

POSTERIOR FOSSA RENAL CELL METASTASIS



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CyberKnife Center: NCH Regional Cancer Institute
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Naples, FL

POSTERIOR FOSSA RENAL CELL METASTASIS

DEMOGRAPHICS

Sex: Female
Age: 65 years
Histology: L Posterior Fossa Renal Cell AC

CLINICAL HISTORY

Referred by: Neurosurgery
Previous Treatment: 1) Right radical nephrectomy 18 years prior for localized renal cell carcinoma
2) Brain surgery for left frontal tumor and thoracotomy for lower lobe metastatic mass 6 months prior; both were histologically confirmed to be metastatic renal cell carcinoma

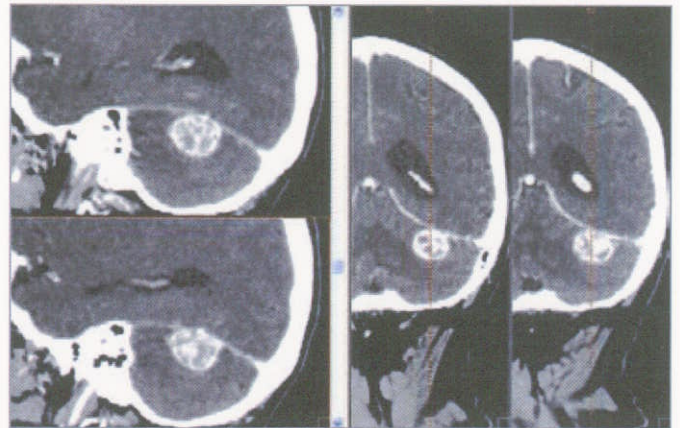
Case History

This female patient underwent a right radical nephrectomy for localized renal cell carcinoma. She had no adjuvant chemotherapy or radiation therapy based on an assessment of local disease. Eighteen years later, she developed mild ataxia with difficulty writing and golfing. A CT revealed a 1.3 cm high left parietal lobe enhancing lesion with surrounding edema. This tumor was surgically removed and was histologically confirmed to be metastatic renal cell carcinoma. Additional imaging revealed a right lower lobe lung mass of 3.5 x 2.0 cm. She underwent a thoracotomy and wedge resection of the right lower lobe; the mass had identical histologic features to the CNS lesion.

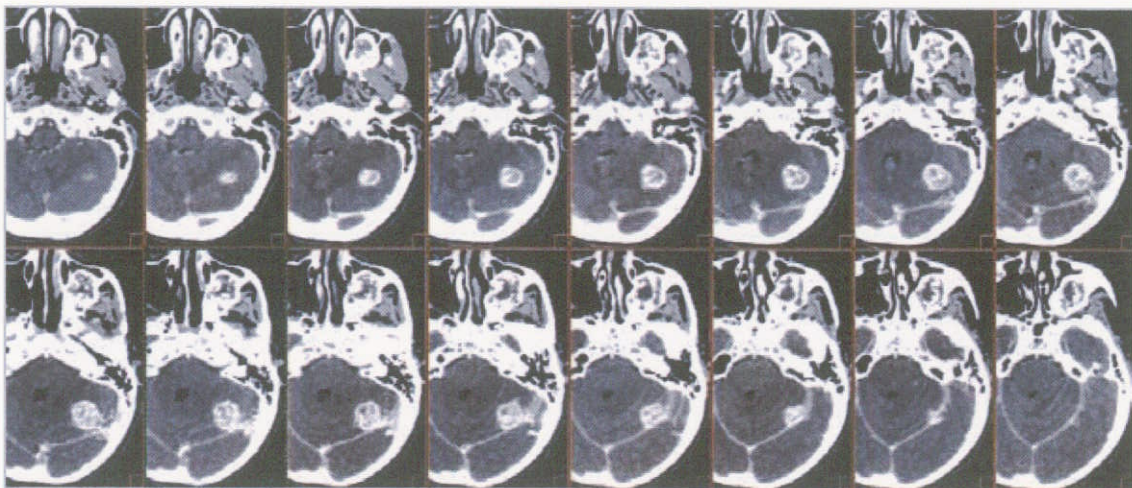
Post-surgery she was assessed by CT, whole-body PET and brain MRI. These imaging studies suggested no evidence of residual disease. Given the long disease-free interval between her initial nephrectomy and development of metastatic disease, the doubling time of her tumor was expected to be several years. Hence, observation was favored over radiation for her condition. Six months post-surgery, however, she developed mild ataxia and slight occipital headache. Follow-up MRI revealed a 2.5 x 2.0 x 1.5 cm enhancing mass in the left posterior fossa.

CyberKnife® Treatment Rationale

Due to the tumor location, stereotactic radiosurgery (SRS) was indicated in favor of operative surgery. The patient proactively inquired six months prior regarding the possibility of CyberKnife® treatment should she develop recurrent disease in the lung or brain. SRS is a well recognized technique for the treatment of cerebellar renal cell carcinoma metastases.^{1,2,3}



Sagittal and coronal CT reformatted images showing a solitary metastatic renal cell carcinoma in the posterior fossa (~2.5 cm diameter).



