

Beyond Vascular Neurosurgery

Case Illustrations by Jonathan L. Brisman, M.D.

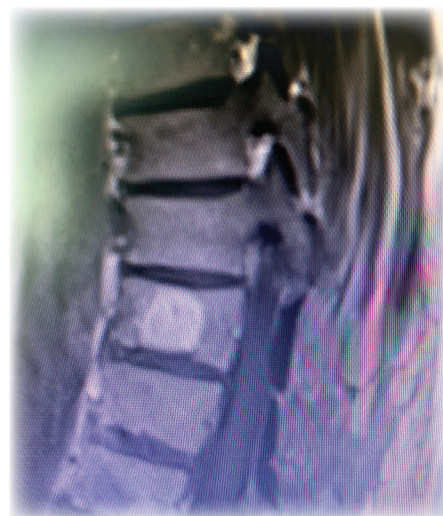


Figure 3B: Post-Operative Sagittal MRI

Postoperative imaging also seen in Figure 3B, shows complete extirpation of the intradural mass. An incidental vertebral hemangioma is also seen.

Questions & Answers:

Q: What is the differential diagnosis for intradural extraaxial lesions in a man of this age?

A: Intradural extraaxial spinal lesions that enhance with gadolinium are almost always meningiomas, schwannomas, or neurofibromas. Given its extension into the neural foramen, the diagnosis of intradural schwannoma was highest on the list and, in fact, the pathology came back as a schwannoma.

Q: What is the indication to remove such tumors?

A: Given the radiographic compression and symptoms in this gentleman, surgery was indicated to relieve pain and prevent neurologic decline. It is also helpful to obtain tissue specimen

to direct further management as other pathologies are possible.

Q: What will be done with the remaining small amount of tumor in the neural foramen?

A: This will be followed conservatively with serial MRI imaging with contrast every six months. If there is either growth or encroachment into the intradural space or new symptoms either further surgical excision or more likely focused radiation will be offered.

Q: Is there a role for fusion or stabilization in this procedure?

A: We preformed a two-level posterior laminectomy only and given that the area is supported by the ribs, further fusion and instrumentation was not deemed necessary.

Jonathan L. Brisman, M.D., Neurosurgeon

Jonathan L. Brisman, M.D. is a Board Certified Neurosurgeon who specializes in Cerebrovascular and Endovascular conditions, including brain aneurysms, arteriovenous malformations (AVM), carotid stenosis, and stroke. He is one of about 150 neurosurgeons nationally, trained in both endovascular and micro-neurosurgical techniques and the first endovascular neurosurgeon on Long Island.

Dr. Brisman was the first neurosurgeon on Long Island to coil a cerebral aneurysm and the first physician in Nassau County to place an intracranial, FDA-approved stent for atherosclerotic disease. He has served as the Director of Cerebrovascular and Endovascular Neurosurgery at both NYU Winthrop Hospital and Mount Sinai South Nassau.

Dr. Brisman received his undergraduate degree, magna cum laude, in History and Science from Harvard University and his medical degree from Columbia College of Physicians and Surgeons. He then completed a general surgery internship and neurosurgical residency at Massachusetts General Hospital, serving as Chief Neurosurgical Resident in his final year. Dr. Brisman completed an interventional neuroradiology fellowship at Roosevelt Hospital in New York City under Alejandro

Berenstein, MD, and a microvascular neurosurgical fellowship at Swedish Hospital, Seattle, Washington, under Drs. David Newell and Marc Mayberg.

Dr. Brisman was the first and neurosurgeon on the Editorial Board of the prestigious American Journal of Neuroradiology. He is the Section Editor of both Vascular Neurosurgery and Endovascular Neurosurgery for the journal *World Neurosurgery*.

Dr. Brisman has been recognized by his peers as a *Castle Connolly "Top Doctor: New York Metro Area"* from 2012-2021. In addition, he has been included in *New York Magazine's "Best Doctors"* listing from 2013-2020. Dr. Brisman was the only neurosurgeon from Queens, Nassau, and Suffolk Counties to be recognized as one of the magazine's "Best Doctors" in 2018 and 2019.



Scan with your mobile device for Dr. Jonathan Brisman's complete biography.



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I want to thank you for taking the time to look at this newsletter, which is now the second newsletter I am publishing on the topic of "Beyond Vascular Neurosurgery."

