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SYNAPSE

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Most Pituitary Tumors Lend Themselves to Less-invasive Surgery

Michael Chan, MD

Pituitary tumors comprise up to 20% of all brain tumors. The pituitary gland sits at the base of the skull behind the nasal cavity inside the sella turcica. Pituitary tumors may present with mass effects on adjacent structures such as the optic chiasm, creating visual field cuts. Alternatively, distortion of the nearby hypothalamus or pituitary gland may cause hormonal disturbance. Prolactin abnormality is the most common form of pituitary tumor endocrinological presentation. A large proportion of pituitary tumors are clinically and endocrinologically silent and are discovered as an incidental finding on imaging studies for other indications.

When a pituitary tumor is present on imaging studies, the patient is frequently referred to a neurosurgeon. While small incidental tumors and prolactinomas may be followed with serial imaging and medical management, respectively, large or clinically significant tumors may benefit from surgical resection. The unique location of pituitary tumors lends itself to less-invasive surgical approaches. While tumors with a large component that extend well beyond the sella may benefit from a traditional open craniotomy, most tumors are either confined completely to the sella, or have a large component within the boundaries of the sella. A transphenoidal approach through the nostrils is the preferred method of resection for these tumors.

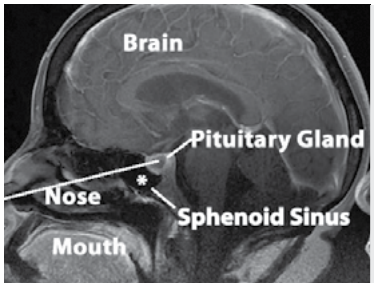

Figure 1.
Sagittal T1 MRI post contrast of the brain. The surgical trajectory is indicated by the oblique line. The sphenoid sinus is indicated by the *.

The sella sits behind the sphenoid sinus, a large air-filled cavity in the back of the nose (Fig 1). The sphenoid sinus provides a corridor to the sella, with the nasal mucosa, the anterior sphenoid wall and the posterior sphenoid wall being the only structures between the nasal cavity and the sella. This procedure is frequently performed in conjunction with an otolaryngologist, who provides the intra-nasal approach. Endoscopes and endoscopic cameras are used to displace the nasal septum and drill through the walls of the sphenoid sinus to expose the dura of the sella, which is incised with a specialized knife to gain entrance into the sella. The neurosurgeon can palpate the sella anatomy and resect the tumor with a specialized ring curette, an instrument which looks like an ice cream scoop. A thorough knowledge of the anatomy is essential as the cavernous carotid arteries are immediately to the side of the sella and injury to these structures can be catastrophic. Injury to the diaphragm sella, a thin membrane that separates the sella from the brain, can result in cerebral spinal fluid (CSF) leak, which may increase the risk of meningitis. This transphenoidal approach requires approximately two hours, and resection of the tumor requires an additional one hour.

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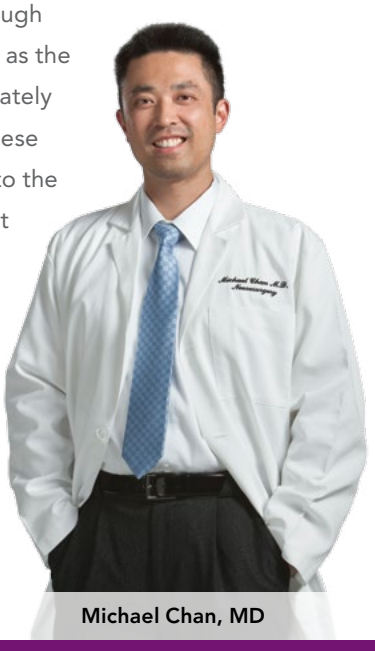

Michael Chan, MD

Mercy Stroke Team Treats 101-year-old Patient with tPA

When Lydia Grekoff suffered a stroke this past November, the effects were immediate and severe. According to her family, her mouth was hanging, her eyes were glazed and she was unresponsive. Quick action on the part of her family and the team at Mercy San Juan Medical Center enabled Grekoff to receive the clot-busting drug tPA (tissue plasminogen activator). Within hours, her symptoms were improving, and by the next morning she had recovered completely. While that in itself is remarkable, what is even more amazing about Lydia's story is this: Lydia is 101 years old.

"Just five or 10 years ago, she would not have been considered a candidate for tPA," explains John Schafer, MD, neurologist with the Mercy Neurological Institute. "But now we know that age is not a contraindication to treatment with tPA."

