹臥位胸腔境の比較（観察研究）

少数例での後ろ向き観察研究では

- 手術時間は腹臥位のほうがながいという報告が多いが，リンパ節郭清範囲が影響か？
- 総術後合併症については有意差なし
- 長期予後に関する結論を導くことは困難

Fabin, et al. Surg Endos, 2008. 22: p. 2485-2491.
Kuwabara, et al. Esophagus, 2010. 7: p. 23-29
Noshiro, et al. Surg Endosc, 2010. 24: p. 2965-2973.
Daiko, et al. Surg Endosc, 2012. 3426:p. 673-680

側臥位胸腔鏡と腹臥位胸腔境の比較（RCT）

中国からRCTの報告もある

Thoracoscopic Esophagectomy in Prone Versus Decubitus Position: Ergonomic Evaluation From a Randomized and Controlled Study

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Division of Thoracic Surgery, Zhongshan Hospital, Fudan University, Shanghai, China

Background. The prone position (PP) and decubitus position (DP) have both been used for thoracoscopic esophagectomy. However, which of these positions is ergonomically better for the operating surgeon is unknown. In this randomized controlled trial (NCT01144325), we aimed to assess the surgeon's physical and mental stress in operating on patients in the PP compared with that in the DP.

Methods. From October 2012 to June 2013, 67 consecutive patients who underwent a three-stage minimally invasive esophagectomy were randomly assigned to the DP or the PP during the thoracic stage. The same senior surgeon performed all operations. Objectively, the surgeon's spontaneous eye blink rate was recorded during thoracoscopic esophagectomy. Subjectively, the physician's musculoskeletal symptoms were rated on a scale ranging from 1 (uninfluenced) to 10 (maximum fatigue). Clinical characteristics, including patient demographics and operative features of the two patient groups, were statistically compared.

Results. There were 35 patients in the PP group and 32 in the DP group. The two groups were comparable in patient demographics. The thoracic stage of the operation was longer in the DP group than in the PP group (87 ± 24 minutes vs 68 ± 22 minutes, $p < 0.001$), and the volume of blood loss was higher (89 ± 18 mL vs 67 ± 16 mL, $p < 0.001$). The surgeon's eye blink rate at the end of thoracic stage decreased more from baseline in the DP group than in the PP group (3.0 ± 1.4 blinks/min vs 1.2 ± 0.9 blinks/min, $p < 0.001$), and the surgeon's symptom scale score was higher after operation with the patient in the DP than in the PP (6.29 ± 1.54 vs 3.13 ± 2.82, $p < 0.001$). No conversion to open thoracotomy was recorded in either group.

Conclusions. Thoracoscopic esophagectomy in the PP provided less workload and better ergonomic results than the DP. Further study based on a larger number of patients is required to confirm these findings.

(Ann Thorac Surg 2014;98:1072–8)

側臥位胸腔鏡と腹臥位胸腔境の比較（RCT）

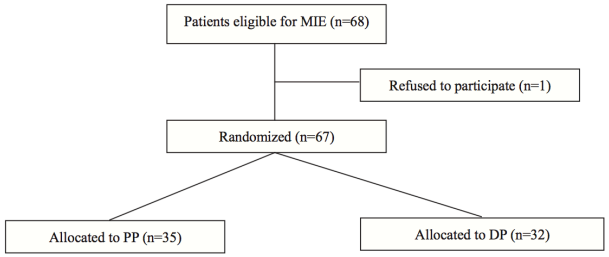

Fig 1. Flow diagram of the study. (DP = decubitus position; MIE = minimally invasive esophagectomy; PP = prone position.)