In my first "Beyond Vascular Neurosurgery" newsletter, I presented three cases: one of normal-pressure hydrocephalus (NPH), one of meningioma surgery, and one of Chiari I malformation surgery.

I continue to expand my practice in the realm of general neurosurgery including spine surgery and, of course, I continue to treat patients with neurovascular or neuro-endovascular diseases as well.

Acute stroke neuro-intervention, namely thrombectomy, continues to flourish and be a very effective means of reducing deficit from stroke. Of course with the COVID

pandemic, there is now a new subset of COVID-related strokes and need for COVID-related thrombectomies, which have also proven to be effective means of treating such patients.

I would like to use the same platform that I did on the initial newsletter, that of presenting three nonvascular cases that I have operated on recently and describing their clinical scenarios. I will give a brief summary of my management algorithm for each disease and then pose a few frequently-asked questions and provide answers.

I hope you enjoy this and please feel free to contact me at jbrisman@nspc.com to give me any feedback on this and any other ways that I could best assist the patients that we collaboratively care for.

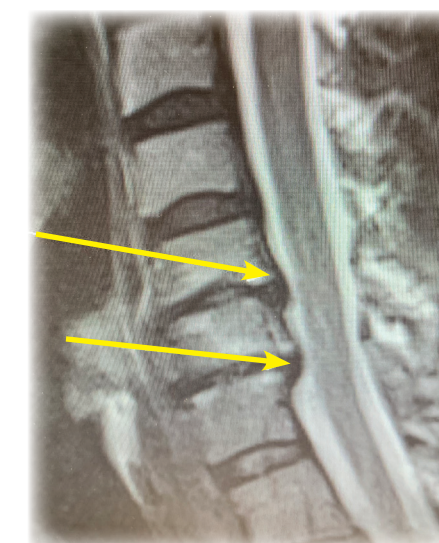
Cervical Stenosis

Case Illustration 1

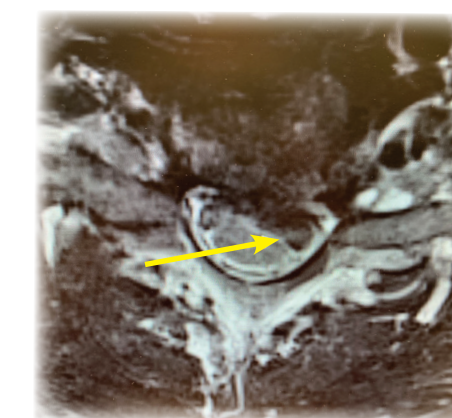
The patient is a 54-year-old otherwise healthy gentleman who presented initially to a hospital with complaints of numbness and tingling in his left arm and leg.

He was evaluated and diagnosed with a possible transient ischemic attack and workup revealed no evidence for acute stroke. He did have a left carotid dissection, felt to be asymptomatic given his symptoms on the same side.

He continued to have complaints of bilateral upper extremity numbness, tingling, and shoulder discomfort as well as headaches for close to a year. After failing conservative therapy including physical therapy, anti-inflammatories, and stretching regimens, MRI imaging was obtained revealing significant spinal cord compression as well as foraminal encroachment, particularly severe from C5-C7. He was referred for surgical evaluation.



On examination, he was in no acute distress but his symptoms were exacerbated with head and neck movement and he had borderline hyperreflexia. He was otherwise nonfocal. He had no bowel or bladder incontinence or gait instability. MRI as described above is seen in Figures 1A and 1B.



Figures 1A: Pre-Operative Sagittal MRI (left) and **1B:** Pre-operative Axial MRI (right)

I diagnosed this patient with symptomatic cervical stenosis with significant degenerative changes causing encroachment at the C5 through C7 level and I therefore, recommended surgical decompression with an anterior cervical discectomy C5 through C7. The patient underwent anterior cervical discectomy with

arthrodesis from C5 through C7 using a titanium plating system. We used bone graft autograft and cadaveric allograft to achieve bony fusion for stabilization after adequate decompression of the spinal cord and nerve roots bilaterally.

He was discharged from the hospital on postoperative day #2 and on follow-up examination in the office setting, he was noted to have marked improvement in his pain syndrome as well as decreased numbness and tingling in both extremities.

Questions & Answers:

Q: What is your indication for surgical decompression in patients with cervical stenosis?