Grekoff, who's from North Dakota, had been visiting family in Fair Oaks with her daughter for the Thanksgiving holiday. "We were just sitting at the table after breakfast," remembers her daughter Sandy Schmidt. "Then she sneezed several times and after the last sneeze, I looked over at her and realized something was very wrong." Schmidt immediately recognized the signs of a stroke and called 911.

Grekoff's stroke may have occurred at a fortuitous time. Back home in North Dakota, she lives 40 miles from the nearest medical center. Here, she was just minutes away from Mercy San Juan and its Primary Stroke Center. Within minutes of the 911 call, Grekoff was being evaluated by Dr. Schafer, who determined she had most likely suffered an embolic stroke due to her atrial fibrillation.

Because she arrived at the hospital so quickly, Grekoff was considered a good candidate for tPA, which must be administered within 4.5 hours of onset of symptoms.

Within an hour, she became more attentive, then she began lifting her arm, and after a few hours she was able to speak, though with dysarthria. By the next morning, she had recovered completely.

Grekoff's major risk factor for stroke was atrial fibrillation, which had been diagnosed 20 years earlier. Her family doctor in North Dakota believed Lydia was too old for anticoagulation therapy, so the atrial fibrillation had gone untreated. Research now shows that age alone should not be a factor when considering anticoagulation for atrial

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FDA Approves Drug to Combat Stroke and Embolism in A-fib Patients

Patty Montgomery, Pharm.D

Rivaroxaban (Xarelto) is an oral agent direct factor Xa antagonist recently approved by the FDA to reduce the risk of stroke and systemic embolism in patients with nonvalvular atrial fibrillation (A-fib). Rivaroxaban was previously approved for prophylaxis of deep vein thrombosis (DVT) in knee or hip replacement surgery.[1]

Approval for nonvalvular A-fib was based on the ROCKET-AF trial, a randomized, double-blind, placebo-controlled comparison to warfarin in 14,264 patients with nonvalvular A-fib and a history of stroke or two additional independent risk factors for stroke.[2] Rivaroxaban was non-inferior to warfarin with respect to stroke and non-central-nervous-system (CNS) embolism. The groups did not differ with respect to major bleeding overall, but there was a lower rate of intracranial bleeding with rivaroxaban.[2] Compared to recent studies of other new antithrombotic agents in atrial fibrilation, ROCKET-AF included patients with a higher risk of stroke and achieved less optimal management of warfarin.[3]

Dosing considerations are needed in patients with either renal or hepatic disease. Clearance may also be affected by drug interactions.[1] Rivaroxaban has a black box warning about use of neuraxial anesthesia (e.g. epidural or spinal anesthesia).[1]

Currently, there is no recommended laboratory test for monitoring rivaroxaban.[1] An antiXa assay specific for rivaroxaban could prove to be effective.

A specific antidote does not exist. A recent trial examined the use of prothrombin complex concentrate (PCC) to reverse the anticoagulant effect of rivaroxaban or dabigatran after 2 1/2 days of therapy at twice the normal dose in healthy volunteers. PCC produced an immediate and complete reversal of rivaroxaban but not dabigatran under these conditions.[4]

Rivaroxaban is the second oral agent approved that is an alternative to warfarin in patients with nonvalvular A-fib. Similar to dabigatran, rivaroxaban requires monitoring for appropriate patient selection and dose adjustment but the anticoagulant effects cannot be monitored. It has not demonstrated superiority to warfarin. Finally, it appears to be more easily reversed with PCC than dabigatran.

REFERENCES:

1. Xarelto [package insert]. Titusville, NJ: Janssen Pharmaceuticals Inc; November 2011.

2. Manesh R. Patel, M.D.; Kenneth W. Mahaffey, M.D.; Jyotsna Garg, M.S.; Rivaroxaban versus Warfarin in Nonvalvular Atrial Fibrillation engl j med 365;10 nejm.org September 8, 2011N Engl J Med 2011; 365:883-91.

3. Mega, JL. A New Era for Anticoagulation in Atrial Fibrillation. N Engl J Med 2011; 365:1052-3.

4. Eerenberg ES, Kamphuisen PW, Sijpkens MK et al. Reversal of Rivaroxaban and Dabigatran by Prothrombin Complex Concentrate: A Randomized, Placebo-Controlled, Crossover Study in Healthy Subjects Circulation; 2011; 124:1573-9.

If you have comments or questions for Patty Montgomery, please e-mail her at mercyneuro@DignityHealth.org. ■

Mercy Stroke Team Treats 101-year-old Patient with tPA, continued from page 2

fibrillation patients. *[See Synapse, volume two, issue three, "Anticoagulation for Atrial Fibrillation in the Elderly"]*

Now, Grekoff is back home in North Dakota, enjoying life as she did before, attending luncheons and volunteering at a nursing home. "This is what we hope for in all of our patients—a complete return to normal function," says Dr. Schafer. "This is the best possible outcome. And this proves that age is not a factor with tPA treatment."

