Surgery after stereotactic ablative RT and radiofrequency ablation

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Disclosure slide
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- no conflicts of interest
Salvage surgery after SART

- pag. 485 one paragraph
- limited experience
- feasible, safe in experienced hands
- also in some patients initially considered inoperable
Surgery after stereotactic ablative RT and radiofrequency ablation

- Salvage surgery after definitive chemoradiation
- Salvage surgery after SART
- Salvage surgery after RFA
- Conclusion
Surgery after stereotactic ablative RT and radiofrequency ablation

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cT4 NSCLC

- 54-year-old male patient
- pain in L hemithorax, shoulder, arm for 2 months
- 40 pack years
- electrical engineer high voltage cables
- possible asbestos exposure
- sedimentation: 47 mm
- CEA: 169.6 ng/ml
chest CT
Chemoradiotherapy stage IIIB
T4  Pancoast

- chest X-ray: opacity L upper lobe
- chest CT + MRI: tumor Ø 10 cm growing to L hilum, close contact aortic arch, invasion brachial plexus
  ▲ mediastinal lymph nodes
- CT brain, liver: no metastases
- bone scan: negative
Chemoradiotherapy stage IIIB
T4  Pancoast

- PET + L upper lobe and aortopulmonary window
- bronchoscopy: red, infiltrated mucosa apicopost. LUL
- brush: atypical cells
- lung function + diffusion: normal
  - FEV1  3.6 l (107 %)
- VO₂ max 21.9 ml/kg/min
- perfusion  L 43  R 57 %
- mediastinoscopy : negative
Chemoradiotherapy stage IIIB T4 Pancoast

- definite concurrent chemoradiotherapy:
  - 3 x cisplatin-based chemotherapy + 60 Gy
chest CT post-CRT
chest CT post-CRT
Chemoradiotherapy stage IIIB
T4 Pancoast

- CEA: 17.7 ng/ml
- partial response: most pronounced at left hilum
- pain L arm ↓
- remediastinoscopy: negative
Salvage surgery stage IIIB
T4  Pancoast

➢ salvage surgery
➢ L posterolateral thoracotomy
➢ lobectomy LUL + apex LLL
   + chest wall (ribs 1-4)

15-18 April 2015, Geneva, Switzerland
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Salvage surgery stage III B
T4  Pancoast

- postop. course: shoulder pain, ↓ mobility arm, hoarseness (no recurrent nerve paralysis)

- pathology: almost completely necrotic adenoca.
  infiltration chest wall into subpleural fatty tissue
  LN 5: mainly necrotic
  ypT3N2
Salvage surgery after definitive CRT

- 39-year-old ♀
- 25 pack years
- cT1N3M0 adenoca. RUL
- PET: no distant metastases
- c stage IIIB
- induction chemotherapy
cisplatin-pemetrexed +
RT  60 Gy 30 sessions

CT 170407
Salvage surgery

CT 170407

CT 260607
Salvage surgery

- infiltrate RUL
- radiopneumonitis, cavity?
- progressive disease?
Salvage surgery

- purulent cough, haemoptysis
- infected cavity, necrotic lung abscess

CT 091007
Salvage surgery

- referred for surgery
  - R muscle-sparing thoracotomy
  - dense hilar fibrosis, invasion fissure
Salvage surgery

- IP pneumonectomy
- Tear proximal pulmonary artery
- Clamp between SVC and ascending aorta
- ECC suture origin R PA
iodopovidone

irrigation system

culture: fungi, Klebsiella ESBL + and Staph. aureus

pathology:
multiple nodules adenoca.
LN 7+ ypT3N2M0
Salvage surgery

- discharge POD 30
- 01/08: bone metastases cervical – thoracic – lumbar vertebral column
- palliative RT

Rx 271107
Salvage surgery for stage III lung cancer after high-dose chemoradiotherapy

- 1529 resected lung cancers 2008-13
- 23 pts (1.5%) salvage surgery for local relapse after CRT (no SART)
- 12 pts stage IIIA, 11 pts stage IIIB
- interval 1-120 months
- resections
  - 6 pneumonectomies (2 carinal resections)
  - 9 lobectomies (6 sleeve resections)
- 4 pts complications (17%): 2 air leaks, 1 pneumonia, 1 chylothorax
- 3-year OS 65.8% DFS 38.5%

Suzuki K. 51st Annual Meeting STS, San Diego, Jan. 2015
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Salvage surgery after SART

- 81-year-old male patient
- AMI, CABG, CNI
- 50 pack years
- lesion RUL
- considered « inoperable »
- 08/11 local, high-dose RT
Salvage surgery after SART

- 10/12 lesion size ↑
- pneumonitis?
- close follow-up
Salvage surgery after SART

