

Comprehensive Care for Spinal Tumors and Associated Degenerative Spinal Conditions at Neurological Surgery, P.C.

TREATING THE GAMUT OF PRIMARY AND METASTATIC SPINE TUMORS WITH AN ARRAY OF STATE-OF-THE-ART, MINIMALLY INVASIVE TECHNIQUES AND MULTIMODAL THERAPIES, NEUROSURGEONS AT NEUROLOGICAL SURGERY, P.C. OFFER COMPREHENSIVE CARE FOR PATIENTS WITH TUMORS OF THE SPINE, AS WELL AS THOSE WITH DEGENERATIVE SPINAL CONDITIONS THAT MAY RESULT FROM SUCH TUMORS.

STEPHEN ONESTI, M.D., Chief of the Division of Neurological Surgery at South Nassau Communities Hospital, neurosurgeon at Neurological Surgery, P.C., says the classic symptom of a spinal tumor is back pain at night that is not relieved by recumbence. Additionally, spinal tumors may present with fever, numbness, sciatica, spinal deformity and back pain

that may or may not be related to activity. Dr. Onesti and Vladimir Dadashev, M.D., neurosurgeon at Neurological Surgery, P.C., specialize in both spinal tumors and degenerative conditions of the spine, and recommend that physicians refer patients at the onset of these symptoms for full evaluation, beginning with magnetic resonance imaging (MRI) and computed tomography (CT) studies.

“MRI is so good, we can get accurate delineation of the tumor and follow it over time,” says Dr. Onesti. “Neuroimaging techniques such as this have made our lives so much better and given us the ability to monitor patients and follow the tumor’s progression after treatment.”

Most spinal tumor patients referred to Dr. Onesti and Dr. Dadashev have metastatic disease, so tumor type is already

Stephen Onesti, M.D., (left) and Vladimir Dadashev, M.D., neurosurgeons at Neurological Surgery, P.C





Dr. Onesti discusses treatment options with a patient.

known, and no biopsy is needed. On occasions when tumor type is not already known, the primary goal of surgery is to obtain diagnosis to determine if the tumor is primary — originating in the spine — or metastatic. Spinal tumors often metastasize from lung, breast, renal and prostate cancers, according to Dr. Dadashev.

“Any patient with a documented spine tumor should be evaluated by a spine surgeon. If physicians know there is metastatic disease to the spine, they should send their patients for evaluation, even in the absence of significant pain or neurological deficit.”

— Stephen T. Onesti, M.D.,
Chief of the Division of
Neurological Surgery at
South Nassau Communities
Hospital, neurosurgeon at
Neurological Surgery, P.C.

Surgical intervention for primary and metastatic tumors carries different aims. For primary tumors, the first step is to diagnose the type of tumor — for example, astrocytomas, chordomas or ependymomas. After surgeons biopsy the tumor, complete resection is often attempted.

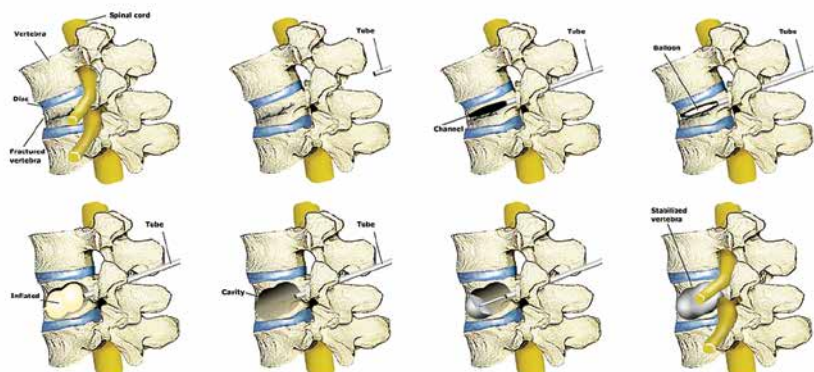
“Usually, the goal for primary tumors is resection, and in most cases, surgery is curative,” Dr. Dadashev says. “If any residual tumor can be identified and is separate from the spinal cord itself, it can be targeted with novel spinal radiosurgery techniques.”