If you have comments or questions, please e-mail us at mercyneuro@DignityHealth.org. ■

"T2 Hyperintense Lesions in White Matter, Can't Rule Out Demyelinating Disorder"

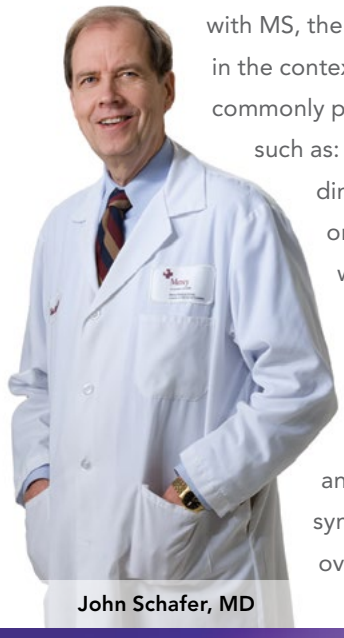
John Schafer, MD

Physicians who order MRI brain scans may encounter reports which describe the presence of T2 hyperintensities within the brain. Often the radiologist provides a differential diagnosis of these lesions, including vasculitis and demyelinating disease, which, of course, is essentially another term for multiple sclerosis. Especially when the scan was ordered for evaluation of headache, trauma or other indication unrelated to MS, the unsuspecting physician may be in a quandary about what to do. Should a report like this trigger treatment for MS, referral to a neurologist or arranging for a spinal tap, looking for markers of multiple sclerosis?

Two important points may be helpful. The first is that there are many causes of T2 hyperintensities in the white matter besides MS, and the second is that a diagnosis of MS is seldom made on the basis of a brain scan alone in the absence of typical signs and symptoms of that disorder.

Common causes for white matter hyperintensities in the brain include migraine syndrome and past neurological infection or trauma. White matter lesions in older patients are common and are believed to be due to vascular changes. Most often, the cause of such lesions remains unknown.

While MRI scans of the brain and spinal cord are a crucial part of diagnosis and monitoring of patients with MS, the scan is nearly always interpreted in the context of the clinical picture. MS most commonly presents with typical syndromes, such as: 1) Optic neuritis, in which vision is dim or lost altogether, usually in only one eye; 2) brainstem syndromes, with eye movement abnormalities, dysarthria, facial numbness and/or incoordination of limbs; or 3) spinal cord syndromes, with sensory level, bladder dysfunction and difficulty with ambulation. These symptoms usually appear subacutely over a few days and last for days or weeks and then improve. Other symptoms which are strongly suggestive of multiple sclerosis include Lhermitte's phenomenon, an electrical or vibratory sensation extending down the spine with flexion of the neck. T2 hyperintensities in a patient with any of these signs or symptoms, currently or in the past, are far more likely to be due to MS than identical MRI findings in a patient with no current or past signs or symptoms. The radiologist, of course, is not usually aware of the presence or absence of such features so must cover all of the bases when suggesting possible causes for these lesions.



John Schafer, MD

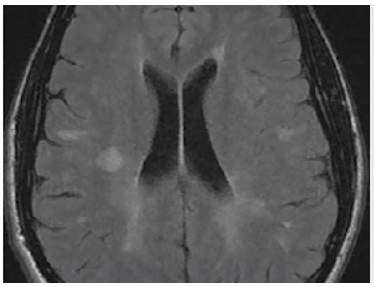


Figure 2.
T2 hyperintense lesions like this could be due to multiple sclerosis if the clinical setting is appropriate.

While the clinical signs and symptoms "trump" the MRI findings in the vast majority of cases, radiologically isolated syndromes of multiple sclerosis (RIS) refers to cases in which MRI lesions highly typical for multiple sclerosis are found in patients being scanned for common indications and who have never had signs or symptoms of MS. While even a few small lesions could clinch the diagnosis of MS in the right

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MS Lecture Series for 2012

The Mercy MS Center is hosting the following lectures for patients from 6:30 to 8 p.m. at Lukens Auditorium at 6555 Coyle Avenue in Carmichael. These lectures are open to anyone interested and are free.

