Pulmonary metastasectomy in pediatric solid tumors

A. Mandelia,
S. Panda, S Agarwala, S Bakhshi ,
M Srinivas, M Bajpai , V Bhatnagar, MK Arora,
DK Pawar, AK Gupta, DK Gupta

Department of Pediatric Surgery,
Medical Oncology, Anesthesiology and Radiodiagnosis
All India Institute of Medical Sciences,
New Delhi, India

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

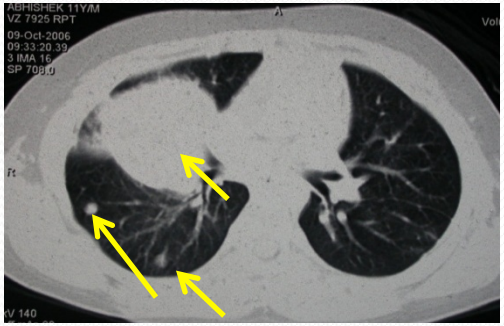
- To retrospectively evaluate patients of solid tumors who underwent pulmonary metastasectomy with regards to:
  - Surgical management done
  - Complications encountered
  - Outcome
    - Overall survival
    - Event free survival

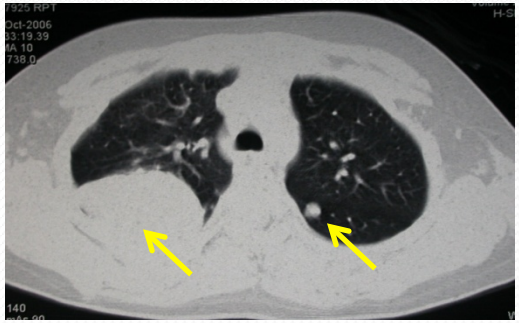
Patients and methods

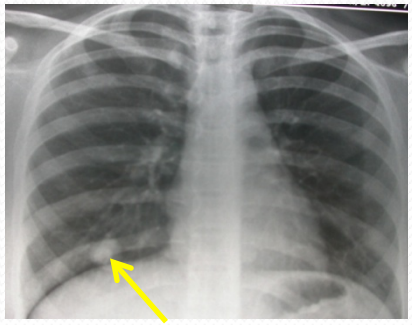
- Case records of solid tumor patients who underwent pulmonary metastasectomy in the period September 2001 to April 2009 were reviewed to evaluate
  - disease distribution
  - number of thoracotomies
  - type of resection
  - complications
  - recurrences
  - overall survival
  - event free survival

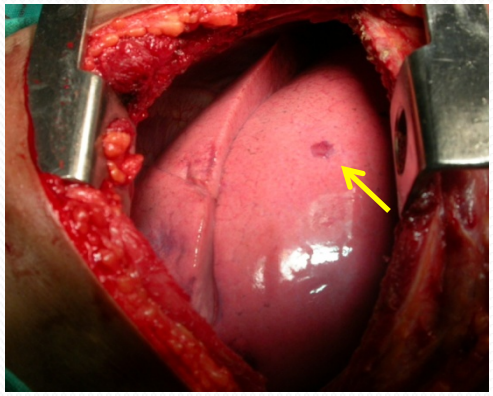
Pulmonary Metastasectomy: Results

- 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)



