

Treatment of recurrent right parietal meningioma using Elekta Synergy®

Institution:	The Christie Hospital NHS Trust, Manchester, UK Wade Centre for Radiotherapy Research
Patient:	Male, 51 years
Diagnosis:	Right parietal meningioma
Plan:	Three-field conformal
Image guidance:	Elekta VolumeView™ off-line protocol
Positioning:	Supine in HeadFIX®
Treatment:	50Gy in 25 fractions to the isocenter

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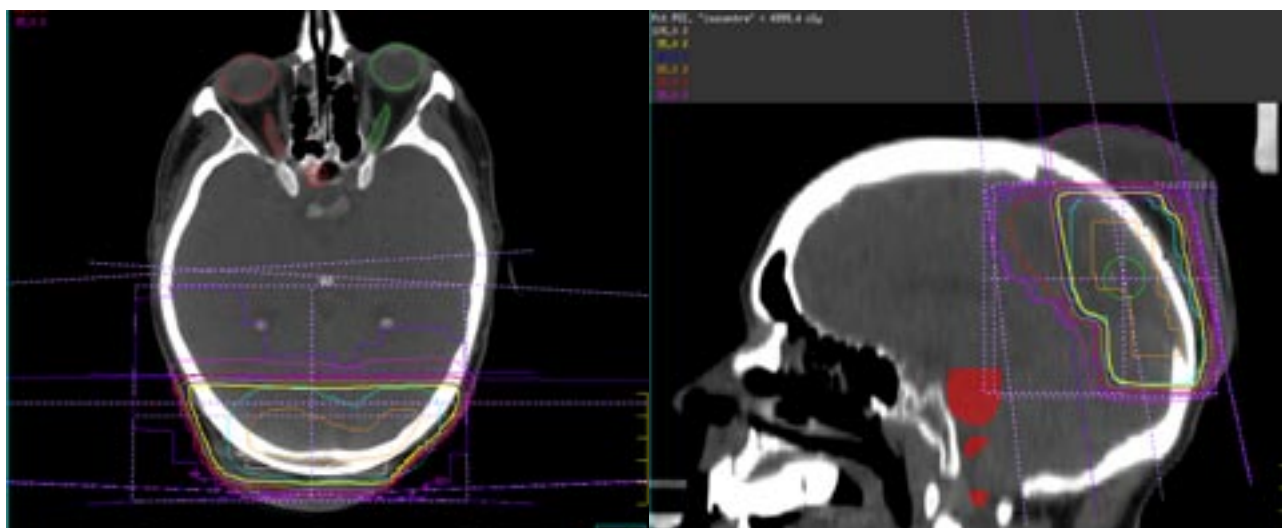
Radiation Therapists: **Michelle Duffy, Julie Davies, Claire McCarthy, Julie Stratford**
Radiation Oncologist: **Dr. H. R Gattameneni**

