Stereotactic Radiosurgery for Brain and Spine Tumors: What the Oncology and Neurosurgery Nurse Needs to Know

The medical literature is full of articles on stereotactic radiosurgery (SRS), a non-invasive, ambulatory procedure for brain and spine tumors not suited for surgical resection. But have nurses been adequately prepared to care for patients receiving cranial SRS? Come learn how you can contribute to the goals of SRS—those like arresting tumor growth and decreasing pain from spine lesions—and recognize adverse events such as potential motor or sensory decline. You’ll also learn to identify the benefits of SRS for patients with cancer, including tumor control and/or effective pain relief.

Content Area: Clinical Practice

Content Level: Intermediate

Speaker:
Stephanie Bino, RN, BS, OCN®
Radiation Oncology Nurse
Holy Name Medical Center
Teaneck, NJ
binos@verizon.net

Full Disclosure: Nothing to Disclose

Speaker:
Kathleen Maloney-Lutz, RN, MSN
Clinical Coordinator
Mount Sinai Medical Center
New York, NY
kmaloneylutz@gmail.com

Full Disclosure: Nothing to Disclose

Objectives:
At the end of this session, participants will be able to:
1. Identify benefits of SRS in the patient with cancer.
2. Empower the nurse with knowledge to about SRS and enhance patient education.

Content Outline:
I. Definition of brain and spine tumors
II. Types of tumors treated with stereotactic radiosurgery
   A. Benign tumors
   B. Primary malignant tumors
   C. Metastatic tumors
III. What is stereotactic radiosurgery?
IV. Gamma Knife, CyberKnife, and Novalis
V. Describe the SRS planning, treatment and follow up care for a patient with a brain and/or spine tumor.
   A. Imaging
   B. Simulation
   C. Treatment plan
   D. Day of treatment flow
   E. Follow-up care
VI. Discuss risk and benefits of stereotactic radiosurgery for brain and spine tumors.
   A. Radiation exposure
   B. Tumor control
   C. Pain control
   D. Vertebral body collapse post radiosurgery
VII. Discuss development of ED tools for SRS.
   A. Video
   B. Written consent; frequently asked questions
   C. Written directions detailing day of and post SRS care

Bibliography:
Allen, K. Stereotactic body radiotherapy and nursing implications http://onsopcontent-ons.org/Publications/SIGNewsletters/rad/rad22.3html
Hael, W.A., Stapleford, L.J., Hadjipanayis, C., Curran, W.J., Crocker,


ETIOLOGY

- Primary - Unknown etiology
- Genetic - Hereditary
  - Neurofibromatosis type I, II
  - Tuberous sclerosis
- Metastatic - Most common etiology
  - 35% Lung
  - 20% Breast
  - 10% Renal/Kidney
  - 10% Gastrointestinal
  - Certain sarcoma's, melanoma, germ cell carcinoma, bladder
- No definitive cause for primary tumors other than those associated with heredity
- Metastatic disease spreads to the brain via the bloodstream usually well differentiated from other brain tissue
  - Single or multiple lesions

Classification of Brain Tumors

- Gliomas
  - Astrocytic
    - Pilocytic, astrocytoma (grade I, II, Anaplastic, grade III), Glioblastoma multiforme
  - Ependymoma
  - Chiroidpegdrosal
  - Medulloblastoma
  - Unclassified (mostly gliomas)
- Meningioma
  - Multiple histological type
  - Atypical type
  - Anaplastic (malignant meningioma)
- Pituitary Adenoma

- Neurinoma
  - Acoustic neuroma
  - Schwannoma
- Craniopharyngioma, dermoid, epidermoid, teratoma
- Angiomas
- Sarcomas
- Miscellaneous - pinealoma, chordoma, granuloma, lymphoma
- Metastatic

STEREOTACTIC RADIOSURGERY

- Nonsurgical procedure that delivers a precisely targeted higher dose of radiation in a single or few fractions
- Relies on three-dimensional imaging (CT, MRI, PET-CT) to target tumor volume
- Immobilization and positioning of patient is essential

STEREOTACTIC RADIOSURGERY

- Delivers single high dose of radiation to a limited area
- Commonly used for solitary lesions less than 3 cm; however multiple small lesions can be treated in one session
- Can be used on patients who have received WBRT for boost or new disease

