

Συμπόσιο Ομάδων Εργασίας  
Η χειρουργική θώρακος - καρδιάς συναντά  
τις όμορες ειδικότητες

ΒΑΧΛΑΣ ΚΩΝΣΤΑΝΤΙΝΟΣ

ΕΠΙΜ Α΄. ΧΕΙΡΟΥΡΓΟΣ ΘΩΡΑΚΟΣ

ΓΝΝΘΑ «Η ΣΩΤΗΡΙΑ»

**Χειρουργική Διάσωσης**

**Σε τοπικά εκτεταμένο ΜΜΚΠ**

**Μετά από εισαγωγική θεραπεία**

1. Τελική (Definite) Θεραπεία (Χήμειοθεραπεία, Ακτινοθεραπεία, Ανοσοθεραπεία)  
σε ΜΜΚΠ που ΔΕΝ επιδέχεται χειρουργικής θεραπείας (στάδια IIIb , IV)  
και στην επαναξιολόγηση, απόφαση για χειρουργική θεραπεία (Salvage).
2. Επείγουσα Χειρουργική Διάσωσης (Emergency Salvage) κατά την πορεία της ογκολογικής Θεραπείας, ή μετά το τέλος της, σε ΜΜΚΠ που ΔΕΝ επιδέχεται αρχικά χειρουργική θεραπεία (στάδια IIIb , IV). Το αίτιο μπορεί να είναι η αιμόπτυση, η αποστηματοποίηση/σήψη, το εμπύημα.
3. Ασθενείς που επέλεξαν να υποβληθούν σε στερεοτακτική ακτινοθεραπεία (SRS, SBRT, Cyberknife) και δεν ανταποκρίθηκαν στη θεραπεία η υποτροπίασαν.



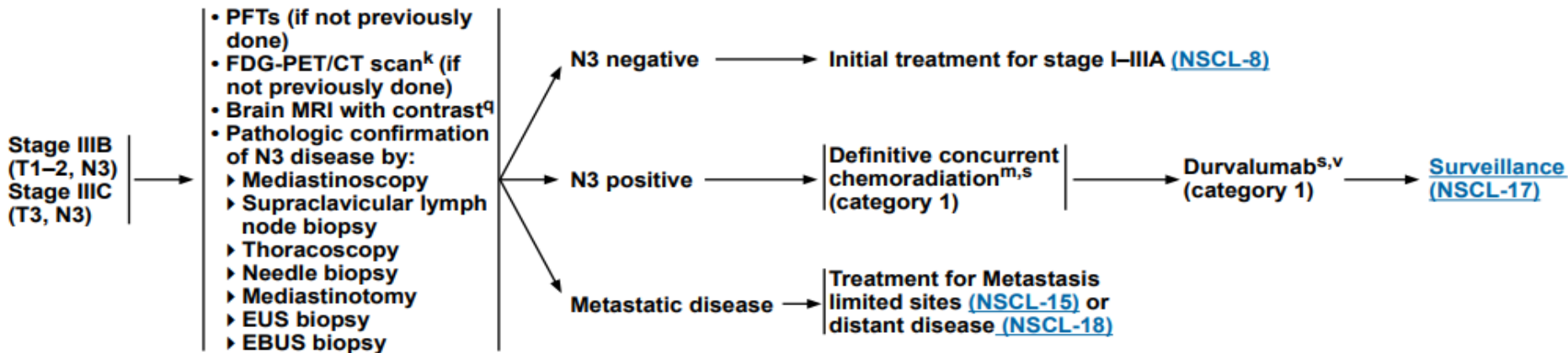
## NCCN Guidelines Version 5.2024 Non-Small Cell Lung Cancer

[NCCN Guidelines Index](#)  
[Table of Contents](#)  
[Discussion](#)

### CLINICAL ASSESSMENT

### PRETREATMENT EVALUATION

### INITIAL TREATMENT



## CLINICAL PRACTICE GUIDELINES

### Early and locally advanced non-small-cell lung cancer (NSCLC): ESMO Clinical Practice Guidelines for diagnosis, treatment and follow-up<sup>†</sup>