Because cancer that metastasizes from other areas of the body to the spine often

reaches the bony structure of the spinal column, the spine is often weakened by the tumor. Dr. Dadashev notes that, like surgery for primary tumors of the spine, surgery on metastatic spine tumors is diagnostic in nature unless the tumor’s origin has already been identified. In addition, surgeons often must take steps to decompress neuronal impingement, reestablish spinal alignment and stabilize the spinal column.

Multimodal Approaches for Better Outcomes

When the spine’s structure has been compromised by a tumor, neurosurgeons collaborate with radiation oncologists



An illustration of how kyphoplasty is performed. Copyright Medtronic, Inc.

“A good, conservative surgeon will consider nonoperative modalities first and, through discussions with patients and their primary care teams, decide when and what appropriate surgical interventions should be taken. It’s important that physicians know their patients’ spinal conditions can be addressed through a variety of methods and be comfortable with the overall management of their patients’ issues while they are under the care of Neurological Surgery, P.C. physicians. Excellent patient outcomes are the fundamental goal in my treatment philosophy.”

— Vladimir Dadashev, M.D., neurosurgeon at Neurological Surgery, P.C.

to offer combination techniques geared toward minimizing hospital stays, promoting patient ambulation following the procedure, maintaining high neurological levels, and avoiding complications that may stem from prolonged hospitalization, bed rest or major surgeries, according to Dr. Onesti.

“The idea behind multimodal techniques is to combine two less invasive techniques to get the best result,” says Dr. Onesti. “We do this to avoid subjecting

patients to one large open procedure or extended radiation treatments that may be spread out over the course of a few weeks.”

For example, patients presenting with spinal tumors may suffer a severe neurological deficit, such as difficulty or inability to walk, because the tumor has weakened the spine. In this case, Dr. Onesti may resect as much of the tumor as possible and then perform kyphoplasty to strengthen and stabilize

the spine. After kyphoplasty, neurosurgeons may use stereotactic radiosurgery to kill remaining tumor cells and reduce the chances of recurrence.

Kyphoplasty is an outpatient procedure performed under local or general anesthesia, depending on patient tolerance. After placing a needle through the pedicles in each damaged vertebra, Dr. Onesti places a balloon dilator in the collapsed vertebra and dilates the balloon on each side, creating a cavity, into which he injects cement that hardens in approximately one hour. Dr. Onesti says patients experience immediate pain relief and require, at most, two Band-Aids where the needle punctured the skin and a couple of stitches.

“Using kyphoplasty allows us to avoid having to slow adjuvant treatments down for two to three weeks while patients recover from a major surgical procedure,” explains Dr. Onesti. “Radiation and chemotherapy may begin immediately because patients are not recovering from painful surgeries. This enables us to keep patients out of hospitals, where they are at higher risk for infection. The more we can keep patients at home, the better it is for the entire health care system, so it is a win-win for everybody.”

When Surgery Won’t Cut It

When patients present with spinal tumors that have been identified as diffuse, complete surgical resection is often not recommended. MRI and CT

Dr. Dadashev examines a patient.





Patient receiving postoperative physical therapy

scans allow physicians to determine the nature of the tumor and formulate a treatment plan corresponding to the tumor's location and type.

“New imaging techniques have revolutionized the way we see tumors,” Dr. Dadashev notes. “This allows for better localization. Neuromonitoring techniques have enhanced our ability to operate and resect, and radiosurgery has allowed us minimally invasive options for tumors we weren't able to treat five to 10 years ago.”

Focal lesions — tumors with well-defined edges that have not infiltrated local tissue — confined to, at most, three vertebral segments, are ideal for radiosurgical treatment, which may be used exclusively or in combination with surgical resection.

When physicians know the diagnosis and no structural damage to the spine needs correction, stereotactic radiosurgery may be used as a stand-alone treatment. Neurological Surgery, P.C. physicians have access to both CyberKnife and Novalis radiosurgical modalities, which beam targeted rays of radiation through the body to the focal point. Individual beams of radiation are weak, so they do not damage body tissues as they make their way through the body to the focal point. Once at the target, beams coalesce into a powerfully high dose of radiation that kills any tissues in the area. Stereotactic radiosurgery involves very sharp radiation dose fall-off, which is particularly necessary in spine treatments because the spinal cord does not tolerate high levels of radiation.

Dr. Onesti notes that, because radiosurgery is so effective at destroying all tissue in the target area, this technique reduces treatment schedules to one to five sessions, whereas traditional external beam radiation treatments may take weeks or months to complete.

