MENINGIOMA

DR. CONSTANTINOS HADJIPANAYIS, MD, PHD, DIRECTOR OF NEUROSURGICAL ONCOLOGY

MOUNT SINAI HEALTH SYSTEM

CLINICAL PRESENTATION

The patient is a 49-year-old female presenting with chronic sinusitis, hemolytic anemia, and unbearable sinus headaches. She leads an active lifestyle and has had no history of cranial surgery. An MRI revealed a contrast enhancing mass overlying the left temporal lobe, causing significant vasogenic edema (Figure I). She was diagnosed with a grade I meningioma located in the anterior medial middle fossa. Due to the patient's headaches and extensive cerebral edema, she underwent surgical removal of the lesion for relief of mass effect on the brain.

This case study highlights the use of BrightMatter™ Plan, a pre-operative surgical planning software that generates whole brain tractography; BrightMatter™ Guide, an integrated intra-operative image-guided navigation system; and BrightMatter™ Drive, a hands-free digital microscope.

Figure I: Axial T1 MRI with contrast (left) and coronal T1 with contrast (right) showing the location of the left meningioma in the temporal lobe.

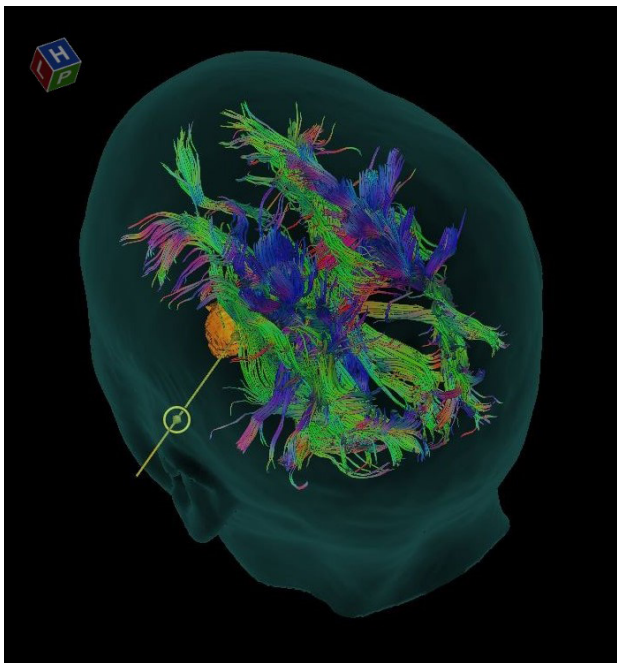

Figure II: BrightMatter™ Plan was used to confirm the surgical approach: left sub-temporal lateral trajectory. There was no intersection of major white matter tracts found.

SURGICAL APPROACH

The surgeon chose a left sub-temporal lateral approach to stay inferior to and avoid the left temporal lobe. Pre-operative visualization of whole brain tractography using BrightMatter™ Plan confirmed that the planned trajectory would not intersect any major white matter tracts (Figure II).

CASE HIGHLIGHTS

- BrightMatter™ Plan confirmed that the surgical approach would not intersect any major white matter fibers.
- BrightMatter™ Drive:
  - Superior visualization aided by improved illumination and a higher depth of field enabled optimal differentiation between healthy tissue and tumor.
  - Reduced surgical duration to two and a half hours.
  - Provided improved ergonomics to the surgeon.

SURGICAL MANAGEMENT

The patient was positioned supine under general anesthesia and the surgeon chose a left temporal craniotomy and microsurgical procedure to resect the meningioma. BrightMatter™ Guide was used to localize the lesion within the medial portion of the left middle fossa, and for intra-operative navigation throughout the procedure (Figure IIIa).

During surgical resection, the superior illumination, magnification, and depth of field allowed for better access to the deep lesion and for visualization of the tumor margins. This enabled the surgeon to clearly differentiate healthy tissue from tumor.

BrightMatter™ Drive provided ergonomic advantages by decoupling the optical system from the surgeon, a critical benefit as, if a surgical microscope was used, the nature of the lateral approach employed for this patient would have forced the surgeon into an ergonomically compromising position. BrightMatter™ Drive allowed for complete visualization of the field of view for both the surgeon and his entire surgical staff, promoting a superior surgical experience (Figure IIIb). The ease of use of the system reduced surgical duration significantly, permitting a case that normally takes four hours to be brought down to two and a half hours.

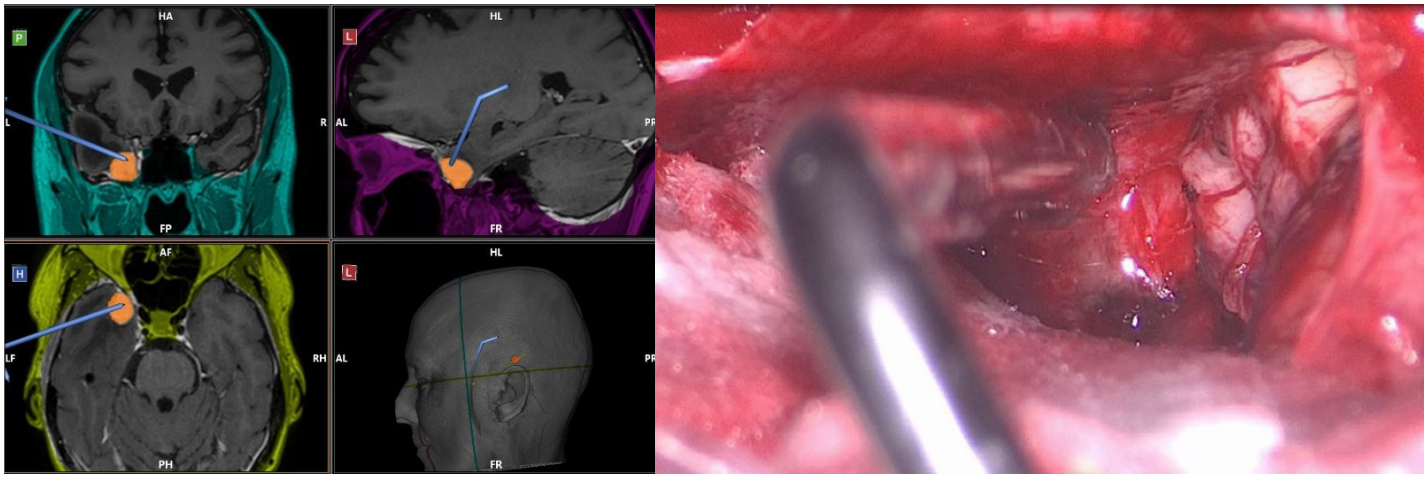

Figure III (a): BrightMatter™ Guide used for intra-operative navigation. (b): Visualizing tumor depth using BrightMatter™ Drive.

CLINICAL OUTCOMES

Post-operative MRI demonstrated gross total resection of the meningioma (Figure IV). The patient experienced no post-operative deficits. Neurological results remained normal upon recovery. The patient's length of stay was less than 48 hours, and at time of follow-up (six weeks) was back to living a healthy and active lifestyle.

Figure IV: Pre-operative MRI (left) and post-operative MRI (right) showing gross total resection.