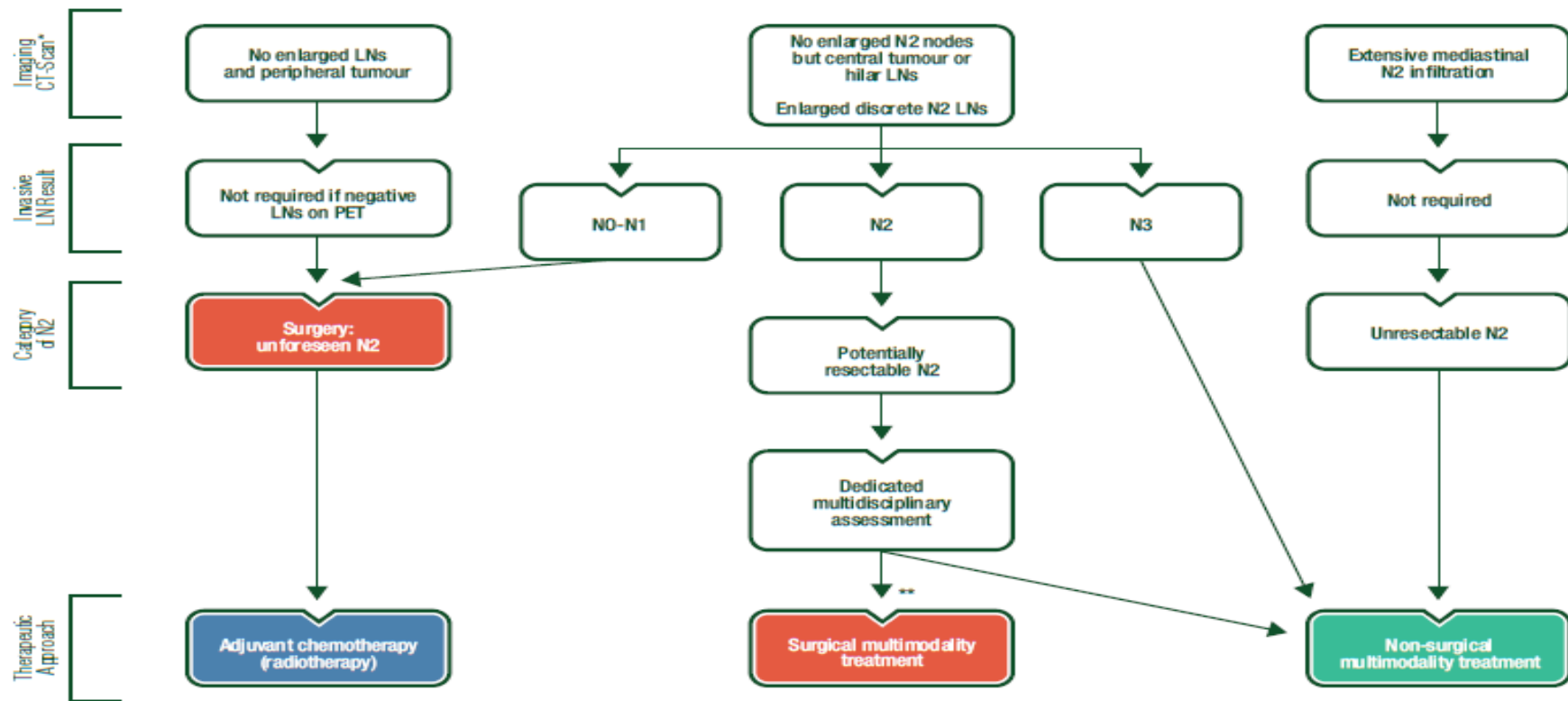
P. E. Postmus<sup>1</sup>, K. M. Kerr<sup>2</sup>, M. Oudkerk<sup>3</sup>, S. Senan<sup>4</sup>, D. A. Waller<sup>5</sup>, J. Vansteenkiste<sup>6</sup>, C. Escriu<sup>1</sup> & S. Peters<sup>7</sup>,  
on behalf of the ESMO Guidelines Committee\*

<sup>1</sup>The Clatterbridge Cancer Centre and Liverpool Heart and Chest Hospital, Liverpool; <sup>2</sup>University of Aberdeen, Aberdeen, UK; <sup>3</sup>Center for Medical Imaging, University of Groningen, Groningen; <sup>4</sup>Department of Radiation Oncology, VU University Medical Center, Amsterdam, The Netherlands; <sup>5</sup>Department of Thoracic Surgery, University Hospitals of Leicester NHS Trust, Leicester, UK; <sup>6</sup>University Hospitals KU Leuven, Leuven, Belgium; <sup>7</sup>Oncology Department, Service d'Oncologie Médicale, Centre Hospitalier Universitaire Vaudois (CHUV), Lausanne, Switzerland

\*Correspondence to: ESMO Guidelines Committee, ESMO Head Office, Via L. Taddei 4, CH-6962 Viganello-Lugano, Switzerland. E-mail: clinicalguidelines@esmo.org

<sup>†</sup>Approved by the ESMO Guidelines Committee: March 2010, last update May 2017. This publication supersedes the previously published version—*Ann Oncol* 2013; 24 (Suppl. 6): vi89–vi98.

# Συμπόσιο Ομάδων Εργασίας



**Figure 2.** Treatment recommendations for patients with locoregional NSCLC, based on imaging, invasive lymph node staging tests and multidisciplinary assessment.

\*Category description according to CT imaging as in ACCP staging document [42].

\*\*See text for factors involved in the choice between non-surgical and surgical multimodality treatment.

ACCP, American College of Chest Physicians; CT, computed tomography; LN, lymph node; NSCLC, non-small-cell lung cancer; PET, positron-emission tomography.