Sixteen consecutive 1.25 mm contrast-enhanced CT axial slices through the posterior fossa demonstrates volumetric extent of metastatic lesion.

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TREATMENT DETAILS

Tumor Volume: 4.99 cc
Imaging Technique(s): CT, MRI
Rx Dose & Isodose: 18 Gy to 85%
Conformality Index: 1.36
Tumor Coverage: 95.6% of PTV
Number of Beams: 90

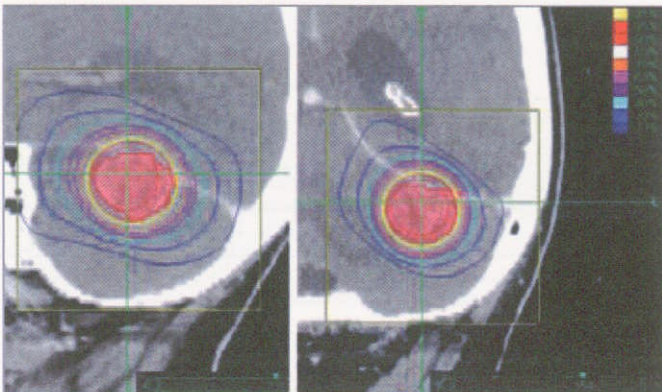
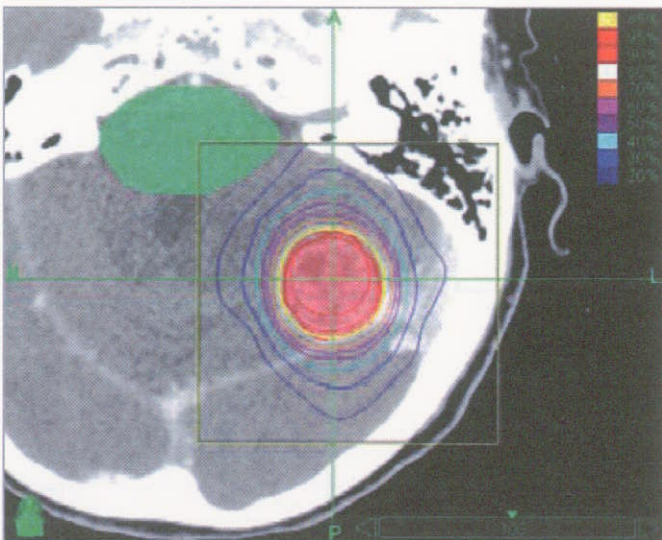
Fractions / Treatment Time: 1 fraction in 35 minutes
Path Template: 3 path 800 mm
Tracking Method: 6D Skull Tracking
Collimator(s): 25 mm

Planning Process and Goals

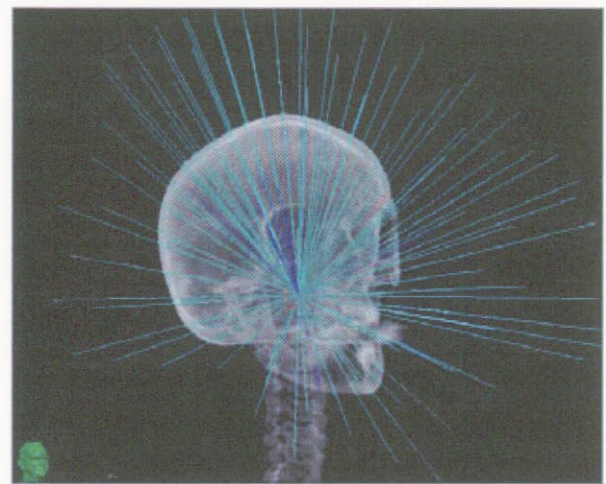
The tumor volume of 4.99 cc and the brainstem (critical structure) were contoured. The treatment plan was 18 Gy in one fraction prescribed to the 85% isodose line of the target volume, providing a 1.36 conformality index and a 1.18 homogeneity index.

Treatment Delivery

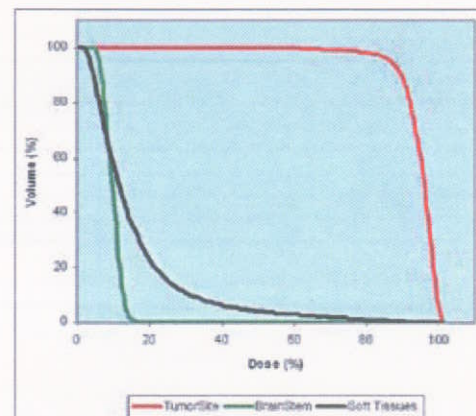
The treatment plan utilized 90 separately targeted beams using a 3 path 800 mm path set, the 6D automatic skull tracking technique and a 25 mm collimator using an isocentric treatment geometry. The maximum dose to the tumor site was 21.2 Gy. The maximum dose to the brainstem was constrained to be 3.86 Gy.



Axial, sagittal and coronal planning images (top to bottom right) showing the brainstem (green) as the critical structure. Note the isocentric treatment geometry and the highly conformal dose distribution.



Right anterior oblique 3D image showing the 90 treatment beams and their relative intensities. These are centered at the single isocenter.



Dose-volume histogram showing tumor, critical structure and soft tissue doses.