Pulmonary metastasectomy in pediatric solid tumors

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Pulmonary Metastasectomy: Introduction

- Pulmonary metastasis in solid tumors mostly resolve with:
  - Chemotherapy and
  - Radiotherapy
- Few indications for metastasectomy
- Questions regarding:
  - Safety of procedure
  - Recurrence/ incomplete removal
  - How many to resect
  - How many times to perform thoracotomy
Pulmonary Metastasectomy: Aims

- To retrospectively evaluate patients of solid tumors who underwent pulmonary metastasectomy with regards to:
  - Surgical management done
  - Complications encountered
  - Outcome
    - Overall survival
    - Event free survival
Patients and methods

- Case records of solid tumor patients who underwent pulmonary metastasectomy in the period September 2001 to April 2009 were reviewed to evaluate
  - disease distribution
  - number of thoracotomies
  - type of resection
  - complications
  - recurrences
  - overall survival
  - event free survival
Pulmonary Metastasectomy: Results

- No. of patients: 23
- No. of thoracotomies: 33
  - 14 unilateral
  - 8 Bilateral- 5 Osteo Sa,
    3 hepatoblastoma
  - 3 Re-thoracotomies- 2 WT,
    1 Osteo Sa
- No. of metastases removed: 120
  - Range 1 to 20 mets/patient
    (lobectomy /pneumonectomy has been counted as 1)
Pulmonary Metastasectomy: Results

- Negative thoracotomy: 1
- Unresectable metastasis: 1 (too many-diffuse)
- Procedures:
  - Pneumonectomy – 1 (severe hemorrhage)
  - Lobectomy - 10
  - Wedge resection – 6
  - Sub-pleural resections – 113
Pulmonary Metastasectomy: Results

Total 23 Patients

- Wilms Tumor: 8
- Osteosarcoma: 6
- Hepatoblastoma: 4
- Malignant GCT: 2
- Malignant Mesenchymal tumor: 1
- Ewing’s Sa: 1
- RMS: 1
Pulmonary Metastasectomy: Results

- **Wilms Tumor**
  - Number of patients: 8
  - Thoracotomies: 10
  - Recurrence: 2/8 (25%)
  - Alive and disease free: 2
  - Alive with disease: 2
  - Dead: 4
Pulmonary Metastasectomy: Results

- **Osteosarcoma**
  - Number of patients: 6
  - Thoracotomies: 11 (1U/L, 5 B/L)
  - Recurrence: 2/6 (33%)
  - Alive and disease free: 2
  - Alive with disease: 4
  - Dead: Nil
Pulmonary Metastasectomy: Results

- **Hepatoblastoma**
  - Number of patients: 4
  - Thoracotomies: 7 (1 U/L, 3 B/L)
  - Recurrence: 3/4 (75%)
  - Alive and disease free: 1
  - Alive with disease: 2
  - Dead: 1
Pulmonary Metastasectomy: Results

Post-operative complications:
- Pneumothorax - 1
  - Resolved with ICD drainage
- Wound infection - 1

- All were intensely pretreated patients
  - with chemotherapy
  - radiotherapy
  - multiple surgeries
Pulmonary Metastasectomy: Results

- Recurrences – 7 of 22 patients (31.8%)
  (1 unresectable patient excluded)

- Recurrences:
  - Wilms – 2/8 (25%)
  - Osteosarcoma – 2/6 (33%)
  - Hepatoblastoma – 3/4 (75%)
Pulmonary Metastasectomy: Results

- Total number of deaths - 6/23
- 3-Yr OS – 81.7% (MST 91.7; 95CI 66.9 - 116.6)
- 4 progressive disease
- 2 chemo related complications
Pulmonary Metastasectomy: Results

- EFS of 45.6% (95CI: 41.2-88.7)
- Mean event free survival – 64.9 months (9m-132m)
Pulmonary Metastasectomy: Discussion

- Multiplicity of metastasis should not be contraindication to operation
- Staged bilateral resections are well tolerated
- A short time to development of metastasis should not prohibit from consideration from resection of metastasis
Pulmonary Metastasectomy: Discussion

- Diagnostic uncertainty can be proved by thoracotomy and may save a child from unnecessary adjuvant therapy if it’s proved to be benign

- The type of tumor is important
Pulmonary Metastasectomy: Discussion

- **Osteosarcoma**

- Complete resection of metastasis has a survival benefit

- Although chemotherapy is indispensable, metastasectomy is still warranted
Pulmonary Metastasectomy: Discussion

- **Osteosarcoma**

  - Preoperative radiological findings are not predictive of the extent of disease found at operation

- Exploration of contralateral lung is indicated in selected condition
Pulmonary Metastasectomy: Discussion

- Wilms’ tumor

  - Chemotherapy and whole lung irradiation have long been established in WT with pulmonary metastasis

  - Favorable histology WT + lung mets: excellent survival (71.4 – 90.6%) following chemo. + pulmonary RT with acceptable rates of interstitial pneumonitis (7.6%)
Pulmonary Metastasectomy: Discussion

- **Wilms’ tumor**
  - Surgical metastasectomy: reserved for pulmonary nodules persisting for > 2 wks after chemotherapy and delivery of 12 Gy whole lung irradiation
  - Biopsy of suspected pulmonary nodules detected on CT has an important role to avoid unnecessary adjuvant treatment
Pulmonary Metastasectomy: Discussion

- **Hepatoblastoma**
  - Metastatic hepatoblastoma may exhibit complete response to chemotherapy
  - Hybrid approach developed: initial treatment with chemotherapy followed by metastasectomy for lung lesion that respond incompletely
  - Drop in the αFP level and continuing adjuvant therapy after complete metastasectomy may enhance the overall survival
Pulmonary Metastasectomy: Conclusions

- Pulmonary metastasectomy is safe and a viable option in selected patients with solid tumors
- Results in acceptable event free survival
Thank You