## Pattern of Local Failure and its Risk Factors of Locally Advanced Non-small Cell Lung Cancer Treated With Concurrent Chemo-radiotherapy

TAKANORI ABE<sup>1</sup>, NAO KOBAYASHI<sup>1</sup>, TOMOMI AOSHIIKA<sup>1</sup>, YASUHIRO RYUNO<sup>1</sup>, SATOSHI SAITO<sup>1</sup>, MITSUNOBU IGARI<sup>1</sup>, RYUTA HIRAI<sup>1</sup>, YU KUMAZAKI<sup>1</sup>, YU MIURA<sup>2</sup>, KYOICHI KAIRA<sup>2</sup>, HIROSHI KAGAMU<sup>2</sup>, SHIN-EI NODA<sup>1</sup> and SHINGO KATO<sup>1</sup>

<sup>1</sup>Department of Radiation Oncology, International Medical Center, Saitama Medical University, Hidaka, Japan;

<sup>2</sup>Department of Respiratory Medicine, International Medical Center, Saitama Medical University, Hidaka, Japan

**Abstract.** *Background/Aim:* The treatment outcome of locally advanced non-small cell lung cancer (LA-NSCLC) has been improved over the past years but local failure is still common for these patients. The purpose of this study is to analyze the pattern of local failure and its risk factor of concurrent chemo-radiotherapy (CCRT) for locally advanced LA-NSCLC. *Patients and Methods:* We evaluated 77 patients treated with CCRT for LA-NSCLC from July 2007 to December 2017 at our institution. Most of the patients were treated with 60 Gy in 30 fractions of radiotherapy and concurrent chemotherapy. The median follow-up time was 26 months. *Results:* Among the 77 patients, 50 developed progressive disease during follow-up, including 14 with only local recurrence (LR), 10 with only distant metastasis and 26 with both. Of the 14 patients with only LR, 12 had primary tumor recurrence and 2 had recurrence in lymph nodes. A primary tumor volume of 50 cm<sup>3</sup> was identified as the optimal cut-off value that was significantly correlated with primary tumor recurrence and overall survival. *Conclusion:*

(OS) rate for patients with LA-NSCLC treated with CCRT is reportedly only at 15%-20% (4-6), with distant metastasis as the most common form of recurrence (7). Recently, consolidated blockade therapy using programmed cell death ligand 1 (PD-L1) inhibitor after concurrent chemo-radiotherapy for LA-NSCLC significantly improved progression-free survival and OS. Antonia *et al.* have reported that for LA-NSCLC patients treated with durvalumab after CCRT an 18-month OS and progression-free survival (PFS) was at 66.3% and 45.5%, respectively, both significantly longer compared to placebo-treated patients (8). Still, in cases where the PFS is significantly improved when consolidated PD-L1 blockade therapy involves durvalumab as maintenance therapy to prevent disease progression after CCRT, local recurrence (LR) remains high (7, 9). Although LR can be classified as a recurrence occurring in the primary tumor, lymph node or both primary tumor and lymph node, only few studies have analyzed LR with respect to the sites it develops. The patterns of local failure and its risk

Abe *et al*: Pattern of Local Failure of Locally Advanced NSCLC Treated With CCRT

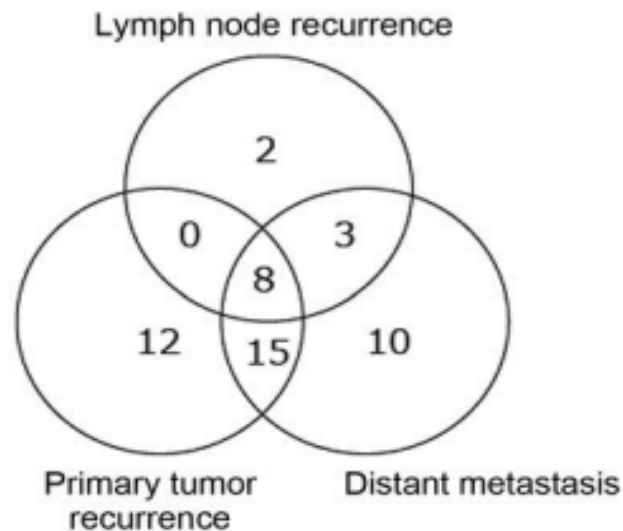


Figure 1. Pattern of failure including lymph node recurrence, primary tumor recurrence and distant metastasis. Among 77 patients, 50 developed progressive disease during follow-up, including 14 with only local recurrence (LR), 10 with only distant metastasis and 26 with both. Of the 14 patients with only LR, 12 had recurrent primary tumors only and 2 had recurrence at lymph nodes only.

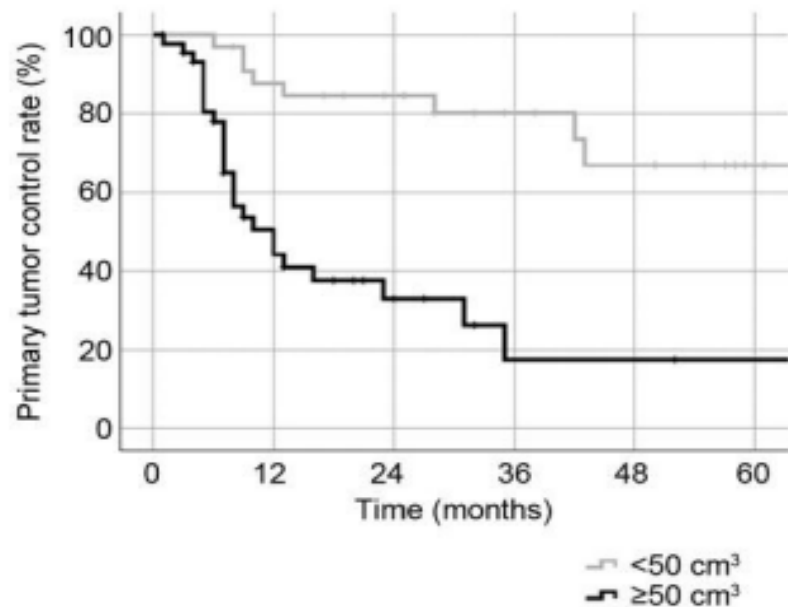


Figure 2. Cumulative primary tumor control rates. A 2-year cumulative primary tumor control rate was approximately at 35% for primary tumors  $\ge 50 \text{ cm}^3$ .