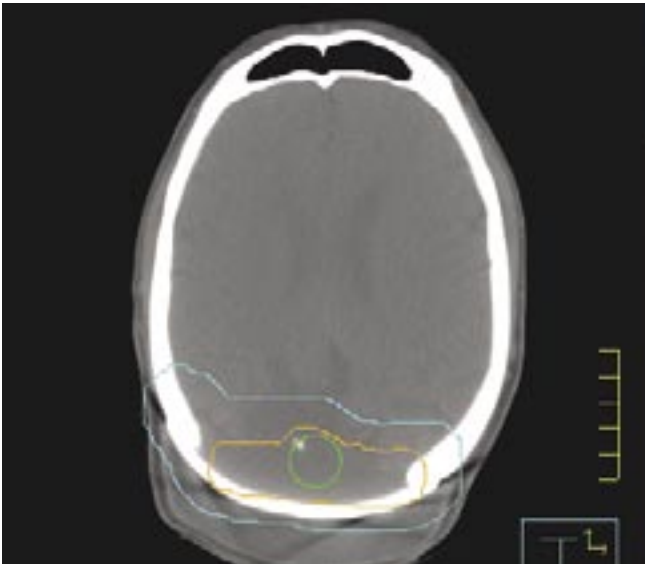
Patient history and diagnosis

A 51 year-old male presented with enlarging lump on the top of his head, a short history of increasing headaches and some numbness affecting his left limbs. He also had bilateral blurring of the optic disc but no long tract deficits. A CT scan showed a large right parietal parafalcine mass and MR angiogram confirmed obstruction of the anterior and middle parts of the superior sagittal sinus. The tumor was removed leaving a large skull defect which was later closed with a titanium cranioplasty in November 2001. Histology showed an atypical meningioma with numerous mitosis. The patient had a recurrence of this tumor in December 2002 which was eventually resected again in May 2004. Further surgery was required in November 2004 for a recurrence posteriorly, after which the patient was referred for post-operative radiation therapy in view of his rapid recurrence.

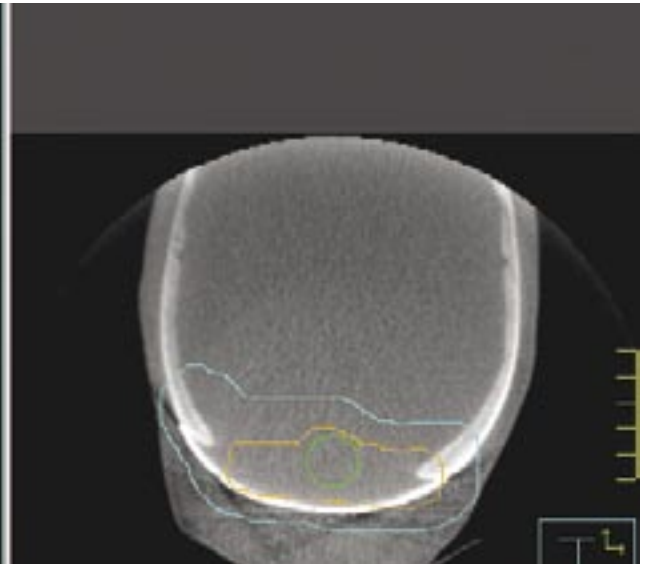
Planned treatment

The patient was treated using HeadFIX® stereotactic head frame to accurately reproduce the daily treatment position. A three-field treatment technique was used comprising right and left lateral and a superior oblique treatment field, all with MLC beam shaping and wedges. The treatment was planned at 6MV using the Philips Pinnacle® planning system to deliver a total tumor dose to the isocenter of 50cGy in 25 fractions, with great care being taken to avoid any unnecessary dose to the eyes, optic nerves and brainstem.

