TEXAS NEUROLOGICAL SOCIETY WINTER 2014

Broca's Area

The Voice of Texas Neurology

Mark Your Calendar

BUSINESS MEETING ANNOUNCEMENT

Texas Neurological Society Membership Business Meeting will take place on Saturday, March 1st at 12:30 pm at the Hilton Austin during the 17th Annual Winter Conference. All members are asked to attend.

2014 SUMMER CONFERENCE

July 18-19, 2014
La Cantera
Hill Country Resort
San Antonio, Texas

(more details see page 4)

President's Message

G. Mark Schwartze, MD

TNS Members,

The Texas Neurological Society (TNS) was founded in 1974. In 2014, our society will celebrate its 40th anniversary. The TNS has been a great advocate for Texas neurology and through it we have accomplished much. We must not rest on our laurels, though. We must continue to show leadership and be able to adapt to the vicissitudes of the changing landscape of medicine.

Each year, the American Academy of Neurology (AAN) sponsors a state leadership conference. This year 34 state societies attended. The TNS is the largest and the most organized of the state societies. Others look to us as the paradigm of a state society. Our membership in 2012 was 650. As of October 2013, we have 747. We have memberships for neurologist, physician assistants, nurse practitioners and registered nurses who are licensed in Texas. Also, there are categories for membership who live out of state, residents and fellows in training along with physicians practicing in fields related to Neurology. Given our accomplishments, we need to continue to grow in order to remain relevant in the future of medicine.

The summer conference in San Antonio was a success. The education program was excellent. The board made some significant changes to meet the new demands of medicine. The TNS hired a lobbyist, Greg Herzog. This is not without precedence as several societies have had their own lobbyist for some years. Greg has 17 years of experience advocating for physicians before Texas legislature and various state agencies. In addition to internal advocacy rolls with the TMA and Texas Academy of Family Physicians, Greg served as Director of the House Committee on Public Health. The board felt it was necessary to add a lobbyist in order to represent our interests timely and efficiently. The board also added a medical economic advisor, Kristi Berrier. With a healthcare and practice management background, Kristi was a perfect fit. She has worked on the Silent PPO legislation, Texas Prompt Pay law and negotiated and implemented managed care contracts for physician practices.

There have been some favorable developments on the legislative front. The Center for Medicare and Medicaid Services (CMS) had considered cutting EEG reimbursements. However, on November 27th, CMS decided not to finalize the proposal to cap practice expense payments for EEG services in the physician's office. Last year we were blindsided by the cuts to NCV services. This year CMS has increased the physician's reimbursement for complete limb and extremity EMGs. Another area of concern was Intraoperative Neurophysiological Monitoring. It has been proposed to limit the monitoring to one case per physician at a time. That is to say a physician could not be reimbursed for simultaneously monitoring more than one case. These are several of the areas that TNS along with Kristi and Greg have been working on and will continue to monitor.

The TNS website also has some useful topics—look at the M.E. Corner. There you will find au courant articles on coding, EHRS and audits.

Our annual winter conference will be held February 28 – March 2, 2014. For the first time in several years, we will be at a different hotel, the Hilton Austin. It is a larger hotel with more space. Dr. Gary Clark has planned an excellent pediatric program and Dr. Aziz Shaibani has performed a tour de force in his planning the general session.

Although the TNS is forty, it remains a significant force in medicine. It has done this because it can change to accommodate the needs of its members.

See you in Austin.

Mark Schwartze M.D.

Editor's Notes

Randolph W. Evans, MD

This issue

I thank our officers and other contributors for their excellent submissions to this issue. We look forward to seeing you at the TNS Winter Conference in Austin, February 28 to March 2. Aziz Shaibani, program chair, Gary Clark, pediatric chair, Bob Fayle, education committee chair, and the education committee have planned a terrific program. Be sure to make your Hilton reservation and register in time for early bird discounts.

JFK Revisited

As we submit our material for Broca's by early December, I was thinking of possible topics to discuss amid the tremendous media focus on the 50th anniversary of the Kennedy assassination. Some thoughts came to mind.

Rice Stadium

I was 9 years old on September 12, 1962 when my mother took me to Rice Stadium in Houston to join 40,000 people at 10 am and hear President Kennedy (with VP Johnson seated behind him) give a speech which changed the course of America's space program in which he said, "But why, some say, the moon? Why choose this as our goal? And they may as well ask: why climb the highest mountain? Why 35 years ago fly the Atlantic? Why does Rice play Texas? We choose to go to the moon in this decade, and do the other things, not because that will be easy, but because it will be hard…." (see the video of one of the greatest Presidential speeches at http://news.rice.edu/2012/08/30/jfks-1962-moon-speech-still-appeals-50-years-later/). After spending $25 billion, (over $100 billion in today's money), Armstrong walked on the moon on July 20, 1969.