1. 1<sup>ο</sup> χρόνο - 50% υποτροπιάζουν
2. 2<sup>ο</sup> χρόνο - 70% υποτροπή
3. Τοπική, απομακρυσμένη, λεμφαδενική νόσος

# Έχει θέση η Χειρουργική Διάσωσης Μετά από ογκολογική θεραπεία ?

Τοπική υποτροπή/ανθεκτική νόσος με N1/N2  
Χωρίς απομακρυσμένες μεταστάσεις

- Σκεπτικισμός
- Ορισμένοι χειρουργοί θώρακος την θεωρούν **απαρχαιωμένη πρακτική**

## Commentary: Salvage Resection for Stage IIIA Lung Cancer in the Era of Immunotherapy



Erin M. Corsini, MD, and Boris Sepesi, MD

The management of stage IIIA (N2) non-small-cell lung cancer (NSCLC) is an area of thoracic oncology in constant controversy and evolution. Historically, the high rate of distant metastatic disease and poor long-term survival made maximal locoregional disease control obsolete. The role of surgical therapy, which offers the best chance for durable locoregional disease control in stage IIIA lung cancer, has been debated. This is mainly because of the lack of level I evidence demonstrating benefit of surgery over chemoradiation alone. Interpreting surgical outcomes among various trials and retrospective studies can be tricky. However, the authors would argue that in appropriately selected patients, complete primary lung cancer resection with mediastinal lymphadenectomy as part of multimodality therapy offers oncologic benefits, even in N2 NSCLC disease. Perioperative morbidity and mortality have to be low, preferably less than 1% in order to maximize survival benefit of surgical therapy. Many studies report 90-day mortality of lobectomy around 6%, which is high and rightly leads to skepticism for planned referral for surgical therapy. In many institutions, patients with N2 NSCLC are therefore treated with definitive chemoradiation, and are referred for surgical resection only for “salvage” when and if the disease recurs. While this strategy may seem reasonable, in general, patient selection for salvage surgery is far more complex, and salvage operations are more challenging than planned operations.

In the present study, Ye et al have leveraged the National Cancer Database (NCDB) to determine whether salvage surgical resection following definitive chemoradiation for stage IIIA (N2) disease would provide comparable short- and long-term outcomes to a planned trimodality approach.<sup>1</sup> Since NCDB does not contain data regarding recurrence, the authors defined salvage by a >90-day landmark, and also used a narrower range of radiation doses (45–72 Gy vs 59–72 Gy) in the hopes of capturing those who received definitive



Boris Sepesi, MD.

### Central Message

Salvage resections for cancer are complex and potentially morbid operations and should not replace well thought-out multidisciplinary plan for maximum disease control.

chemoradiation with curative intent. In their propensity-weighted analysis, they reported similar 90-day postoperative mortality rates, as well as 3- and 5-year survival rates between groups and concluded that salvage strategy can provide comparable survival as intended trimodality therapy and therefore remains an option for appropriately selected patients.

We commend authors for their study; however, in the rap-

“Salvage resections for cancer are complex and potentially morbid operations and should not replace well thought out multidisciplinary plan for maximum disease control”

MD Anderson Houston Texas

- Σκεπτικισμός, αμφιβολίες  
Ακόμη και για την αξία της χειρουργικής θεραπείας IIIA σταδίου (N2) μετά από εισαγωγική θεραπεία
- Έλλειψη Level 1 of evidence
- Πρέπει η περιεγχειρητική θνητότητα να είναι 1-2% ώστε να υπάρχει πλεονέκτημα επιβίωσης του χειρουργείου , ειδικά στον καιρό της ανοσοθεραπείας
- Μελέτες ανεβάζουν το ποσοστό χειρουργικής θνητότητας μετά από εισαγωγική θεραπεία στο 7%

## Five-Year Survival Outcomes From the PACIFIC Trial: Durvalumab After Chemoradiotherapy in Stage III Non–Small-Cell Lung Cancer

David R. Spigel, MD<sup>1</sup>; Corinne Faivre-Finn, MD, PhD<sup>2</sup>; Jhanelle E. Gray, MD<sup>3</sup>; David Vicente, MD<sup>4</sup>; David Planchard, MD, PhD<sup>5</sup>; Luis Paz-Ares, MD, PhD<sup>6</sup>; Johan F. Vansteenkiste, MD, PhD<sup>7</sup>; Marina C. Garassino, MD<sup>8,9</sup>; Rina Hui, PhD<sup>10</sup>; Xavier Quantin, MD, PhD<sup>11</sup>; Andreas Rimmer, MD<sup>12</sup>; Yi-Long Wu, MD<sup>13</sup>; Mustafa Özgüröglu, MD<sup>14</sup>; Ki H. Lee, MD<sup>15</sup>; Terufumi Kato, MD<sup>16</sup>; Maike de Wit, MD, PhD<sup>17</sup>; Takayasu Kurata, MD<sup>18</sup>; Martin Reck, MD, PhD<sup>19</sup>; Byoung C. Cho, MD, PhD<sup>20</sup>; Suresh Senan, PhD<sup>21</sup>; Jarushka Naidoo, MBBCh, MHS<sup>22</sup>; Helen Mann, MSc<sup>23</sup>; Michael Newton, PharmD<sup>24</sup>; Piruntha Thiyagarajah, MD<sup>25</sup>; and Scott J. Antonia, MD, PhD<sup>26</sup>; on behalf of the PACIFIC Investigators