April 17—MS, the Memory and Concentration | Caron Nogen, Psy.D., Clinical Psychology | Neuropsychologist

July 17—Employment Options and MS | Ann Johnson | Community Development Manager, National MS Society (NMSS)

Oct. 16—Treatments for MS: Where Are We and Where Are We Going | John Schafer, MD | Mercy MS Center Director

RSVP for each lecture to the NMSS 1.800.344.4867 or register online at nationalmssociety.org/can

Diabetic Peripheral Neuropathy: What to Expect and How to Treat It

Peter Skaff, MD

Type 2 diabetes is a common, chronic, acquired disorder of glucose metabolism, usually associated with obesity, that affects approximately 25 million Americans. It is estimated that another 80 million Americans are "pre-diabetic," with fasting or post-prandial blood glucose measurements that are above the normal range, but not high enough to be considered diabetic. Unfortunately, even people with pre-diabetes can develop microcirculatory complications of diabetes. Chief among these is peripheral neuropathy.

"By far, the most common cause of peripheral neuropathy in the United States is diabetes…"

The peripheral neuropathies, in general, are distally symmetrical, length-dependent, peripheral nerve disorders in which the nerve itself (the axon), the insulation surrounding the nerve (the myelin) or both are injured by some systemic factor. By far, the most common cause of peripheral neuropathy in the United States is diabetes, which accounts for at least half of all cases. Moreover, according to the National Institutes of Health, 60–70% of diabetics will eventually develop some form of neuropathy during their lifetimes. Given these statistics, it is no surprise that symptoms of peripheral neuropathy often bring undiagnosed diabetics to the attention of medical professionals.

Diabetic peripheral neuropathy (DPN) most frequently presents as a distally symmetrical, sensory predominant, peripheral neuropathy, initially affecting small nerve fibers, and later the larger fibers. Because the small, unmyelinated fibers convey pain and temperature sensation, the earliest symptom of DPN is often pain. Patients may describe dysesthesias such as "burning," "stinging" or "electrical" sensations that tend to start in the feet and are most bothersome when the patient is at rest such as when trying to sleep. Spontaneous, non-painful sensations (paresthesias) such as "tingling" or "buzzing" or loss of sensation (anesthesia) described as "numbness" may also be present. Finally, there may be hypersensitivity of the feet to otherwise non-painful or painful stimulation (allodynia and hyperpathia, respectively).

As neuropathy advances, larger sensory fibers subserving joint position and pressure sensation become involved resulting in loss of proprioceptive feedback from the feet to the vestibular centers. The resultant "sensory ataxia" tends to be worse in dark environments or when the patient's eyes are closed, when compensatory, visual input is lost. The Romberg test is based on this phenomenon. Motor fibers may also become affected by DPN, also appearing first in the distal extremities, particularly in the intrinsic foot muscles. Signs on exam include hammering of the toes and visible atrophy of the interossei and extensor digitorum brevis. Involvement of the autonomic nerves may lead to indigestion, constipation, orthostatic hypotension and sexual dysfunction.

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Peter Skaff, MD

Most Pituitary Tumors Lend Themselves to Less-invasive Surgery, continued from page 1

Occasionally, fat taken from either the patient's stomach or thigh is used to pack the sella and collagen is used to seal the sphenoid sinus. Other than the fat graft incisions, there are no visible surgical scars. Postoperatively, the patient is observed in the intensive care unit or a neurosurgical floor for one or two days for signs of diabetes insipidus secondary to manipulation of the pituitary stalk.

Endoscopic transphenoidal pituitary tumor resection represents the new standard of minimally-invasive brain surgery employed by high-end medical centers.

If you have comments or questions for Dr. Chan, please e-mail him at mercyneuro@DignityHealth.org. ■

Brain Waves: Updates from the Mercy Neurological Institute

MERCY NEUROLOGICAL INSTITUTE NAMES NEW DIRECTOR

In mid-November, Chris Wood joined the Mercy Neurological Institute of Greater Sacramento as senior director. Since 2005, Wood served as director of the Sutter Neuroscience Institute.

In his new role, Wood is responsible for the strategic planning and operational oversight of the neuroscience service line at six acute care hospitals in the region. He holds a Bachelor of Science in Managerial Economics from UC Davis and a Masters of Health Administration from the University of Southern California.

Wood's main office will be on the Mercy San Juan Medical Center campus. He can be reached at 916.864.5878.

MULTIPLE SCLEROSIS SOCIETY RECOGNIZES MERCY MS NURSE

Edie Happs, RN, CRNN, MS Nurse with the Mercy MS Center, has been honored with the Volunteer Service Award at the annual meeting of the Northern California Chapter of the National Multiple Sclerosis Society (NMSS), held on Nov. 13 in Santa Clara.

Happs received the award for her work with chapter-sponsored programs, including the Newly Diagnosed sessions and chapter-sponsored patient support groups. She has been active with NMSS for many years and has been part of the Mercy MS Center for three years.

