What is the best approach in pulmonary metastasectomy?

P. Van Schil, MD, PhD
Department of Thoracic and Vascular Surgery
Antwerp University Hospital, Belgium

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Lung metastases – approach

- different approaches
- accuracy of high-resolution chest CT
- accuracy of VATS
- 2 special cases
- treatment algorithm
- conclusion
Lung metastases – approach

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Surgery for pulmonary metastases

- Low morbidity and mortality (1%)
  - Preoperative chemotherapy may contribute
- Acceptable survival if completely resected
  - 36% at 5 y.
  - 26% at 10 y.
  - 22% at 15 y.
- High recurrence rate
  - 30%
- Metachronous lesions
  - 2 or more thoracotomies
- Synchronous lesions
  - Hepatic and pulmonary
Surgery for pulmonary metastases

Selection criteria

- able to withstand the operation planned (cardiac, lung functional evaluation)
- complete resection of all pulmonary mets
- primary tumour and extrapulmonary mets must be controlled or controllable
- no *better* treatment available offering the same chance of cure or superior palliation

Surgery for pulmonary metastases

Incisions - open procedures

- sternotomy
- thoracotomy - staged
- clam shell
Surgery for pulmonary metastases

**Sternotomy**

- palpation of both lungs
- simultaneous resection
- less painful

- limited exposure to lower lobes and dorsally located metastases
Surgery for pulmonary metastases

**Lateral thoracotomy**

+ good exposure
+ minimal tumour manipulation
+ adequate surgical margins

- painful (epidural analgesia)
- soft tissue trauma (muscle-sparing)
- no access to contralateral side
Surgery for pulmonary metastases

Incisions - minimally invasive procedures

VATS (thoracoscopy)
robotic system
Surgery for pulmonary metastases

VATS

+ less invasive (functionally / immunologically)
+ superior visualisation

- loss of digital palpation (small lesions may be missed)
- tumour manipulation: local - port metastasis (endobag)
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helical CT

✓ retrospective review 1996 – 2004
✓ 53 patients – 60 pulmonary metastasectomies
✓ adequate clinical history + focused documentation helical CT

✓ results:
  preop. helical CT entirely correct 19% of cases
  helical CT missed metastases 46% of cases

Missed pulmonary metastasis

- 215 pulmonary metastasectomies by thoracotomy
- retrospective review 2001 – 2011
- n nodules preop. CT ↔ n nodules pathology
- results:
  - ipsilateral non-imaged malignant lung mets 36% of cases
  - 41% of mesenchymal tumours, 28% of epithelial tumours

- manual lung palpation still necessary!

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Role of VATS

- accuracy of VATS peripheral lung mets
- 28 pts CT scan: ≤ 3 solitary mets
  ≤ 3 cm, peripheral nodules
- VATS + confirmatory thoracotomy
- VATS: 10 technically impossible
  1 carcinoid
  17 confirmatory thoracotomy

Surgery for pulmonary metastases

Role of VATS

- confirmatory thoracotomy 17
  complete resection by VATS 12
  residual disease 5
- success rate: 1 lesion 11/12 correct
  > 1 lesion 1/5 correct
- VATS: solitary pulmonary metastasis
  ≤ 3 cm, peripheral nodule

Role of VATS

observer blinded study

- oligometastatic pulmonary disease
- VATS + thoracotomy (different team)
- 89 pts  CT 140 suspicious nodules
- VATS  122 nodules palpated (87%)
- thoracotomy:  67 additional nodules
  22 mets (33%)  43 benign (64%)  2 lung cancers (3%)
- VATS : inadequate to resect all pulmonary metastases

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Surgery for lung metastases: case 1

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- 1983 orchietomy L + retroperit. lymphadenectomy teratocarcinoma
- 1985 shortness of breath pulmonary mets; systemic chemotherapy
Surgery for lung metastases: case 1

1986  L thoracotomy (mature teratoma)
Surgery for lung metastases: case 1

respiratory epithelium

squamous epithelium
Surgery for lung metastases: case 1

- 3 cycles chemotherapy
  (2 BEP, 1 VIP)
- 7/94 R pneumonectomy
  - metastases RUL
  - mature teratoma subcarinal

alphafetoprotein:

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Surgery for lung metastases: case 1

Persisting embryonal carcinoma  RUL
When primary tumour becomes problematic...

- 20-year-old ♂
- current oncological problem
  - large extragonadal yolk sac tumour → systemic chemotherapy
  - lung metastasis left lung
  - poor response salvage chemotherapy
  - dyspnoea
  - superior vena cava syndrome
Surgery for lung metastases: case 2
Surgery for lung metastases: case 2

Approach

- clam shell incision
- preparation femoral artery and vein: extracorporeal circulation
- preparation internal jugular vein → drain superior part
Surgery for lung metastases: case 2

- partial mobilisation of tumour
- ingrowth RUL: wedge excision
- invasion azygos vein, SVC
  → double venous reconstruction
- metastasis L lung: wedge excision
- no extracorporeal circulation
Surgery for lung metastases: case 2

Pathology

- tumour 4.247 kg - max. diameter of 30 cm
  mature teratoma + components immature teratoma (<5 %)
  free resection margins

- nodule LUL
  lung metastasis:
    mature + immature teratoma
  complete excision
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Lung metastases

Treatment algorithm

Lung metastases

↓ operative risk

1-2 mets (peripheral)

VATS

→

open intervention

> 2 mets

RFA/SRT

↑ operative risk

recurrent lung mets after prior resection

repeat resection

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Surgery lung mets - conclusions

- multidisciplinary approach
- open ↔ minimally invasive procedures
- peroperative manual palpation of nodules (if > 2 on spiral CT)
- limited resections
- systematic lymph node dissection
- low mortality - morbidity
- prognosis
  - complete resection
  - DFI
  - 1ary tumour type
  - number of metastases