CyberKnife

The CyberKnife, made by Accuray, allows patients a more comfortable option than previous generations of radiation therapy. Real-time image guidance eliminates targeting problems caused by the body's natural movement by identifying and marking the tumor so radiation beams find the tumor directly and leave surrounding healthy tissues intact. Patients do not need to hold their breath for CyberKnife treatments because of its image-guidance system. Dr. Dadashev also notes that CyberKnife's large patient bed and open design enable

even the most claustrophobic patients a worry-free procedure.

Radiation treatment for the spine can be difficult because of the spinal cord's low radiation tolerance, so pinpoint accuracy is essential. The image-guiding technology is extremely helpful in this regard, but the CyberKnife's ability to deliver radiation beams from thousands of angles is of equal importance. According to Accuray, CyberKnife treatments generally send radiation beams from 150 to 200 sources, specifically aimed to deliver radiation beams in the most precise path to the patient's tumor.

Novalis

Patients may also undergo radiosurgery procedures in Neurological Surgery, P.C.'s Novalis radiosurgery platform, depending on which system radiation oncologists and neurosurgeons deem the most appropriate for the patient's treatment. Like the CyberKnife, the Novalis platform locates the tumor using image-guided technology that accounts for natural body movement and focuses radiation delivery to destroy only tumor cells and spare healthy tissue.

Dr. Onesti evaluates a patient.



The Novalis radiosurgery system rotates around patients to deliver radiation beams from appropriate angles, while providing physicians real-time imaging and information about the position, shape and size of the tumor, which may assist planning and beam positioning during treatment. Treatments may take as few as 15 minutes, and patients suffer minimal side effects. Otherwise, radiosurgery on either modality is painless.

“Radiosurgery and minimally invasive surgical techniques have had a tremendous impact on patient recovery times,” notes Dr. Onesti. “We can get patients out of the hospital faster or keep them out of the hospital altogether. We can identify tumors and hopefully treat them before they cause major neurological issues. We can maintain patients’ neurological function and also treat pain associated with these tumors much better. Radiosurgery is a huge advance as far as allowing us to better control patient pain. In addition to tumor control, radiosurgery’s primary benefit is pain control.”

A Multitude of Options

When tumors of the spine have caused damage requiring major spinal reconstruction, Dr. Onesti explains, surgery is necessary to support the spinal column and relieve pressure on the spinal cord, which will help preserve ambulation and neurological function. Recent technological advances and new techniques help surgeons correct structural issues while promoting patient safety and toleration.

When Dr. Onesti and Dr. Dadashev operate on a patient’s spine, they collaborate with a specially trained neurophysiology technician who conducts real-time neurological monitoring. In a manner similar to Christmas lights, in which lights on one end of the string will not function if

a one light is out, if there is a disruption in the spinal cord, patients will lose feeling or movement in their extremities. Neurophysiologists run electrical currents through the spinal cord that ensure no disruption in the spinal cord occurs.

Because tumors in the spinal column may crowd the spinal cord, degenerative



Dr. Dadashev studies an MRI film of a patient’s spine.

diseases may result. One such disease, spinal stenosis, is characterized by the application of abnormal pressure on the spinal cord or the narrowing of the openings where the spinal cord exits the spinal column.

Presenting with numbness, cramping, or pain in the arms, back, buttocks, calves, neck, shoulders or thighs — as well as weakness of part of an arm or leg — spinal cord compression may make walking difficult and, in some cases, cause incontinence. Patients who exhibit these symptoms may be referred to Neurological Surgery, P.C. neurologists for a full evaluation that will confirm or reject the diagnosis of spinal cord compression, as well as use CT or MRI to rule in or out the possibility of a tumor’s involvement.

When a procedure is necessary, Dr. Dadashev explains, traditional methods of laminectomy surgery still provide the best outcomes. Surgeons decompress

the compromised section of the spinal column to relieve pressure on the spinal cord. A patient lies on his or her stomach on the operating table, and surgeons make an incision in the back. Any small disc fragments, bones spurs or problematic soft tissues are removed through a small tube and microscope, according to Dr. Dadashev. In some cases, spinal fusion is necessary to stabilize the spine.