The Northern California Chapter has its headquarters in San Francisco and serves 41 of 58 counties in the state of California, extending from about Fresno to the Oregon border. ■

"T2 Hyperintense Lesions In White Matter, Can't Rule Out Demyelinating Disorder," continued from page 4

clinical context, RIS refers to highly typical scans with numerous lesions, including some with larger size, some with elongated appearance and radial orientation to the corpus callosum, and lesions divided between subcortical, periventricular, corpus callosum and brainstem locations. Even in these cases, however, neurologists are divided about whether to treat with multiple sclerosis drugs if no current or past signs or symptoms are apparent. In several studies these patients have been followed, and some, indeed, eventually developed signs and symptoms or worsening of the MRI findings, diagnostic of multiple sclerosis.

In summary, the report of T2 hyperintensities on the brain scan should always be correlated with the patient's current or past signs or symptoms when the diagnosis of multiple sclerosis is considered. Though the MRI scan is absolutely invaluable in confirming the diagnosis of and monitoring the course of multiple sclerosis, the diagnosis is almost always a clinical one.

If you have comments or questions for Dr. Schafer, Director of the Mercy MS Center, please e-mail him at mercyneuro@DignityHealth.org. ■

The Mercy Telehealth Network Expands to Redding

Telehealth services have changed the face of medicine not only in remote areas but also in urban areas with a shortage of subspecialists.

Even though primary stroke centers are equipped with the resources and personnel to provide patients with acute stroke with a timely, adequate assessment and emergency stroke treatments, they represent only a minority of all hospitals.

Even hospitals with neurologists on staff cannot always guarantee 24/7 stroke coverage. This has been the case at Mercy Medical Center Redding (MMCR), which joined the Mercy Telehealth Network in January.

Led by Neurology Medical Director Richard Karem, MD, MMCR is in the process of becoming a certified primary stroke center. Participation in the Mercy Telehealth Network will further assure immediate and 24/7 coverage via telehealth technology, provided by neurologists based at Mercy San Juan Medical Center and Mercy General Hospital. ■

Via the In Touch Health Robot, Alan Shatzel, DO, visits the Mercy Stroke Program leaders at Mercy Medical Center Redding. Pictured left to right: Deb Wedick, RN, stroke coordinator; Richard Karem, MD, medical director; and Susan Lee, RN, stroke coordinator.

Diabetic Peripheral Neuropathy: What to Expect and How to Treat It, continued from page 5

Treatment of diabetic neuropathy has two main goals. First and foremost is treatment of the underlying cause—the diabetes. In obese patients, normalization of blood glucose levels through aggressive dietary and lifestyle modification has been shown in controlled, clinical studies to reverse damage to cutaneous nerves.[1] The importance of this recent revelation cannot be over-emphasized. The second approach is alleviation of symptoms. For neuropathic pain, numerous pharmacological agents have shown benefit including anti-seizure medications (e.g. pregabalin, gabapentin), anti-depressants (e.g. amitriptyline, venlafaxine, duloxetine) and opiates.[2] It is important to remember that these agents attenuate pain, but do not alleviate "numbness." For patients with sensory ataxia, physical therapy focused on reduction of fall-risk through balance and gait training, assessment for need of adaptive devices and establishment of a home exercise program are appropriate.

Further information about pharmacologic and lifestyle treatment of diabetic neuropathy may be found in the following articles.

1. Smith AG, et. al. Lifestyle intervention for pre-diabetic neuropathy. Diabetes Care. 2006;29:1294-9.

2. Bril, V, et. Al. Evidence-based guideline: Treatment of painful diabetic neuropathy. Neurology. 2011; 76; 1758-66. (Also available online at http://www.neurology.org/).

If you have comments or questions for Dr. Skaff, please e-mail him at mercyneuro@DignityHealth.org. ■

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Recurring Opportunities

Monthly Neuro Grand Rounds
Mercy San Juan Medical Center
First Friday of each month at 12:30 p.m. in Conference rooms 2, 3, 4 or via webinar

Neuroscience Case Conferences
Mercy San Juan Medical Center
First and third Tuesdays of each month at 6 p.m. in CC3

tPA and Neurocritical Care Conferences
Mercy General Hospital
Second Tuesday of each even month (alternating) at 6 p.m. in the Greenhouse

Mercy San Juan Medical Center
Second Tuesday of each odd month (alternating) at 6 p.m. in CC3

Epilepsy Case Conference
Mercy General Hospital
Fourth Tuesday of each month at 6 p.m. in the North Auditorium

Contact Ann.Engwer@DignityHealth.org or 916.962.8751 for more information