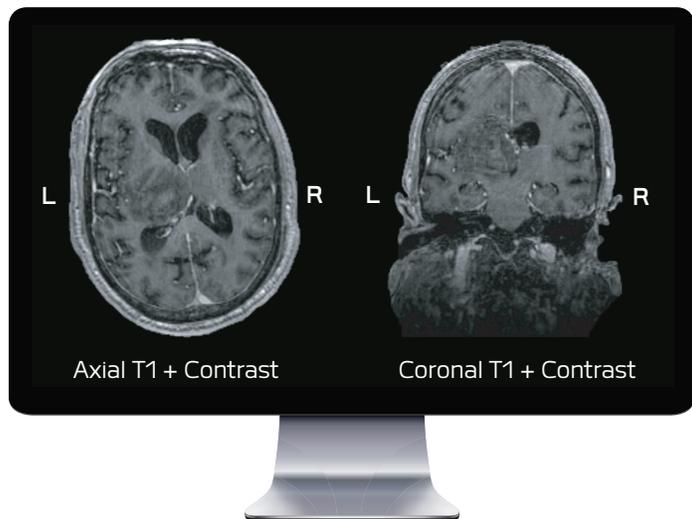


LEFT INTRACEREBRAL HEMATOMA (ICH) DOMINANT HEMISPHERE



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CLINICAL PRESENTATION

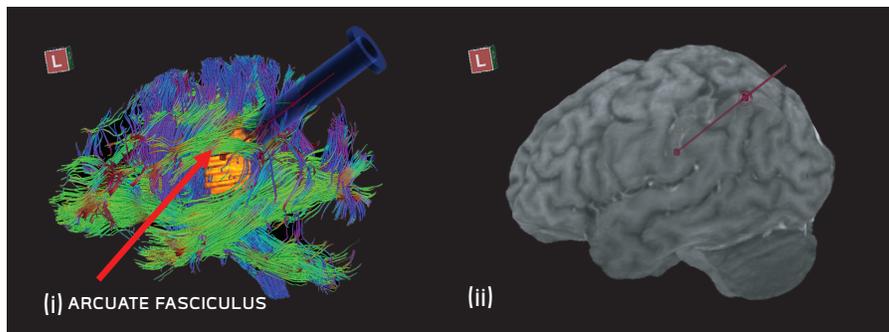
The patient is a 64 year old male presenting with an acute onset of right hemiparesis secondary to a left thalamic lesion. Further pre-operative imaging findings (anatomical MRI and DTI [left]) revealed an intracerebral hematoma, 3.2 x 2.4 x 3.4 cm in volume, resulting in compression of the posterior limb of the left internal capsule.

A combination of both pre-operative planning software with whole brain tractography (BrightMatter™ Plan) and intra-operative navigation and visualization tools (BrightMatter™ Guide and Drive) were used for evacuation of the hematoma.

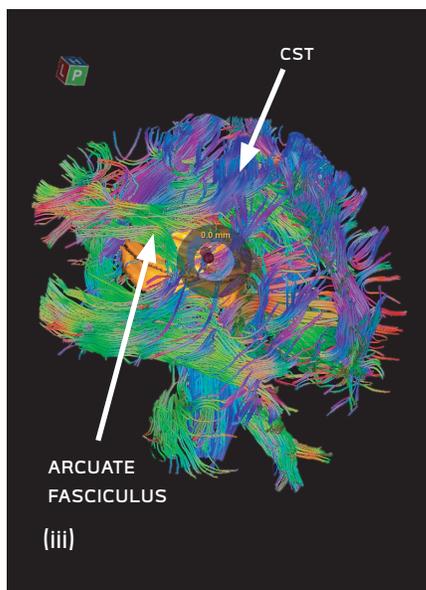
SURGICAL PLAN

The classic approach to treat a lesion of this size and depth, would be to wait and see if the body would break the hematoma down naturally.¹ This approach would involve several months of follow-up consultations and risk of significant deficits including permanent weakness or other neurologic deficits over time. Alternatively, if a surgeon were to choose to operate, the typical approach would be to take the shortest path to the lesion, thus risking damage to major speech fibers and the posterior limb of the internal capsule. This would risk further damage to the corticospinal tracts (CST), resulting in worsening of the neurologic deficit.

