Palliative radiotherapy near the end of life for brain metastases from lung cancer: a population-based analysis

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Disclosures

- No conflicts of interest
Learner centered objectives

- Learn basic principles of (brain) radiotherapy
- Understand the prognosis of lung cancer patients with brain metastases
- Discuss how to best select patients for brain radiotherapy
Radiation oncology

- Therapy using ionizing radiation, generally as part of cancer treatment to control or kill malignant cells and normally delivered by a linear accelerator.
Linear accelerator

https://www.youtube.com/watch?v=pnAkPexEdk0&feature=youtu.be
Radiation oncology
DNA damage

- DNA repair
  - Difference between normal cell and cancer cell

- Fractionation of radiation dose
Radiation (dose) planning

4 field conventional

5 field conventional

Arc Therapy
Radiation effects

- Local treatment
- Location
- Total dose
- Fraction dose
- Volume

- Local (side-)effect
- Tissue sensitive for RT?
- (Fraction) dose↑ = (side-)effect↑
- Volume↓ = side-effect↓
Radiation for brain metastases

- Indications
- Palliative vs. radical
- Whole-brain radiotherapy (WBRT) vs Stereotactic radiation (SRT)
WBRT vs. SRT

- **WBRT**
  - Palliative treatment
  - Volume = complete skull
    - Also subclinical lesions
  - Toxicity
  - 5-10 fractions

- **SRT**
  - Radical treatment
  - Volume = metastasis
    - Only treated lesions
  - Less toxicity
  - 1-3 fractions
Brain metastases in lung cancer

- 10% at time of diagnosis
- Large proportion of brain mets = lung primary
- Median survival 2.5-4.5 months
- Treatment impacts quality of life
- No difference WBRT vs optimal care
- SRT safe option for selected patients
- Pt selection is important
Getting back on topic

Research
[ri-surch, ree-surch], noun
1. what you are doing when you don’t know what you are doing
Goals

- Identify patients that died within 4 weeks and 90 days of start of radiotherapy

- Identify factors that predict which patients will not benefit from radiotherapy for brain metastases
Methods

- Database
  - Patient characteristics
  - Treatment characteristics

- Lung cancer patients in BC with brain metastases
  - Treated with radiotherapy

- January 2014 – December 2015

- 740 patients
- 826 courses of radiation
Patient characteristics

Gender

- Male: 40%
- Female: 60%

Age

- <50: 40%
- 50 - <60: 20%
- 60 - <70: 20%
- 70 - <80: 10%
- ≥80: 10%

Histology

- Adenocarcinoma: 20%
- Squamous cell carcinoma: 10%
- NSCLC NOS: 5%
- Small cell carcinoma: 5%
- Other: 55%
Treatment characteristics

- ECOG performance score
- Initial systemic therapy
- Completion of radiotherapy
- Number of fractions
- Radiation technique
- Total radiation dose
Results

- **Mortality**
  - 11% after 4 weeks
  - 40% after 90 days

- **Initial systemic treatment:** ≈50%
- **95% completion rate**
- **11% stereotactic radiation**
Prognostic factors

- Factors predicting 4 week mortality after radiotherapy for brain metastases in lung cancer patients
  - Initial systemic therapy – lower risk
  - >5 fractions – lower risk
  - Age 70 - <80 – lower risk
Prognostic factors

Factors predicting 90 day mortality after radiotherapy for brain metastases in lung cancer patients

- Higher age – higher risk
- Squamous cell carcinoma – higher risk
- Initial systemic therapy – lower risk
- >5 fractions – lower risk
- Stereotactic radiation – lower risk
Discussion

- 4 week mortality: 11%
- 90 days mortality: 40%

- Important prognostic factors
  - Initial systemic therapy
  - >5 fractions of radiation

- Selection of patients important
  - Our results possibly influenced by selection bias
Conclusions

- It’s a matter of perspective
- Improve patient selection in future
  - Who benefits from treatment?
- Better use of prognostic tools
## Multivariate analysis 4 week mortality

<table>
<thead>
<tr>
<th></th>
<th>Odds</th>
<th>95.0% C.I. for EXP(B)</th>
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<tbody>
<tr>
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<td>Lower</td>
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<tr>
<td>Age – continuous</td>
<td>1.066</td>
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<td>1-5 fractions conventional (reference)</td>
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<td>&gt;5 fractions conventional</td>
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<td>SRS / SFRT</td>
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<td>Age &lt;50</td>
<td>3.35</td>
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<td>Age 80 or higher</td>
<td>0.553</td>
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## Multivariate analysis 90 day mortality

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