腹臥位のほうが胸部操作時間，出血量，リンパ節郭清個数に関して優越．しかし合併症に関しては優越性無し

Table 1. Clinical Features

Characteristics[a]	PP (n = 35)	DP (n = 32)	*p* Value
Age, y	60.5 ± 7.3	60.9 ± 8.4	0.836[b]
Sex			0.946[c]
Male	26	24	
Female	9	8	
Location			0.974[c]
Upper	6	5	
Middle	22	20	
Lower	7	7	
Histologic type			0.917[d]
Squamous cancer	33	29	
Adenocarcinoma	2	3	
Stage			0.984[d]
T1	6	6	
T2	8	7	
T3	21	19	
BMI, kg/m^2	23.4 ± 4.1	22.7 ± 3.9	0.477[b]
ASA			0.976[c]
1	13	12	
2	22	20	
Thoracic duration, min	68 ± 22	87 ± 24	<0.001[b]
Abdominal duration, min	55 ± 21	51 ± 17	0.397[b]
Blood loss, mL	89 ± 18	67 ± 16	<0.001[b]
Lymph nodes harvested, No.[e]	18.2 ± 2.9	15.4 ± 3.3	<0.001[b]
Length of stay, days	9.4 ± 3.6	10.8 ± 4.3	0.152[b]

[a] Continuous data are presented as mean ± standard deviation and categoric data as the number. [b] By the Student *t* test. [c] By the χ^2 test. [d] By the Fisher exact test. [e] Harvested during the thoracic stage.

ASA = American Society of Anesthesiologists; BMI = body mass index; DP = decubitus position; PP = prone position.

Table 3. Mortality and Morbidity

Variable	PP (n = 35) No.	DP (n = 32) No.	*p* Value
Mortality	0	0	…
Morbidity	9	10	0.616[a]
Anastomotic leakage	3	3	0.754[b]
Pulmonary complication	2	4	0.587[b]
Hoarseness	3	2	0.917[b]
Wound infection	1	0	0.964[b]
Delayed gastric emptying	0	1	0.964[b]

[a] By the χ^2 test. [b] By the Fisher exact test.

食道癌に対する新しい手術

HOW TO DO IT

Single-Port Mediastinoscopic Lymphadenectomy Along the Left Recurrent Laryngeal Nerve

非開胸縦隔境手術は
注目されている

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We herein describe a single-port mediastinoscopic method for upper mediastinal dissection in esophageal cancer surgery. After the left cervical incision and lymphadenectomy, a Lap-Protector (Hakko, Tokyo, Japan) was inserted into the wound and an EZ Access port (Hakko) was attached. Esophageal mobilization with en bloc lymphadenectomy along the left recurrent laryngeal nerve was then performed using a port-in-port technique with conventional flexible laparoscopy. Carbon dioxide insufflation expanded the intramediastinal space, and minute structures in the deep mediastinum around the aortic arch, such as nerves, bronchial arteries, and lymphatic vessels, were clearly visualized, allowing lymphadenectomy to be safely and carefully performed along the nerve.

(Ann Thorac Surg 2015;100:1115–7)

食道癌に対する新しい手術

Diseases of the Esophagus (2016) **29**, 131–138
DOI: 10.1111/dote.12303

DISEASES OF THE ESOPHAGUS

ISDE The International Society for Diseases of the Esophagus

Original article

Hand-assisted laparoscopic transhiatal esophagectomy with a systematic procedure for en bloc infracarinal lymph node dissection

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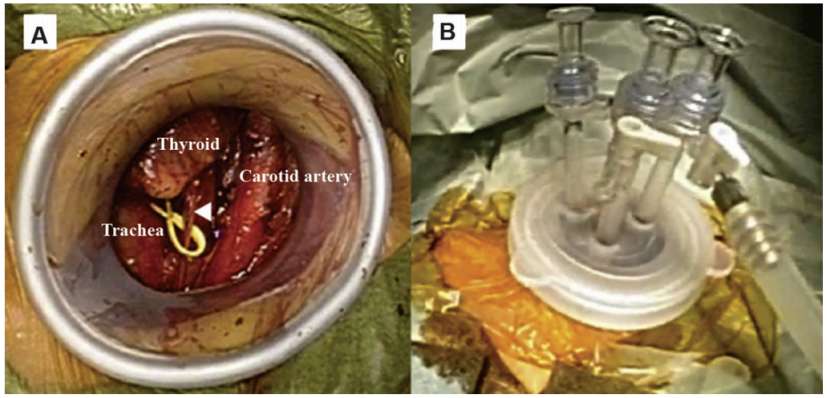
非開胸縦隔境手術は注目されている