In cases where fusion is necessary, Drs. Onesti and Dadashev note that recent minimally invasive techniques may be used to decrease operative time, minimize muscle dissection and blood loss, reduce scarring, eliminate associated complications, and shorten recovery time. Extreme lateral interbody fusion (XLIF) is one such technique Neurological Surgery, P.C. surgeons use to provide better outcomes for their patients.

“Minimally invasive techniques help us avoid making large incisions and dissecting muscle,” Dr. Dadashev notes. “Through a ½-inch incision, we can introduce appropriate instrumentation that will help us stabilize the patient’s spinal column.”

Recent advances in instrumentation alone play a large role in availing minimally invasive techniques to spine surgeons. Transpedicular instrumentation, which allows for pedicular screw fixation, allows surgeons to more easily perform procedures on the thoracic spine — a difficult location to access with earlier instrumentation, notes Dr. Onesti.

After tumor resection, the space left behind causes spinal instability. The development of expandable titanium cages that can be placed between the vertebrae to better support the weight of the spine provide a more durable option for patients.

Previous techniques of interbody fusion required surgeons to enter the body through patients’ backs or abdomens, requiring dissection or disruption of



Dr. Onesti and Dr. Dadashev review an article together.

muscles, nerves and abdominal contents, which may have caused major neurological deficits or bleeding issues. XLIF allows surgeons to enter the disc space through the side. Authors of a 2009 review of the technique published in *Current Orthopaedic Practice* note that previous methods required large, open incisions that led to longer recovery times, cosmetically displeasing scarring and more potential damage to soft-tissue structures. Using a lateral incision allows surgeons to avoid disrupting organs in the abdomen and major blood vessels.

The Importance of Teamwork

Because Dr. Onesti treats many older patients who have complex needs, a multidisciplinary team is essential to providing patients the care they need. In addition to medical oncologists — who are often already involved in the care of patients with metastatic disease — neurosurgeons at Neurological Surgery, P.C. rely on the combined expertise of social workers, orthopedic surgeons, pain management specialists, physical therapists, occupational therapists, radiation oncologists, and various specialists, such as cardiologists and urologists, to address patients' other needs.

Many patients with spine tumors require extensive surgery and subsequent

rehabilitation, so physical and occupational therapists are usually involved at the onset of treatment planning. Dr. Onesti explains that other physicians and specialists are brought in to assist with treatment on an as-needed basis.

Regardless of patients' conditions when referred to Neurological Surgery, P.C., neurosurgeons ensure that patients receive the best treatment available, always opting for the most appropriate procedure to minimize complications and recovery times. Dr. Onesti notes that maintaining open lines of communication with primary care physicians is of the utmost importance in patient care. Throughout the treatment process, Neurological Surgery, P.C. physicians communicate extensively with primary care physicians and oncologists regarding treatment plan options.

"We're here to help primary care physicians," says Dr. Onesti. "We'll communicate and keep them informed every step of the way. Our aim is to take care of their patients, make sure they receive the best care available and get them back to their physicians after they've completed their treatment."

To find out more about Neurological Surgery P.C.'s continuum of care, please visit www.nspc.com. ■

EXPERTS IN SPINE TREATMENT

NEUROLOGICAL SURGERY, P.C. neurosurgeons Stephen T. Onesti, M.D., FACS, and Vladimir Dadashev, M.D., have extensive training in treating spinal conditions with both minimally invasive and traditional open approaches.

+ **Dr. Onesti** earned his undergraduate degree from Harvard College and his medical degree from Harvard Medical School. He completed his residency in neurosurgery at The Neurological Institute of New York and the Columbia Presbyterian Medical Center. From 2003 to 2011, Dr. Onesti served as professor of neurosurgery and chair of the Department of Neurosurgery at State University New York Downstate Health Science Center at Brooklyn, NY. At present, Dr. Onesti is Chief of the Division of Neurosurgery, South Nassau Communities Hospital. He is a member of the board of directors of the Nassau County Medical Society. He is a member of the American Association for the Advancement of Science, American Association of Neurological Surgeons and the New York State Neurosurgical Society, for which he served as president.

+ **Dr. Dadashev** received his undergraduate degree in chemistry from Hunter College in New York, NY, where he was salutatorian. He earned his medical degree with high distinction from Wayne State University School of Medicine. He completed his internship and residency in the department of neurosurgery at Emory University in Atlanta, GA, and served as chief resident during his last year at the institution. He is a member of the American Association of Neurological Surgeons and the Congress of Neurological Surgeons.