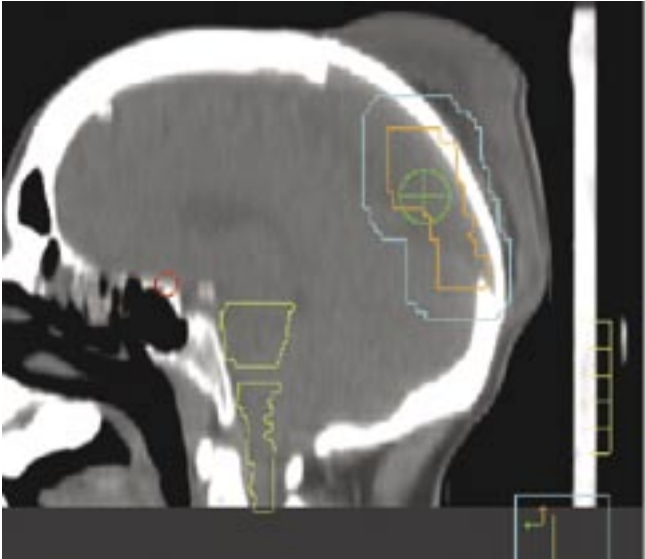




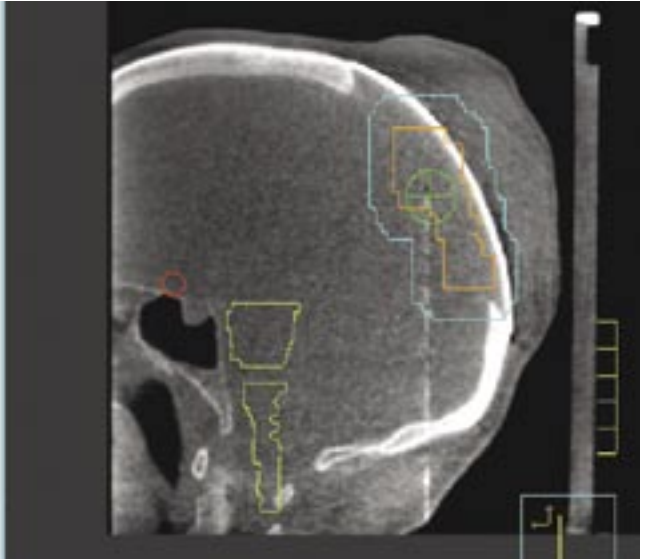
RTP Scan: transverse view



VolumeView™: transverse reconstruction



RTP Scan: sagittal view



VolumeView™: sagittal reconstruction

Treatment using image guidance techniques

The patient was treated supine in HeadFIX® stereotactic head frame for immobilization purposes. A standard immobilization shell was considered inappropriate for this patient due to a large CSF collection at the back of his head, the volume of which fluctuated on a daily basis. The patient was comfortably positioned in HeadFIX® and Elekta VolumeView™ 3D images were acquired days 1 to 3 in order to correct for any systematic errors. The patient was imaged using Elekta VolumeView™ once weekly thereafter. An off-line image registration protocol was used.

Treatment time = 12 minutes:

- 3 mins. – patient set-up
- 2 mins. – acquisition
- 4 mins. – treatment
- 3 mins. – off-line analysis

The correction policy was off-line, taken over 3 days – averaged and corrected approx. 2 mins.

Imaging dose

- 1.4mGy VolumeView™ acquisition
- 3cGY Open MV EPID

(continued overleaf)

As a result of the enhanced imaging provided by 3D Elekta VolumeView™ we could be confident of the accuracy of the treatment position and verify that the fluctuating volume of CSF fluid was not compromising treatment. We could clearly see soft tissue definition and check PTV coverage, all for an extra two minutes in the treatment position for the patient. 3D Elekta VolumeView™ images were acquired with the patient receiving minimal imaging dose (an extra 1.4mGy per Elekta VolumeView™ image acquisition compared to 3cGy for an open MV EPID) while achieving far superior image quality.

Outcome and follow-up

This patient has only had one follow-up so far and is due for another shortly. He was well following treatment and was due to resume work while awaiting a shunt operation in September 2005.

Discussion

In view of the rapid recurrence of disease in this patient, a quick solution was needed. The patient could not tolerate a standard shell used for head-and neck patients and so HeadFIX® stereotactic head frame was used. The Elekta VolumeView™ 3D imaging enabled us to accurately check PTV coverage and keep a close eye on the volume of CSF fluid to ensure this wasn't affecting treatment position. Any corrections made could then be verified on the treatment unit without the need for any re-simulation.

The Elekta VolumeView™ image takes about two minutes to acquire, which can easily be tolerated by patients and can be fitted into a normal working day on a busy treatment machine without having a major impact on workload. Off-line bony registration is quick, so the whole procedure, including analysis and correction, takes around 10 minutes. The departmental policy for this technique has now changed so that Elekta VolumeView™ images are acquired on the first three days of treatment and then weekly thereafter. 2D MV portal image verification is no longer used.

Fighting serious disease

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