A: In general, my decision to operate is almost completely dependent on the patient's symptoms. Of course, age and general health play a role as well. Certainly if there is evidence for myelopathy with significant gait disturbance, urinary incontinence, or obvious myelopathic signs, then

this is an indication to proceed with decompression. Otherwise, as in this gentleman, surgery can alleviate pain symptoms or other neurologic symptoms once conservative methods fail, as was successfully demonstrated here. Another indication would be gross radiographic instability such as malalignment or abnormal movement on flexion and extension x-rays as this patient did not have.

Q: How do you make the decision to proceed anteriorly or posteriorly with the decompression?

A: In general, if there is any question of myelopathy or significant cord compression that is relatively focal up to two levels and the patient can tolerate an anterior approach, then this is usually preferred. Posterior approaches are generally favored if the compression is mostly posterior in elderly patients or in some patients who cannot tolerate the anterior approach or in patients that have several levels of involvement.

Q: Do you fuse all such patients and is fusion necessary?

A: Fusion is not always necessary, particularly if just one segment is involved. Although given the low risks of fusion, we generally do fuse, particularly if more than one segment is involved as this seems to be low risk and has a long-term stabilization effect for the patient.

Q: What are the risks associated with the anterior approach?

A: In general, the risk can be minimized with good operative technique and the use of neurophysiologic monitoring, which is always utilized in such surgeries. Obviously, laryngeal nerve injury, CSF leak, or other injury to the esophagus or surrounding structures are quite rare, but always discussed with the patient before the procedure.

I placed a Strata programmable valve set at 1.5, which is essentially a medium pressure. I implanted that and then tunneled it into the abdomen with the assistance of a general surgeon such that the procedure was performed laparoscopically without significant incisions on the abdomen.

The patient was discharged the following day and has noted marked improvement in his headaches and no longer feels unsteady when walking. Repeat head CT showed decreased ventricular size.

Questions & Answers:

Q: What is the differential diagnosis for this tumor and what is his prognosis and treatment strategy?

A: This is most likely a benign intraaxial low-grade brain stem glioma. These tend to be indolent. He will be followed up with serial MRIs with gadolinium and unless there is a growth or other change in the lesion appearance, this will be followed expectantly.

Q: Was there a role for any additional workup on the initial presentation such as a spinal tap?

A: No. In fact, given the normal fourth ventricular size, the patient most likely had obstructive hydrocephalus and a spinal tap could prove disastrous as it could encourage brain herniation via reduction in intracanal pressure in the spinal region.

Q: What was the particular pitfall in this case?

A: The patient gave a history of traumatic intracranial hemorrhage, which can lead to hydrocephalus. The patient was unable to supply those images and, therefore, we were working under the presumption that this was hydrocephalus secondary to trauma and hemorrhage when in fact, the lesion was simply not well visualized on the initial MRI due to patient motion and low strength magnet.

Q: Was endoscopic third ventriculostomy considered for this patient?

A: Endoscopic third ventriculostomy would be a consideration, as it is in most cases of obstructive hydrocephalus. My experience, however, has been that it is not as definitive as shunting and given concerns over noncompliance with this patient, I felt that that a potentially curative shunt was the best treatment strategy.

Hydrocephalus and Brainstem Tumor

Case Illustration 2

The patient is a 59-year-old gentleman who was otherwise healthy, but states that he had a traumatic head injury several months prior for which he was hospitalized and had some intracranial bleeding.

He presented several months later to a neurologist in order to get a driving clearance and an MRI was performed showing hydrocephalus.

On initial examination, the patient was neurologically intact without complaints of headache. His imaging; however,

did show hydrocephalus, most notably the lateral and third ventricles with a normal sized fourth ventricle. Given that the patient had no complaints, a decision was made to follow this expectantly and he was referred for a neuro-ophthalmologic evaluation, which confirmed no evidence of papilledema. MRI was otherwise negative.

Several weeks later, the patient re-presented to the office complaining of significant headaches and gait disturbance and a decision was made at that point to recommend shunting.

Prior to shunting, a head CT was obtained and the head CT in addition to documenting a pattern of obstructive hydrocephalus suggested a possible mass lesion compressing the aqueduct at its inferior aspect. Repeat MRI confirmed this finding, not seen on a previous image with a low strength magnet. Figure 2 demonstrates the hydrocephalus and the possible lesion. A decision was made at this point that the patient had obstructive hydrocephalus that was now symptomatic and he was taken for a laparoscopic-assisted ventriculoperitoneal shunt.

