Three-Year Experience of a Multidisciplinary Central Nervous System Clinic Model for Radiation Oncology and Neurosurgery (RADIANS) in a Community Hospital Setting

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Introduction

- RADIANS multidisciplinary CNS clinic formed Fall of 2016
- Community Hospital Setting outside Portland, OR
  - patient-centric approach
  - optimize patient/physician time
  - simultaneous evaluation with radiation oncologist and neurosurgeon
- Medical Oncology (most common referral source)
- Patient Satisfaction Score = 4.77/5
- 140% Increase in Patient Volume in Last 12 Months
Methods

- IRB approved prospective patient registry developed Fall 2016
- Clinical and demographic data were collected, stored in secure database where only IRB-approved research team members had access, and reviewed over 3-year period (2016-2019)
- Patients referred into RADIANS clinic were seen simultaneously by both physicians, the radiation oncologist and neurosurgeon, in a single clinic visit setting
- Prior imaging and workup reviewed before the initial visit
- Discussion and Q&A regarding diagnosis and treatment options were done
- Family members and/or caregivers were included in discussion with consent of patient.
- Patient surveys given to all patients prior to the conclusion of their visit
Patient Characteristics (n=101)

- Mean Age = 61yrs; Med = 63yrs; Range = 20-94yrs
- Females (n=65, 64.4%); Males (n=36, 35.6%)
- Mean Distance Traveled = 54.9mi; Med=13.0mi; Range = 0.6-340mi
- KPS ≥ 80 = 81, 80.2%   (KPS ≤ 70 = 20, 19.8%)
- Co-Morbidities (one-two), n=49 (48.5%); (three-four), n=13 (12.8%)
- Two Most Common Co-Morbidities
  - COPD (n=27, 26.7%)
  - HTN (n=26, 25.7%)
- Obesity Class I (BMI = 30-34.9) = 20, 19.8%
  Obesity Class II (BMI ≥ 35.0) = 15, 14.8%
Malignant

- Breast: 25%, n=18
- Lung: 37%, n=27
- Kidney: 8%, n=6
- Multiple Myeloma: 4%, n=3
- Other: 10%, n=7
- GBM: 10%, n=7
- Plasmacytoma: 3%, n=2
- Astrocytoma: 3%, n=2
- Meningioma: 55%, n=16
- Glioma: 7%, n=2
- Pituitary Adenoma: 4%, n=1
- Myxopapillary Ependymoma: 3%, n=1
- Non-Tumoral CNS: 24%, n=7

Primary Brain = 9
Primary Spine = 2
Brain Mets = 28
Spine Mets = 27
Both = 6

Benign

- Meningioma: 55%, n=16
- Primary Brain = 18
Primary Spine = 4
- Glioma: 7%, n=2
- Pituitary Adenoma: 4%, n=1
- Schwannoma: 7%, n=2
- Myxopapillary Ependymoma: 3%, n=1
- Non-Tumoral CNS: 24%, n=7

Primary Brain = 18
Primary Spine = 4
Treatment Allocation

Radiation Therapy Received

- Stereotactic Radiosurgery/Body RT = 38/51, 75%
- Conventional Fractionated RT = 14/51, 27%
- Tumor Treating Fields* = 2/7, 28%
- 1 patient received WBRT and SBRT to the spine

Neurosurgery Performed

- Craniotomy with Tumor Resection = 28/38, 74%
- Separation Surgery¥ = 8/38, 21%
- Laminectomy/Laminotomy = 2/38, 5%

* 1 GBM patient received TTF; 1 GBM patient received Conventional RT + TTF
¥ Separation Surgery = spinal stabilization/fusion with maximal safe resection and decompression
# Treatment Outcomes

<table>
<thead>
<tr>
<th>Treatment Group</th>
<th>Number</th>
<th>Description</th>
<th>Radiation Necrosis</th>
<th>Radiation Myelitis</th>
<th>Local Control</th>
<th>CNS Disease Progression</th>
</tr>
</thead>
<tbody>
<tr>
<td>RT Only (n=29)</td>
<td>9 pts</td>
<td>followed-up by MedOnc or deceased prior to RADIANS follow-up</td>
<td>0%</td>
<td>0/29</td>
<td>80%, 16/20</td>
<td>55%, 11/20</td>
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<tr>
<td></td>
<td>20 pts</td>
<td>with 3mo repeat imaging:</td>
<td>0%</td>
<td>0/20</td>
<td>100%, 16/16</td>
<td>6%, 1/20</td>
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<tr>
<td>NS Only (n=16)</td>
<td></td>
<td>No neurologic deficits</td>
<td>0%</td>
<td>0/16</td>
<td>100%, 16/16</td>
<td>6%, 1/16</td>
</tr>
<tr>
<td>Both RT/NS (n=22)</td>
<td></td>
<td>Tumor resection followed by post-op RT to tumor cavity and unresected lesions</td>
<td>4%</td>
<td>1/22</td>
<td>91%, 20/22</td>
<td>18%, 4/22</td>
</tr>
</tbody>
</table>

- Radiation Necrosis = 0%, 0/20
- Local Control = 80%, 16/20
- CNS Disease Progression = 55%, 11/20
- Post-op complications = 6%, 1/16
- [medically-related = 4/16]
- At 3mo post-op repeat imaging:
  - Radiation Necrosis = 0%, 0/20
  - Local Control = 100%, 16/16
  - CNS Disease Progression = 6%, 1/16
- Post-op complications = 14%, 3/22
- At 3mo repeat imaging:
  - Radiation Necrosis = 4%, 1/22
  - Radiation Myelitis = 4%, 1/22
  - Local Control = 91%, 20/22
  - CNS Disease Progression = 18%, 4/22
Patient Current Status

- Active Follow-up = 63
- Transfer of Care = 8
  - Decision to receive RT closer to place of residence
  - Decision to have NS performed at university hospital
- Hospice Care = 6
- Declined Treatment = 1
- Lost to Follow-up = 1
- Deceased = 22 (18/22 with Stage IV disease)
Conclusions

• Unique **Community-Hospital Based** CNS Clinic Model
• **High Patient Approval** at Extended Follow-up
• **Regional Referral Center** for Complex CNS Disease
• Delivers State-of-the-Art, **Evidence-Based Treatment Modalities** in a Community Hospital Setting
• Good **Local Control** and Low Rates of (G3/4) **Radiation-Induced Toxicity**
• Access to **On-Going Clinical Trials**
• **Future Considerations**: Analyzing Cost-Benefit, CNS Morbidity/Mortality Rates, Early Detection Rate, Elderly Adult Patient Outcomes, and Caregiver Impact