**PURPOSE** The phase III PACIFIC trial compared durvalumab with placebo in patients with unresectable, stage III non–small-cell lung cancer and no disease progression after concurrent chemoradiotherapy. Consolidation durvalumab was associated with significant improvements in the primary end points of overall survival (OS; stratified hazard ratio [HR], 0.68; 95% CI, 0.53 to 0.87;  $P = .00251$ ) and progression-free survival (PFS [blinded independent central review; RECIST v1.1]; stratified HR, 0.52; 95% CI, 0.42 to 0.65;  $P < .0001$ ), with manageable safety. We report updated, exploratory analyses of survival, approximately 5 years after the last patient was randomly assigned.

**METHODS** Patients with WHO performance status 0 or 1 (any tumor programmed cell death-ligand 1 status) were randomly assigned (2:1) to durvalumab (10 mg/kg intravenously; administered once every 2 weeks for 12 months) or placebo, stratified by age, sex, and smoking history. Time-to-event end point analyses were performed using stratified log-rank tests. Medians and landmark survival rates were estimated using the Kaplan-Meier method.

**RESULTS** Seven hundred and nine of 713 randomly assigned patients received durvalumab (473 of 476) or placebo (236 of 237). As of January 11, 2021 (median follow-up, 34.2 months [all patients]; 61.6 months [censored patients]), updated OS (stratified HR, 0.72; 95% CI, 0.59 to 0.89; median, 47.5 v 29.1 months) and PFS (stratified HR, 0.55; 95% CI, 0.45 to 0.68; median, 16.9 v 5.6 months) remained consistent with the primary analyses. Estimated 5-year rates (95% CI) for durvalumab and placebo were 42.9% (38.2 to 47.4) versus 33.4% (27.3 to 39.6) for OS and 33.1% (28.0 to 38.2) versus 19.0% (13.6 to 25.2) for PFS.

**CONCLUSION** These updated analyses demonstrate robust and sustained OS and durable PFS benefit with durvalumab after chemoradiotherapy. An estimated 42.9% of patients randomly assigned to durvalumab remain alive at 5 years and 33.1% of patients randomly assigned to durvalumab remain alive and free of disease progression, establishing a new benchmark for standard of care in this setting.

“An estimated

- **42.9%** of patients randomly assigned to durvalumab remain alive at **5 years**
- and **33.1%** of patients randomly assigned to durvalumab remain alive and **free of disease progression**

establishing a new benchmark for standard of care in this setting”

# Χειρουργική Διάσωσης Σε τοπικά εκτεταμένο ΜΜΚΠ Μετά από εισαγωγική θεραπεία

Την τελευταία 20-ετία δημοσιεύονται σποραδικά  
σειρές περιστατικών με εντυπωσιακά μάλιστα υψηλά  
ποσοστά επιβίωσης



GENERAL THORACIC SURGERY:

The *Annals of Thoracic Surgery* CME Program is located online at <http://www.annalsthoracicsurgery.org/cme/home>. To take the CME activity related to this article, you must have either an STS member or an individual non-member subscription to the journal.

## Salvage Lung Resections After Definitive Chemoradiotherapy: A Safe and Effective Oncologic Option



Adam J. Bograd, MD, Catherine Mann, MD, Jed A. Gorden, MD, Christopher R. Gilbert, DO, Alex S. Farivar, MD, Ralph W. Aye, MD, Brian E. Louie, MD, and Eric Vallières, MD

Division of Thoracic Surgery, Swedish Cancer Institute, Seattle, Washington

**Background.** Patients with locally advanced, non-small cell lung cancer treated with definitive chemoradiotherapy alone often demonstrate persistent or recurrent disease. In the absence of systemic progression, salvage lung resection after definitive chemoradiotherapy has been used as a treatment option. Given the paucity of data, we sought to evaluate the safety and efficacy of salvage pulmonary resections occurring greater than 90 days after definitive chemoradiotherapy.

**Methods.** Retrospective institutional database review identified patients undergoing salvage lung resection at least 90 days after the completion of definitive chemoradiotherapy. Primary outcomes evaluated were overall survival and recurrence-free survival.

**Results.** Thirty patients met inclusion criteria between January 1, 2004 and December 31, 2015. Median time to surgery after definitive radiotherapy was 279 days (interquartile range, 168-474 days). Extended resections were performed in 11 patients (37%). Ottawa Thoracic Morbidity and Mortality Classification System grade IIIA

or greater complications occurred in 12 patients (40%). Thirty-day mortality was 6.7% (2 patients). Median overall survival after salvage resection was 24 months. Median overall survival for an R1 resection was 5.3 months vs 108 months for an R0 resection ( $P = .001$ ). Persistent pN1-positive salvage resections also did less well compared with pN0 (8.9 vs 28.2 months;  $P = .06$ ). For patients who underwent nonextended salvage resection (simple lobectomy or simple pneumonectomy), median overall survival was 108.4 months, vs 8.9 months for extended salvage resections ( $P = .02$ ).