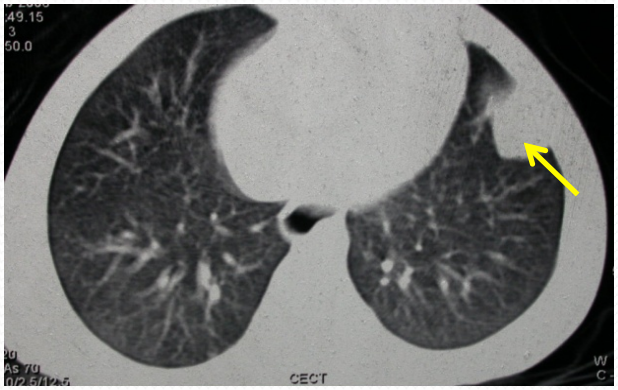


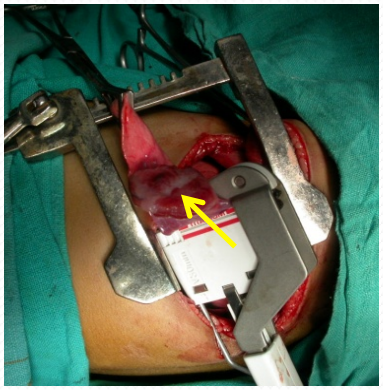


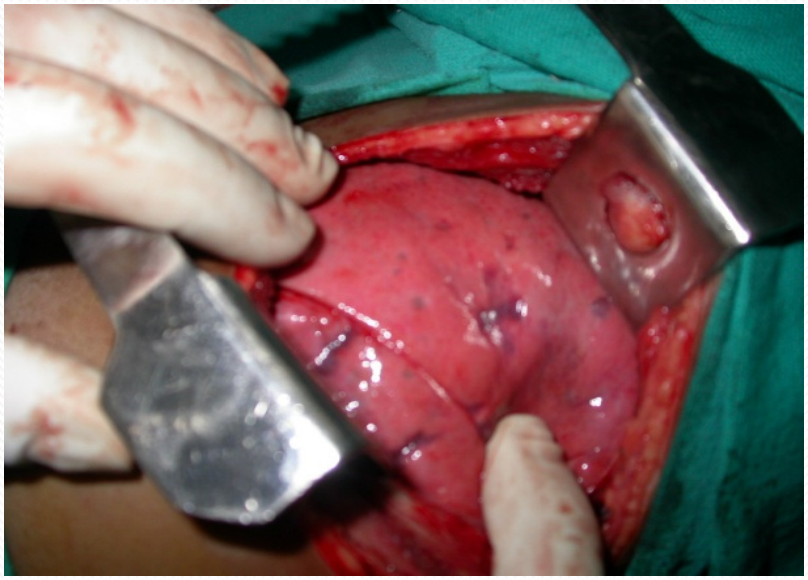


Pulmonary Metastasectomy: Results

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

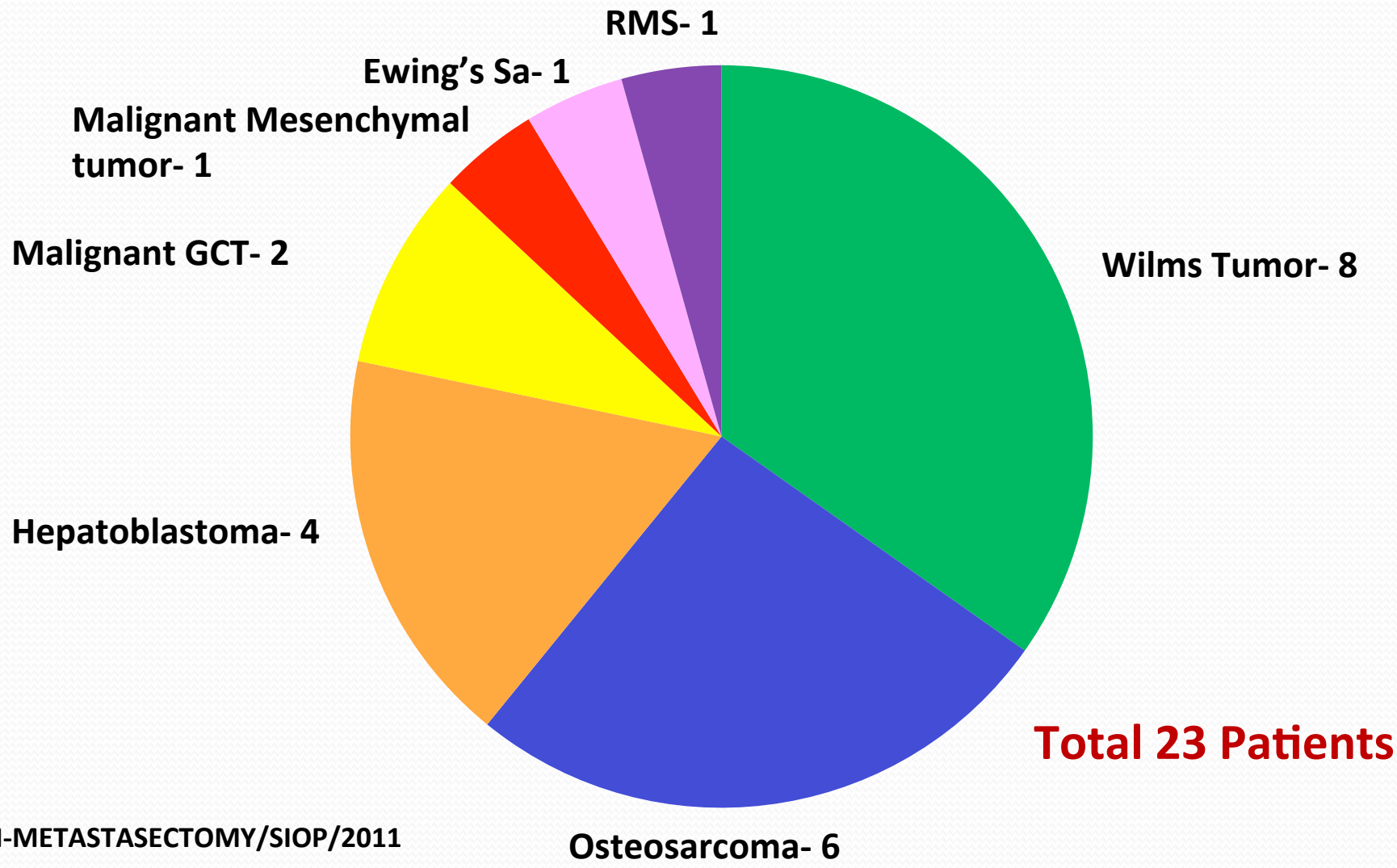