BrightMatter™ Plan enabled the surgeon to visualize white matter anatomy through generation and display of whole-brain tractography. This allowed the surgeon to choose a clear trajectory that provided the safest surgical corridor to the lesion. A minimally invasive parafascicular transsulcal approach utilizing BrainPath™ was used for access. A small window of entry, medial to the arcuate fasciculus (AF), and parallel to major anatomic fiber tracts was identified through the white matter, thereby avoiding post-operative deficits, where both speech and motor were avoided. Tractography generated by BrightMatter™ Plan also allowed for further visualization of the CST deformation by the hematoma that could not be otherwise visualized with standard MR imaging alone.



Surgical trajectory with 3D tractography: (i) View from Trajectory, (ii) Corresponding View from Cortical Surface. Whole brain tractography enabled entry medial to the arcuate fasciculus and (iii) Port axis view



CASE HIGHLIGHTS

- BrightMatter™ Plan allowed for visualization of major fiber tracts representing speech and motor.
- The corticospinal tracts (CST) tracts were dramatically restored after evacuation of the hematoma.
- Patient initially presented with hemiplegia; surgery resulted in significant reversal of deficit with patient ambulatory with walker at 3 months.



SURGICAL MANAGEMENT

The surgical plan was imported into the BrightMatter™ Guide software, which allowed for intraoperative monitoring of navigation. The main surgical goal of this case was to decompress the mass effect on the CST caused by the ICH with a goal of improvement of neurologic motor function.

With the use of BrightMatter™ Guide and Drive, intra-operative guidance was provided with real-time verification of placement and entry of the access device. The tractography, namely the CST and AF, was visible throughout the case with the use of BrightMatter™ Guide. The hands-free automated positioning system (BrightMatter™ Drive) allowed for automatic alignment of the visualization system with the surgical site, providing optimized views throughout the procedure. The use of the BrightMatter™ Plan, Guide and Drive allowed for a smooth and optimal surgical workflow.

INTRA-OPERATIVE VISUALIZATION USING BRIGHTMATTER™ DRIVE

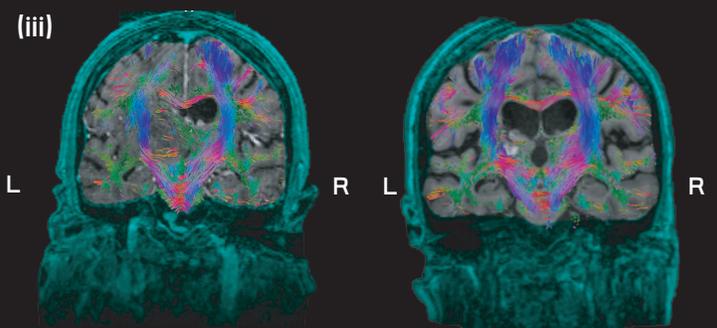
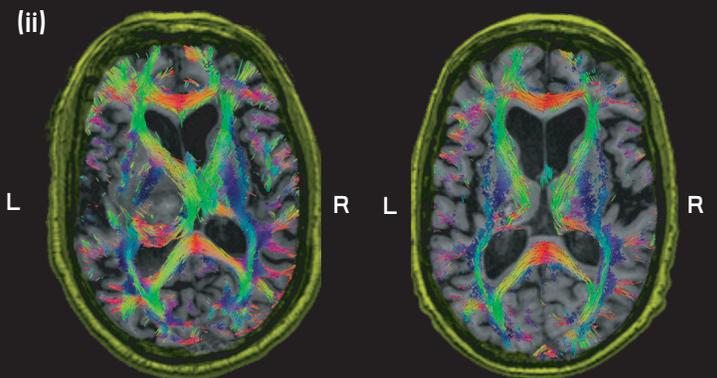


CLINICAL OUTCOMES

After minimally invasive evacuation of the intracerebral hematoma, post-operative DTI was performed revealing restoration of the CST. Restoration of the radiographic appearance was associated with improvement in the clinical function of the CST.

Post-operative MRI shows restoration of normal tractography with minimal evidence of the surgical approach. This was associated with an excellent post-operative functional outcome.

PRE-OPERATIVE (LEFT) & POST-OPERATIVE (RIGHT) IMAGES



- (i) Pre & post-op axial T1: minimal post-op residual.
- (ii) Pre & post-op axial T1 with tractography: clear deformation of CST tracts due to hematoma; restoration post-surgery.
- (iii) Pre & post-op coronal T1 with tractography: dramatic restoration of CST tracts.