**Conclusions.** With proper patient selection, salvage lung resections can be performed with acceptable morbidity, mortality, and oncologic outcomes, particularly when a ypN0R0 resection can be achieved by non-extended surgical means.

(Ann Thorac Surg 2020;110:1123-30)

© 2020 by The Society of Thoracic Surgeons

30 patients

30 day mortality 6,7%

Median overall survival 24 months



# Συμπόσιο Ομάδων Εργασίας

ORIGINAL ARTICLE

## Eight cases of salvage pulmonary resection for residual disease or isolated local recurrence detected after definitive chemoradiotherapy for N2 Stage-IIIa lung cancer



Shigeki Sawada\*, Hiroshi Suehisa, Tsuyoshi Ueno, Motohiro Yamashita

Department of Thoracic Surgery, National Hospital Organization Shikoku Cancer Center, Matsuyama, Japan

Received 26 February 2015; received in revised form 21 April 2015; accepted 28 May 2015  
Available online 8 September 2015

**KEYWORDS**  
chemotherapy;  
lung cancer;  
outcomes;  
radiation;  
salvage resection;  
surgery

**Summary** *Background/ Objective:* The concept of salvage pulmonary resection after definitive chemoradiotherapy (dCRT) is not yet commonly accepted in lung cancer treatment. We report our experience of eight patients in whom we performed salvage pulmonary resection for residual disease or isolated locoregional recurrence detected after dCRT.

*Methods:* Between 2005 and 2014, we performed salvage pulmonary resection for eight patients with N2 Stage-IIIa non-small cell lung cancer. The patients had initially received dCRT (radiation  $\leq$  60 Gy), but eventually underwent pulmonary resection with curative intent for residual disease or isolated locoregional recurrence. The postoperative complications, incidence of recurrence, and survival parameters were evaluated.

*Results:* Salvage pulmonary resection was performed in four patients with residual disease and four patients with locoregional recurrence. Complete resection was successfully performed in all eight patients. Postoperative complications were observed in three patients, however, there were no postoperative mortalities. One patient developed local recurrence in a mediastinal lymph node and two patients died. Of the two fatalities, one was related to lung cancer. The estimated 5-year survival rate of the eight patients was 75.0%.

*Conclusion:* We report our experience of salvage pulmonary resection performed for residual disease or isolated locoregional recurrence diagnosed after dCRT in eight patients with locally

8 patients

5 year survival 75%

Periop Morbidity 30%

No mortality

## Pulmonary Resection After Curative Intent Radiotherapy (>59 Gy) and Concurrent Chemotherapy in Non-Small-Cell Lung Cancer

Joshua R. Sonett, MD, Mohan Suntharalingam, MD, Martin J. Edelman, MD, Ashish B. Patel, MD, Ziv Gamliel, MD, Austin Doyle, MD, Peter Hausner, MD, and Mark Krasna, MD

Division of Cardiothoracic Surgery, Columbia University Medical Center, New York Presbyterian Hospital, New York, New York, and The Thoracic Oncology Program, Greenebaum Cancer Center, University of Maryland, School of Medicine, Baltimore, Maryland

**Background.** Pulmonary resection after chemotherapy and concurrent full-dose radiotherapy (>59 Gy) has previously been associated with unacceptably high morbidity and mortality. Subsequently neoadjuvant therapy protocols have used reduced and potentially suboptimal radiotherapy doses of 45 Gy. We report a series of 40 patients with locally advanced non-small-cell lung cancer who successfully underwent pulmonary resection after receiving greater than 59 Gy radiation and concurrent chemotherapy. Operative results and midterm survival follow-up are presented.

**Methods.** Data were reviewed from 40 consecutive patients who underwent lung resection after receiving high-dose radiotherapy and concurrent platinum-based chemotherapy between January 1994 and May 2000. The follow-up closing interval for this study was until August 2003 or time of death.

**Results.** Preoperative stage was IIb (7 patients), IIIA (21 patients), IIIB (10 patients), and IV (2 patients with isolated brain metastasis). Thirteen patients exhibited Pancoast tumors. Median time from completion of induction therapy to surgery was 53 days. Twenty-nine lobectomies and 11 pneumonectomies (7 right, 4 left) were performed. There were no postoperative deaths. Intercostal muscle flaps were used prophylactically in all but one pneumonectomy patient. Seven patients required periop-

erative transfusions. Median intensive care unit (ICU) time averaged 2 days and the total length of stay was 6 days. One patient exhibited postpneumonectomy pulmonary edema and a bronchopleural fistula developed in another patient (not receiving an intercostal muscle flap). Thirty-four of 40 patients (85%; 95% CI: 70%–94%) were downstaged pathologically, 33 out of 40 patients (82.5%, 95% confidence interval [CI]: 67%–93%) indicated no residual lymphadenopathy, and 18 out of 40 patients (45%, 95% CI: 29%–61%) exhibited a complete pathologic response. Median follow-up was 2.8 years. The 1-, 2-, and 5-year overall survival rates were 92.4%, 66.7%, and 46.2%, respectively. Disease-free 1-, 2-, and 5-year survival rates were 73.0%, 67.2%, and 56.4%, respectively. Median disease-free survival has not been reached.