PULM-METASTASECTOMY/SIOP/2011

Pulmonary Metastasectomy: Results



PULM-METASTASECTOMY/SIOP/2011

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

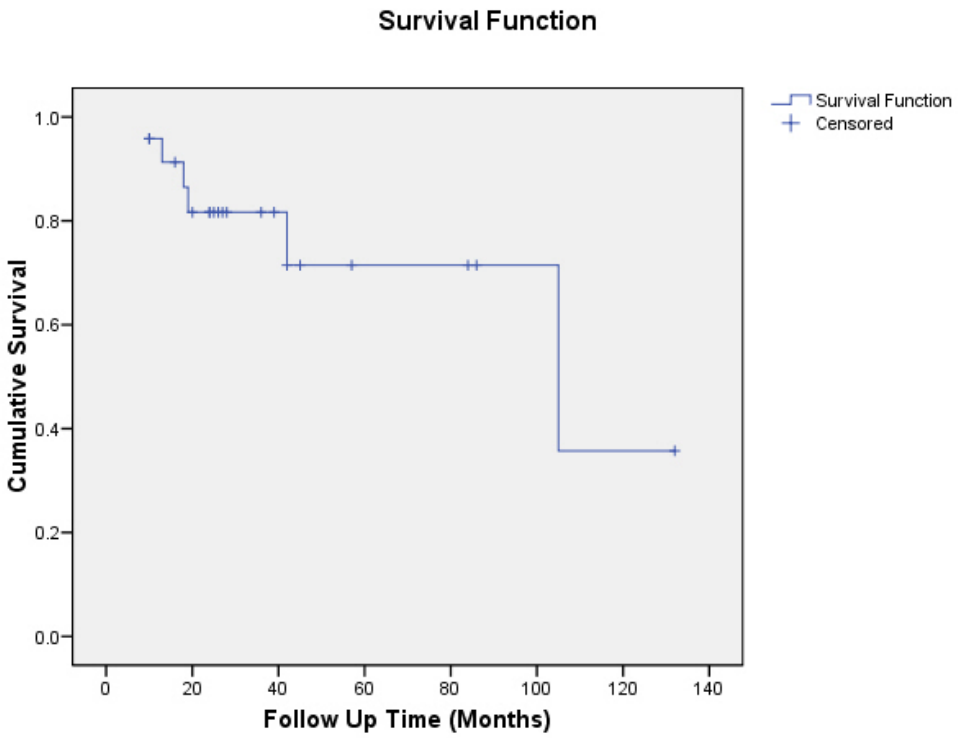
Pulmonary Metastasectomy: Results

- 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

