

Neurosurgery

2020 HIGHLIGHTS

**Unmatched Surgical Expertise,
Advanced Neurovascular Imaging
Combine to Enable Risky Resection**

Prognosis Transformed for Patient

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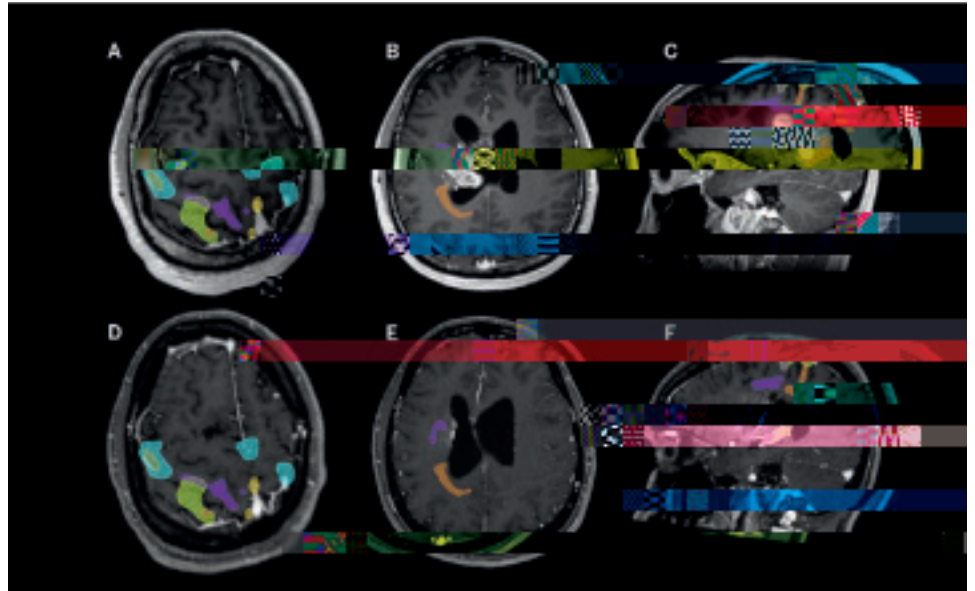
When other, less invasive measures failed to contain an aggressive, deep-seated cavernous malformation, a patient with worsening neurological complications sought the expertise of NYU Langone Health neurosurgeons with experience in successfully removing such high-risk lesions. Aided by advanced imaging and a high degree of surgical skill, a multidisciplinary team carefully planned and executed the safe resection of the lesion, which others had considered inoperable—preserving the patient’s function and transforming his prognosis.

WEIGHING THE RISKS OF A COMPLEX RESECTION

The patient, a 38-year-old male, had been diagnosed with the cavernous malformation in 2004 after presenting with acute hemorrhage in his right basal ganglia. Over time, the lesion grew larger and began to compromise the patient’s function, causing sensory loss and left-side deterioration that impacted his gait and upper-extremity strength. A repeat MRI performed at NYU Langone in 2019

revealed what had become a very large cavernoma in the thalamus with associated hemorrhage.

In the 15 years since his diagnosis, the patient had sought treatment at other institutions. With watchful waiting as the primary recommended



A SPECIALTY UNIQUELY POISED TO LEAD WITH DATA

Investigations into clinical applications for AI, with a focus on neurosurgical care, have gained significant momentum with the recruitment of Eric K. Oermann, MD, assistant professor in the Departments of Neurosurgery and Radiology and a leading expert in AI applications in medicine. Dr. Oermann brings deep expertise at the intersection of neurosurgery and mathematics to research projects that apply data science and algorithms to answer pressing neurosurgical

With a deepening focus on unleashing novel applications of artificial intelligence (AI) across—and beyond—neurosurgery, a multidisciplinary team of physicians and mathematicians is collaborating on advanced approaches to diagnosis and patient care, developing data-driven methods that hold potential for progress across the continuum of medicine.



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the gap between science and patient care,” notes Dr. Orringer. “Our collaboration plays to Eric’s strengths as an applied mathematician, so there’s complete integration—patient to bench to computer chip to bedside.”

GLEANNING MORE KNOWLEDGE FROM FEWER INPUTS

In one research vertical, Dr. Oermann is working to expand the Department of Pathology’s molecular diagnostic capacity. Building on intraoperative data gathered using stimulated Raman histology (SRH)—the laser-based imaging technique pioneered by Dr. Orringer—the new approach applies data modalities focused on maximum tumor resection and patient safety to help surgeons make more informed real-time decisions. It will enable more accurate intra-operativ



e surgical challenge of resecting this type

When intensifying symptoms associated with a right-sided meningioma involving the orbit and brain led to functional decline, a 44-year-old female patient traveled to New York City from the United Arab Emirates for treatment. The tumor's magnitude and rare orbital location presented a surgical challenge that necessitated an open approach—a complicated operation requiring the delicate hands of an experienced, multidisciplinary surgical team capable of resecting the tumor and mitigating postsurgical cosmetic effects. Combining neurosurgical precision and nuanced reconstruction techniques, the team executed a carefully planned approach, safely resected the patient's tumor, and restored both her function and her appearance.

postoperatively, and she was able to travel home about two and a half months after surgery, following minor reconstructive procedures performed by Dr. Stassenberg. Once home, the patient continued to regain her vision, with full recovery of eye function.