**Conclusions.** Pulmonary resection may be performed safely after curative intent concurrent chemotherapy and radiotherapy to greater than 59 Gy. High pathologic complete response rates and sterilization of mediastinal lymph nodes were observed accompanied by highly favorable survival rates. This experience, though promising, will require confirmation in a prospective multi-institutional clinical trial.

40 patients

No mortality

17% morbidity

5 year OS : 46%

Median OS : 53 months

FULL TEXT ARTICLE



## Salvage Surgery Compared to Surgery After Induction Chemoradiation Therapy for Advanced Lung Cancer



Aki K. Kobayashi MD, Kazuo Nakagawa MD, Yuko Nakayama MD, Yuichiro Ohe MD, Masaya Yotsukura MD, Shinsuke Uchida MD, Keisuke Asakura MD, Yukihiro Yoshida MD and Shun-ichi Watanabe MD  
Annals of Thoracic Surgery, 2022-12-01, Volume 114, Issue 6, Pages 2087-2092, Copyright © 2022 The Society of Thoracic Surgeons

### Abstract

### Background

Salvage surgery is performed for selected patients with relapses of locally advanced lung cancer after definitive chemoradiation therapy (CRT), and it seems to be effective. To assess the feasibility of salvage surgery after definitive CRT, this study compared clinical outcomes of surgery after definitive CRT with those of surgery after induction CRT.

24 Salvage, 36 Surgery post IndCRT

No difference in  
Blood loss, Op time, Hospital Stay,  
morbidity

Salvage 42%PFS in 5 years

Surgery post IndCRT 47%PFS

Salvage

>90days post CRT

59-72 Gy RT

## Salvage pulmonary resection after stereotactic body radiotherapy: A feasible and safe option for local failure in selected patients



Mara B. Antonoff, MD,<sup>a</sup> Arlene M. Correa, PhD,<sup>a</sup> Boris Sepesi, MD,<sup>a</sup> Quynh-Nhu Nguyen, MD,<sup>b</sup> Garrett L. Walsh, MD,<sup>c</sup> Stephen G. Swisher, MD,<sup>c</sup> Ara A. Vaporciyan, MD,<sup>a</sup> Reza J. Mehran, MD,<sup>a</sup> Wayne L. Hofstetter, MD,<sup>a</sup> and David C. Rice, MB, BCh<sup>d</sup>

### ABSTRACT

**Objective:** For inoperable patients with pulmonary malignancy, stereotactic body radiotherapy is a reasonable therapeutic option. Despite good early tumor control, local failure occurs in up to 10% of patients by 3 years. Because management of local recurrence after stereotactic body radiotherapy is unclear, we evaluated use of surgery as a salvage option.

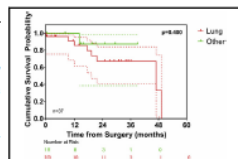
**Methods:** A retrospective review was conducted of consecutive patients from a single institution who underwent salvage resection of primary and metastatic pulmonary malignancies previously treated with stereotactic body radiotherapy. In addition, a literature search was conducted to identify previous reports of pulmonary resection for local stereotactic body radiotherapy failures, to allow cumulative analyses with previously published cases.

**Results:** A total of 21 patients met inclusion criteria. The median time between stereotactic body radiotherapy and salvage surgery was 16.2 months (range, 6.4-71.5). Postoperative complications occurred in 7 patients (18.9%), in whom atrial arrhythmias and prolonged air leaks (>5 days) were most frequent (n = 2 each, 5.4%). There was no local recurrence after salvage surgery. Distant failure occurred in 5 of 21 patients (23.8%) at a median of 36.2 months, and median disease-free survival was 19.2 months. The 30- and 90-day mortality was 4.8% (1 patient). Cumulative analysis included 37 patients from 4 institutions and comprised 26 (78.8%) primary non-small cell lung cancers and 11 (29.7%) lung metastases. Median overall survival after salvage surgery was 46.9 months, and 3-year survival was 71.8%.

**Conclusions:** After local failure of stereotactic body radiotherapy, salvage resection remains a viable option for operable patients, with acceptable morbidity and survival. As use of stereotactic body radiotherapy continues to expand, further studies to evaluate the optimal management for local failure are needed. (J Thorac Cardiovasc Surg 2017;154:689-99)

For early-stage non-small cell lung cancer (NSCLC), operative resection consisting of lobectomy and mediastinal lymph node dissection has been a long-standing, established standard of care.<sup>1</sup> For patients thought to be

inoperable or with prohibitively high operative risk, novel therapeutic options have been introduced in recent years through advances in radiotherapy.<sup>2</sup> Stereotactic body radiotherapy (SBRT) is a means of delivering high doses of external beam radiation over a limited number of treatment fractions to an image-defined target, and it has become a



Survival after salvage surgery for failed SBRT.

### Central Message

Operative resection after local failure of SBRT in highly select individuals is feasible and safe, and has an overall acceptable morbidity and mortality.