ADVANTAGES OF SRS

- Whole brain radiation does increase risk of learning and memory problems
- SRS may have advantage in local control
- There may be longer survival in select group of patients (younger age, good performance status and primary tumor control) with SRS

(Barani, 2013)

COMPLICATIONS OF RADIATION TO THE BRAIN

- Acute reactions are usually caused by edema and can generally be controlled with medications
- Symptoms are usually dependent on the volume of healthy tissue treated
- Whole brain radiation is the most damaging resulting in more neurotoxicity
- Late side effects of SRS such as edema and radionecrosis are rare

(Hickey, 2008)
### SRS Procedure

- Generally performed on outpatient basis
- MRI for planning purposes
- Placement of head frame with local anesthesia/light sedation
- CT for planning purposes
- Development of treatment plan
- Multidisciplinary team approach

### Pre-Procedural Teaching

- NPO if sedation or contrast is being used
- Insertion of IV for medication administration
- Local injections of anesthesia at pin sites
- Treatment planning studies
- Detailed description of the events of the day and duration of procedure

### Patient Teaching Post SRS

- Pin Site Care
- Call your doctor if drainage soaks the bandage
- Remove bandage the next day. You may shower and wash your hair
- Apply a small amount of antibiotic ointment to the pin sites daily until healed
- Call your doctor if the pin sites develop redness, swelling or drainage

### Potential Problems

Potential signs of edema or swelling
- Headache that does not go away
- Unsteadiness when walking
- Seizures
- Change in vision
- Vomiting or nausea

### Treatment Complication Options

- Steroid Management oral or IV depending on the severity of symptoms
- Surgical interventions
  - Craniotomy
  - Vertebroplasty

### Medication Management

- Dexamethasone is often used during radiation therapy
- Typically short term use to reduce surrounding edema that may increase mass effect and contribute to symptomatology
- Tapering schedule should consist of a reduction in dose of 2-4mg every 1-3 days (reduction of dose and/or interval)
- Should be adjusted to patient’s tolerance
NURSING ASSESSMENT

- Behavioral, cognitive and mental status
- Cranial nerve assessment
- Motor function
- Coordination and gait
- Sensory perception

SPINAL CORD DISEASE

- Presenting symptom is usually pain from tumor growth or spinal instability
- Neurologic symptoms such as motor weakness and sensory loss, generally follow progressive pain
- Spinal cord compression is considered a medical emergency and intervention should be implemented to prevent neurological decline

SPINE TUMORS

Primary Spine Tumors:
- Comprise approximately 7% of primary central nervous system tumors
- Metastatic Tumors
  - Originate from primary sites, most commonly from prostate, lung, breast, colon, liver, and renal cell

Classification of Spine Tumors
- Extradural
  - Outside the spinal cord in the epidural space
  - May develop into surrounding bones or vertebral bodies
- Intradural
  - Within or under the spinal dura and leptomeninges
  - Can attach to the spinal nerve roots
- Intramedullary/Intradural
  - Within the substances of the spinal cord

TREATMENT OPTIONS

- Goal of treatment is improvement of quality of life and preservation of neurologic function
- Type and aggressiveness of primary tumor influence treatment choices
- Surgical decompression and stabilization may be indicated for patients with life expectancy of >3 months

SRS FOR SPINE TUMORS

- Estimated 5-10% of cancer patients will develop spine metastasis
- External beam radiation has been an effective treatment modality
- Stereotactic radiotherapy is emerging as an effective technology for primary retreatment, post operative treatment or irradiation of previously treated spinal tumors

(Hickey, 2008)

(NCCN Guidelines Version 2 .2013)
COMPLICATIONS OF SPINAL SRS

- Short term complications are usually self-limiting and mild
- May include esophagitis, dysphagia, diarrhea or transient radiculitis
- Radiation induced vertebral compression fracture is a rare long term complication

NURSING ASSESSMENT

- Pain relief
- Improvement in neurological symptoms
- Improvement of treatment related toxicities

NURSING CARE PLAN

- Potential complications of immobility
- Potential for injury due to sensory and motor deficits
- Potential for alteration in skin integrity
- Recognition of deterioration of symptoms
- Education regarding pain management and steroids

Case scenarios with audience response

- Review neurological assessments
- Learn new treatment methods for brain and spine tumor with minimal treatment complications
- Management of symptoms from disease and treatment
- Quality of life issues