SUMMARY. **Laparoscopic transhiatal esophagectomy is a minimally invasive approach for esophageal cancer. However, a transhiatal procedure has not yet been established for en bloc mediastinal dissection. The purpose of this study was to present our novel procedure, hand-assisted laparoscopic transhiatal esophagectomy, with a systematic procedure for en bloc mediastinal dissection. The perioperative outcomes of patients who underwent this procedure were retrospectively analyzed. Transhiatal subtotal mobilization of the thoracic esophagus with en bloc lymph node dissection distally from the carina was performed according to a standardized procedure using a hand-assisted laparoscopic technique, in which the operator used a long sealing device under appropriate expansion of the operative field by hand assistance and long retractors. The thoracoscopic procedure was performed for upper mediastinal dissection following esophageal resection and retrosternal stomach roll reconstruction, and was avoided based on the nodal status and operative risk. A total of 57 patients underwent surgery between January 2012 and June 2013, and the transthoracic procedure was performed on 34 of these patients. In groups with and without the transthoracic procedure, total operation times were 370 and 216 minutes, blood losses were 238 and 139 mL, and the numbers of retrieved nodes were 39 and 24, respectively. R0 resection rates were similar between the groups. The incidence of recurrent laryngeal nerve palsy was significantly higher in the group with the transthoracic procedure, whereas no significant differences were observed in that of pneumonia between these groups. The hand-assisted laparoscopic transhiatal method, which is characterized by a systematic procedure for en bloc mediastinal dissection supported by hand and long device use, was safe and feasible for minimally invasive esophagectomy.**

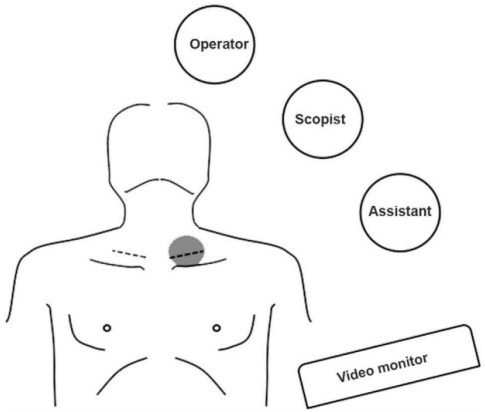
KEY WORDS: **esophageal cancer, hand-assisted laparoscopic surgery, transhiatal esophagectomy.**

食道癌に対する新しい手術



気縦隔も併用

Fig 2. Placement of single-port devices on the cervical wound. (A) The Lap-Protector, a ring device for protecting wounds, was inserted into the cervical wound; the EZ Access, a silicon rubber cap, was then attached to the Lap-Protector. Arrowhead indicates the left recurrent laryngeal nerve marked with tape. (B) Three 5-mm trocars were inserted.



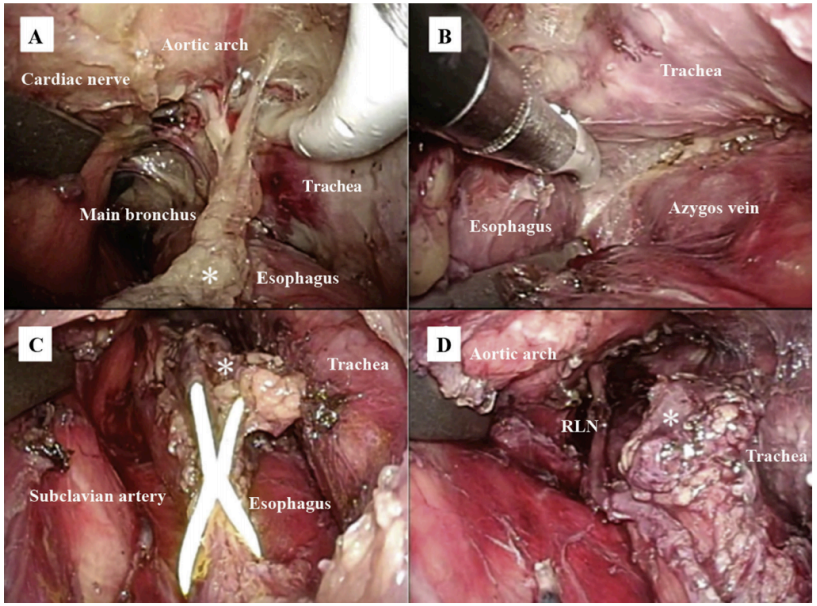


Fig 3. Intraoperative view: (A) lymph node tissues (*) along the left recurrent laryngeal nerve (RLN) were separated from the aortic arch and tracheal wall; (B) esophageal mobilization over the azygos vein arch; (C) after completion of esophageal mobilization; and (D) after completion of lymphadenectomy.