### Perspective

This study represents the largest series of pulmonary resection after local SBRT failure reported to date, along with a cumulative review that incorporates all patients who have been previously reported. We demonstrate that resection after local failure of SBRT in highly select individuals is feasible and safe, and has an overall acceptable morbidity and mortality, albeit higher than what is typically observed in nonirradiated patients.

See Editorial Commentary page 700.

From the Departments of <sup>a</sup>Thoracic and Cardiovascular Surgery and <sup>b</sup>Thoracic Radiation Oncology, University of Texas MD Anderson Cancer Center, Houston, Tex. Read at the 96th Annual Meeting of The American Association for Thoracic Surgery, May 14-18, 2016, Baltimore, Maryland.  
Received for publication May 2, 2016; revisions received Feb 23, 2017; accepted for publication March 25, 2017; available ahead of print May 9, 2017.  
Address for reprints: Mara B. Antonoff, MD, 1400 Pressler St, Unit 1489, Houston, TX 77030 (E-mail: mbaantonoff@mdanderson.org).  
0022-5222/18/0000-0000\$16.00

Copyright © 2017 by The American Association for Thoracic Surgery  
<http://dx.doi.org/10.1016/j.jtcvs.2017.03.142>

Scanning this QR code will take you to a supplemental video. To view the AATS 2016 Webcast, see the URL next to the webcast thumbnail.



THOR

# Συμπόσιο Ομάδων Εργασίας

8 patients IIIA N2

No mortality  
Lobectomy 5 pt  
Lobectomy+bronchial, artery sleeve 3

5 years OS 75%

Cite this article as: Hino H, Utsumi T, Maru N, Matsui H, Taniguchi Y, Saito T *et al.* Results of emergency salvage lung resection after chemo- and/or radiotherapy among patients with lung cancer. *Interact CardioVasc Thorac Surg* 2022; doi:10.1093/icvts/ivac043.

## Results of emergency salvage lung resection after chemo- and/or radiotherapy among patients with lung cancer

Haruaki Hino<sup>a,\*</sup>, Takahiro Utsumi<sup>a</sup>, Natsumi Maru<sup>a</sup>, Hiroshi Matsui<sup>a</sup>, Yohei Taniguchi<sup>a</sup>, Tomohito Saito<sup>a</sup>,  
Koji Tsuta<sup>b</sup> and Tomohiro Murakawa<sup>a</sup>

<sup>a</sup> Department of Thoracic Surgery, Kansai Medical University, Osaka, Japan

<sup>b</sup> Department of Pathology, Kansai Medical University, Osaka, Japan

\* Corresponding author. Department of Thoracic Surgery, Kansai Medical University, 2-3-1 Shinmachi Hirakata-shi, Osaka 573-1191, Japan. Tel: +81-72-804-0101; fax: +81-72-804-2548; e-mail: hino@hirakata.kmu.ac.jp (H. Hino).

Received in revised form 7 January 2022; accepted 31 January 2022

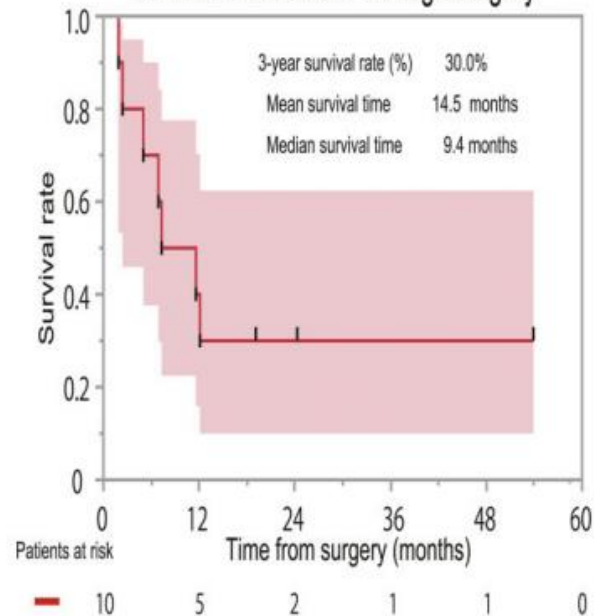
Median blood loss 1071 ml

Median postop stay 37 days

Median op time 191 min

10 patients

### Overall survival from salvage surgery



## Χειρουργική Διάσωσης - Σε τοπικά εκτεταμένο ΜΜΚΠ Μετά από εισαγωγική θεραπεία

- Διεγχειρητική Τεχνική δυσκολία και επιπλοκές ειδικά μετά από:

Ανοσοθεραπεία,

Ακτινοβόληση υψηλής δόσης (>60gy)

Ίνωση , ουλοποίηση

## Συμπεράσματα

**Η χειρουργική διάσωσης μετά από ογκολογική θεραπεία**  
Είναι εφαρμόσιμη και εμφανίζει αποδεκτή νοσηρότητα και θνητότητα, προσφέρει ικανοποιητική πιθανότητα επιβίωσης

Αρκεί να ακολουθούνται κάποιες βασικές αρχές

## Συμπεράσματα

Αρκεί να ακολουθούνται κάποιες βασικές αρχές

- Απόφαση ογκολογικού συμβουλίου
- Τοπικά περιορισμένη υποτροπή/ανθεκτική νόσος με συμμετοχή N1 η και N2 λεμφαδενικών σταθμών
- Δυνατότητα R0 εκτομής