- lesion size ↑ 08/13
- VC 3.79 l (105%), FEV1 2.66 L (104%) DLCO 90%
- Echocardiography: normal L ventricular function
- 10/13 bilobectomy RUL-RML
- pT2bN0M0 pl2
- no complications
- 04/14 brain metastasis †
Salvage surgery after SART
*a new challenge for thoracic surgeons*

- SART: precise delivery of high local radiation dose
- hypofractioned, “ablative”, precise response evaluation?
- mainly applied in NSCLC patients with severe comorbidity
- salvage surgery for recurrent or locally progressive disease
- unresolved issues:
  - feasible, more technical difficulties?
  - ↑ postoperative morbidity?
  - ↑ prolonged air leak, bronchopleural fistula, empyema?
  - long-term results
- no prospective data

Van Schil P. J Thorac Oncol 2010;5:1881-2
Salvage surgery after SART

- 144 pts SART for peripherally located NSCLC  10-year period
- retrospective study
- all functionally operable,  BED 105.6 Gy
- median follow-up 31.5 months   local recurrence 24 pts (16.7%)
- salvage surgery 5 pts (20.8%)
- lobectomy + systematic nodal dissection
- no significant adhesions
- no technical difficulties, no ↑ morbidity
- p stage I   tumor size 25-50 mm
- recurrence mostly in central portion of irradiated area

Chen F.  J Thorac Oncol 2010;5:1999-2002
Salvage surgery after SART

- 127 pts SART for NSCLC (n=81) or lung mets (n=46, total of 65 mets)
- retrospective study
- local recurrence 18 pts (14.1%): 6 NSCLC, 12 mets
- salvage surgery 7 pts (38.9%)
- median period SART - salvage surgery 10 months
- 6 lobectomies, 1 segmentectomy; 2 incomplete resections
- no pleural adhesions
- no technical difficulties
- complications: 1 pulmonary fistula, 4 postRT pneumonitis

Neri S. J Thorac Oncol 2010;5:2003-7
Salvage surgery after SART

- 209 pts SART for early-stage NSCLC 10/04-12/10
- prospective RT protocol
- local progression 6 pts (2.9%)
- salvage surgery 4 pts
- lobectomy + nodal sampling
- 1 partial chest wall resection
- pleural adhesions in all cases
- no significant complications

Allibhai Z. Eur Resp J 2012;35:1039-42
Salvage surgery after SART

- no viable tumor in 1 case; others 5-65% viable cancer cells
- 1 patient mediastinal nodal disease → adjuvant chemoradiation
- NED after median FU of 30 months

- interpretation of radiological changes post-SART may be challenging
- gold standard: tissue confirmation of suspicious mass
- optimal approach: thoracotomy
- careful patient selection by multidisciplinary team

Allibhai Z. Eur Resp J 2012;35:1039-42
Salvage surgery after SART

- 17 pts local recurrence after SART
- 9 NSCLC 8 solitary metastasis 4 pts 2 surgeries
- median time to local recurrence 15.6 months
- 5 pts presurgical diagnosis
- extensive adhesions 5 pts; conversion to thoracotomy 3 pts
- 4 postop. complications
- median LOS 7 days
- 30-day † 0%
- 3 pts mediastinal nodal disease
- median OS 38 months

Verstegen NE, Senan S. ELCC 2015 61O - 160415

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RFA

RFA: alternating current active – dispersive electrode frictional heating region of necrosis

RFA for early-stage NSCLC

- review paper of RFA for early-stage NSCLC
- RFA-associated mortality very rare
- pneumothorax up to 63% of cases but chest drain in only 15%
- 3-year OS 36-88%, cancer-specific survival 59-88%
- RFA ↑ local failure rate than sublobar resection and SART
- RFA early-stage NSCLC: pts unfit for sublobar resection or SART
- salvage surgery not mentioned (very rare indications)

RFA for early-stage results of ablate and resect study

- 32 pts bi- or multipolar RFA + resection by open thoracotomy
- wedge resection or lobectomy + mediastinal LN dissection

- complete necrosis 38%
- scattered vital tumour 50%
- incomplete ablation 13% > 20% vital tumour tissue

- technically feasible, safe
- ↑ rate viable tumour cells – RFA curative concept?

Schneider T. Eur J Cardiothorac Surg 2011; 39:968-73
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Salvage surgery after SART - RFA

Conclusions

- surgery after definitive chemoradiation: “terribly simple or simply terrible”
- after SART - RFA: relatively new entity in thoracic surgery
- response evaluation after SART - RFA?
- multidisciplinary cooperation
- experienced thoracic surgical centre
- centrally located lesions?
- nodal evaluation SART -RFA?
- † morbidity and long-term results of salvage surgery?
- thoracic surgeons: be prepared for worst case scenario!