食道癌に対する新しい手術

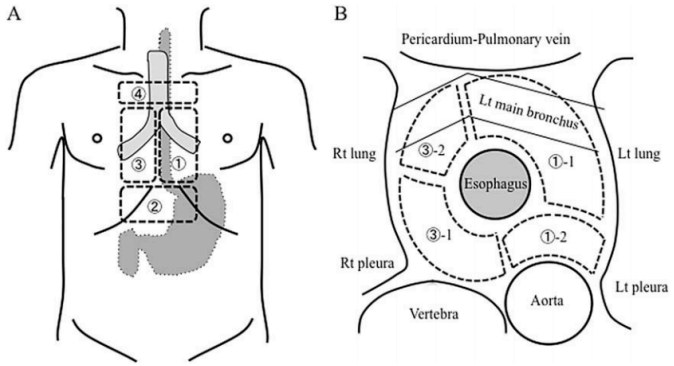


Fig. 2 A systematic procedure for en bloc mediastinal dissection. The transhiatal procedure starts from left mediastinal dissection. Left mediastinal dissection is performed from the anterior part (①-1) followed by the posterior part (①-2). Following abdominal dissection (②), right mediastinal dissection is performed from the posterior part (③-1) followed by the anterior part (③-2). Finally, mobilization of the upper thoracic esophagus is added (④). (A) Coronal plane. (B) Transverse plane. Lt, Left; Rt, Right.

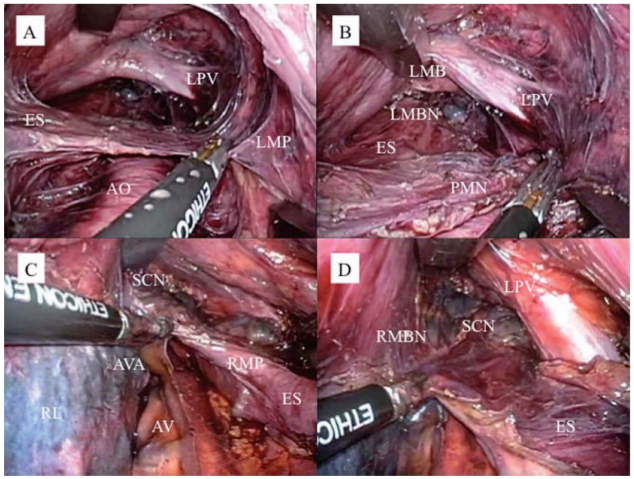


Fig. 3 Intraoperative view of transhiatal mediastinal dissection. (A, B) Left mediastinal dissection. The left paraesophageal tissues were dissected in a layer and were divided along the left mediastinal pleura (LMP) under the left inferior pulmonary vein (LPV) to the left main bronchus (LMB). The left main bronchial lymph nodes (LMBN) and paraaortic posterior mediastinal nodes (PMN) were dissected en bloc using this procedure. AO, aorta; ES, esophagus. (C, D) Right mediastinal dissection. The right paraesophageal tissues were dissected in a layer and were divided with the right mediastinal pleura (RMP) along the azygos vein (AV) to the right main bronchus. The subcarinal lymph nodes (SCN) and right main bronchial nodes (RMBN) were dissected en bloc using this procedure. AVA, azygos vein arch.

食道癌に対する新しい手術

さらにロボット手術も

まとめ

- 広く行われるようになった胸腔鏡下食道癌手術であるが，その優位性はまだ確定していない
- 胸腔鏡下手術が胸部食道癌の治療に寄与するかについてはJCOG1409の結果が注目される
- 新規の術式に対する期待も大きい