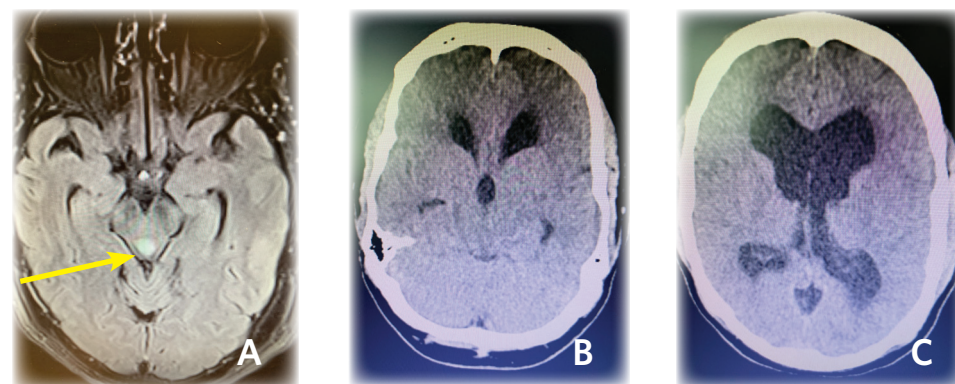


Figure 2: Pre-Operative MRI (A) and CT (B, C) Images

Spinal Cord Tumor

Case Illustration 3

The patient is a 48-year-old otherwise healthy postal worker who has been suffering from significant back pain that radiated predominantly into his left leg. He has also had progressive numbness of his left leg. He denied bowel or bladder dysfunction or gait disturbance, but was in quite a bit of pain.

MRI imaging was obtained and revealed an intradural, but extramedullary spinal cord tumor. Extramedullary or extraaxial tumors are outside the spinal cord itself. The patient was referred for neurosurgical evaluation.

On examination, the patient was neurologically intact, although he did walk with a limp and it was unclear if this was secondary to pain or a muscular weakness component. He was referred for decompression and excision of the tumor.

The patient had an MRI of the thoracic region with and without gadolinium, which revealed, as described, a 2.4 x 1.6 cm intradural extra-axial heterogeneously enhancing tumor at the level of T12 and expanding the left neural foramen. There was significant cord compression. This is demonstrated in Figure 3A.

Given the symptomatic nature of the tumor and the need for pathologic specimen to direct management, the patient was advised to have operative decompression and excision. Further MRI imaging of the entire nervous system and spinal axis were negative for additional lesions.

The patient underwent skin marking at the level of T12 by radiology prior to being brought to the operating room. He then underwent a posterior T11 and T12 thoracic laminectomy and the dura was opened.

Neurophysiologic monitoring was used throughout the entire procedure and after the dura was opened in the midline, a 90% drop in the left-sided somatosensory-evoked potentials was noted. The operation was continued with augmented systemic blood pressure after steroids were administered and in an effort to start removing the tumor, an additional drop on the right side was also noted and the motor potentials also began to drop.

A decision was made to proceed with more urgent and expeditious removal of the tumor which was taken out with

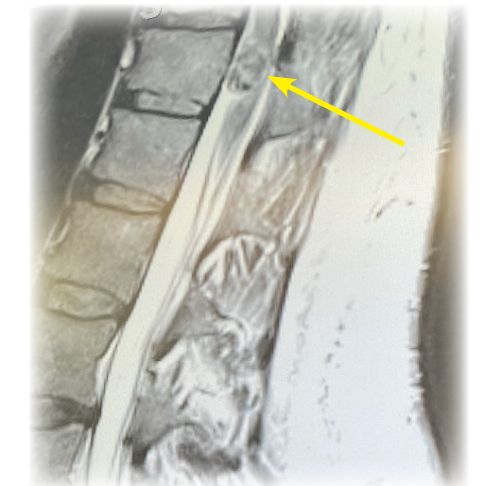


Figure 3A: Pre-Operative Sagittal MRI

bipolar cauterization of the identified nerve root. The intradural tumor was excised in a gross total manner.

The patient did wake up with some significant weakness of his left leg in particular.

Over the next few hours and day, his leg strength improved and over the next several weeks, his leg strength came back to baseline and even a bit stronger than preoperatively. His pain was almost completely gone.