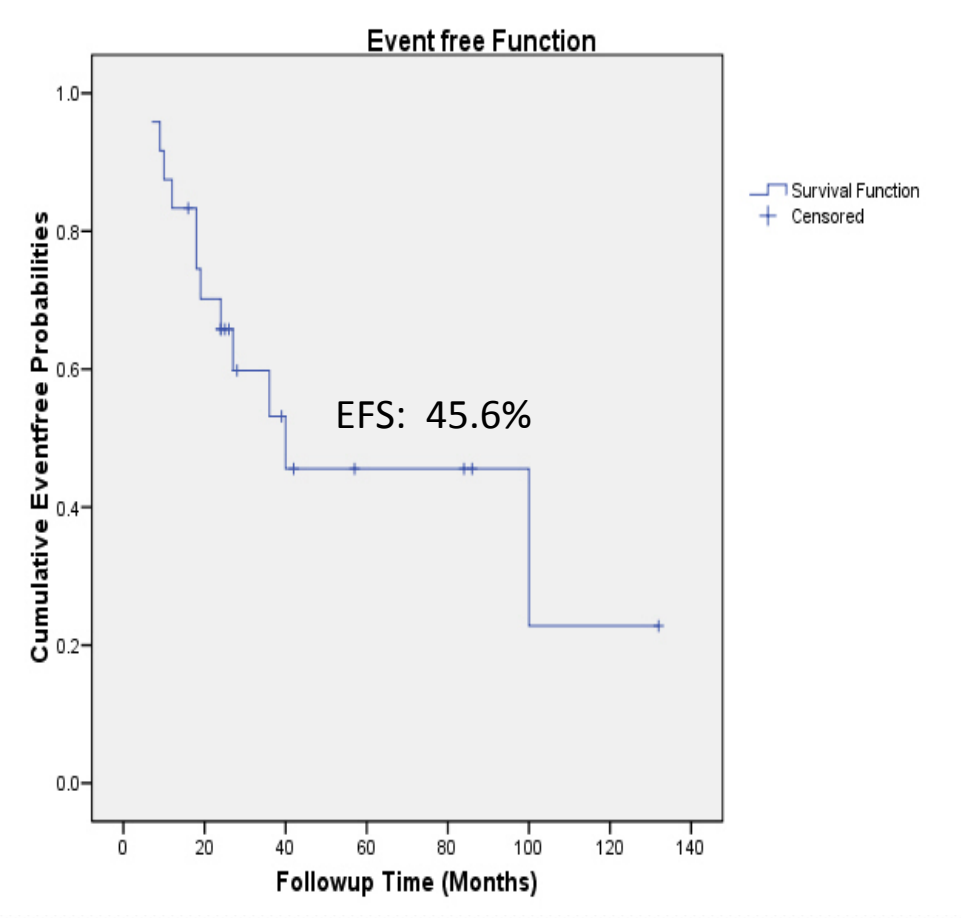
- Total number of deaths - 6/23
  - **3 –Yr OS – 81.7%** (MST 91.7; 95CI 66.9 - 116.6)
  - 4 progressive disease
  - 2 chemo related complications



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

PULM-METASTASECTOMY/SIOP/2011


Thank You