“Notably, most of the recovery occurs naturally as the eye muscle returns to normal strength and the brain’s wiring intrinsically works to move both eyes in tandem,” explains Dr. Sen. “Like all patients, she had to wear a patch initially as she walked so her double vision

When a patient presented with a series of increasingly severe idiopathic symptoms, a multidisciplinary team of endocrinologists, neurosurgeons, and radiologists pursued an elusive diagnosis to identify her condition’s root cause: a rare pituitary tumor. Supported by advanced diagnostics and intraoperative imaging, the team collaborated to plan a minimally invasive surgical resection—and halt the patient’s decline.

ACCURATE DIAGNOSIS REQUIRES EXTENSIVE DIAGNOSTIC SLEUTHING

The 38-year-old patient had a complex history, with a range of comorbidities including prior stroke, hypertension, cardiomyopathy, and treatment-resistant type 2 diabetes mellitus with hyperglycemia. Despite several hospitalizations at other centers, her symptoms continued to elude a definitive diagnosis. She consulted with a multidisciplinary team at NYU Langone, including endocrinologist Eliud Sifonte, MD, that suspected and confirmed hypercortisolism and a right-sided adrenal adenoma thought to be benign and unrelated to the hypercortisolism. Indications pointed to Cushing syndrome. However, the source of the hormonal irregularity remained unconfirmed, and the patient’s symptoms persisted, threatening her life and demanding swift diagnosis.

“With a case like this, it’s critical to really nail down the diagnosis and determine what is essentially giving this 38-year-old patient the clinical profile of a sick 75-year-old,” says Nidhi Agrawal, MD, clinical assistant professor in the Department of Medicine and director of pituitary diseases at the Pituitary Center. “And that diagnosis necessitates farcittthee dw5onenond dhe d5iaasecon-tintedithe precesf pwlc, MD0.6 (e)-13. (r)-37.2 (m)-35 T0 T*14 00 14 15 (2644 99

RESECTING THE ROOT CAUSE, CAREFULLY

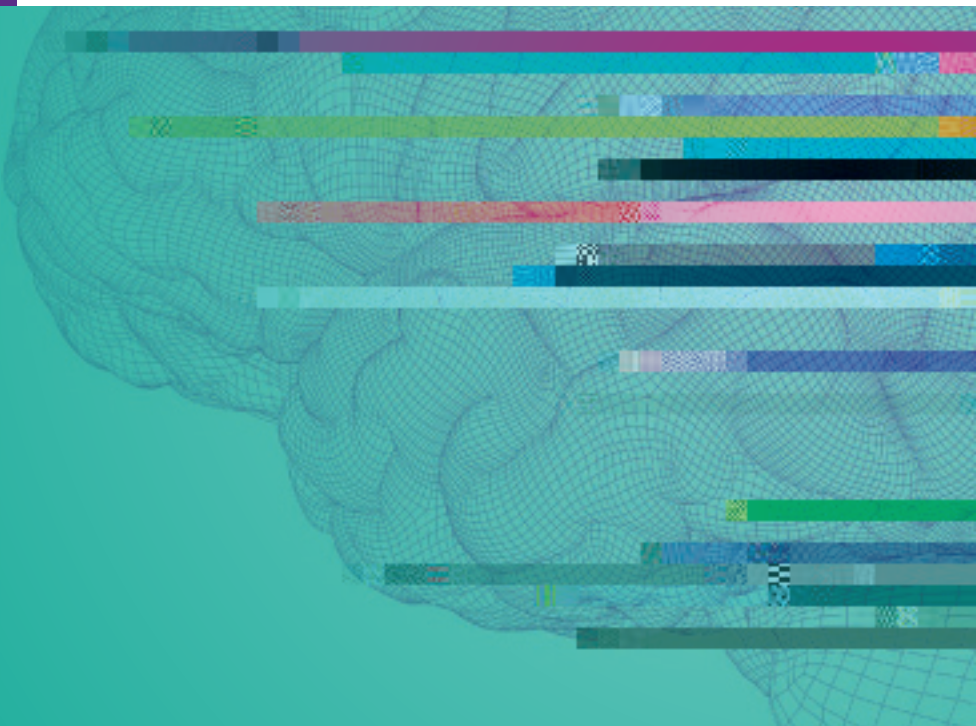
Diagnosis in hand, the surgical planning began. “After the long road to diagnosis, surgery should be the simpler part—except that you’re working with something that’s 6 millimeters in size, and if you don’t resect every trace of the tumor, it still secretes hormone,” notes Dr. Pacione.

Understanding the historically high recurrence rate of such pituitary tumors, Dr. Pacione recommended an endoscopic endonasal approach for tumor resection, a minimally invasive approach that would enable precise navigation. Dr. Pacione

MAPPING A DELICATE ANATOMY FOR REAL-TIME VISUALIZATION

...e site of the tumor precluded en bloc resection
in favor of a more precarious intralesional
resection, in order to reduce the risk of





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