Why does Rice play Texas? As a Rice sophomore, on October 28, 1972, at Rice Stadium among 65,000 fans, most cheering for Texas, I wasn't sure as Rice was on a losing streak to Texas which would eventually run 28 consecutive games from 1966-1993. My future wife and I were in the cheap student seats and I decided to see if we could find some better empty seats. We brazenly walked over to the 50 yard line and there was Lyndon Johnson surrounded by Secret Service agents. We walked down the same aisle and there was John Connally. We found two great seats near him to watch Rice lose 45-9. But at least I still have the souvenir gray and blue small rubber football.

You may recall the irony of how Connally was appointed Treasury Secretary by Kennedy's 1960 opponent, President Nixon in 1971, and then headed "Democrats for Nixon" in 1972. Connally refused to take the Treasury job unless Nixon found an administration position for George H.W. Bush who had lost a U.S. Senate race to Lloyd Bentsen. Bush became UN Ambassador and revived his political career. When Spiro Agnew resigned as VP, Nixon had a top 4 list of replacements: 1. John Connally 2. Nelson Rockefeller 3. Ronald Reagan and 4. Gerald Ford. The Senate would not confirm someone who would be a strong 1976 GOP presidential nominee so Nixon chose Ford. "With all of the problems I was having with Watergate, I could not become embroiled in a massive partisan slugging match over the selection of the new vice president," Nixon later wrote.

11/22/63 and Trauma Room One

The late Dallas native, Dr. Kemp Clark, age 38, who created the neurosurgery service at Southwestern Medical School and Parkland and the residency program, was in his lab with his new faculty member, Dr. Robert Grossman, age 30, (who became chairman of neurosurgery at Baylor College of Medicine and Methodist Hospital) when they were called to Trauma Room One at Parkland.

Dr. Grossman wrote: "The President was lying on his back. He was instantly recognizable. There was a considerable emotional impact that resulted from knowing it was the President who was lying comatose on the stretcher. He was surrounded by physicians. … Mrs. Kennedy was standing against the wall on the left side of the President, toward his feet. … It had been noted that the President had a head wound and that his pupils did not react to light, but his head had not been carefully examined. Kemp and I went to examine him. … Kemp and I lifted his head to inspect the occiput. There was a laceration approximately 1 inch in diameter located close to the midline of the cranium, approximately 1 inch above the external occipital protuberance. Brain tissue, some of which I thought had the appearance of cerebellar folia, was lying in the laceration…. There was no organized electrocardiogram. Closed cardiac massage was used to attempt to maintain circulation and to start the President's heart. Resuscitation was performed for approximately 15 minutes. Dr. Clark, who was the senior surgeon present, pronounced President Kennedy dead at approximately 1 PM." (Sullivan D, Faccio R, Levy ML, Grossman RG. The assassination of President John F Kennedy: a neuroforensic analysis--part 1: a neurosurgeon's previously undocumented eyewitness account of the events of November 22, 1963. Neurosurgery. 2003;53:1019-25).

Dr. Clark's 18-carat Patek Philippe watch, which he used to pronounce the President dead (purchased by his mother for $750 in 1949 with his name engraved on the back), was auctioned at Christie's in December, 2013 for $161,000.

Dr. James "Red" Duke, Jr (who is professor of surgery at the University of Texas Health Science Center at Houston Medical School) was a senior general surgeon resident on the thoracic service when he was paged to the ER to help care for Governor Connally. "He had this big chest wound. His lung was flopping in and out," Duke recalled. "So I stopped it up and put a chest tube in him – just like you do any other gunshot wound." Two days later, Dr. Duke was called back into a trauma room to try and save the life of 24 year old Lee Harvey Oswald. (from http://educationforum.ipbhost.com/index.php?showtopic=19975). Dr. Grossman also attended to Oswald and determined that he did not have a spinal cord injury.

Lincoln's Gunshot Wound

Contrast JFK's gunshot wound with that of Abraham Lincoln's sustained from a Derringer fired at close range by the 25 year old actor, John Wilkes Booth. The .44-caliber bullet entered the back of his skull to the left of the midline just above the left lateral sinus which it severed, passed through the left posterior lobe of the cerebrum into the left lateral ventricle and stopped in the white matter just above the anterior portion of the left corpus striatum fracturing both orbital plates of the frontal bone. The bullet likely created cortical pressure waves which damaged the brain stem and also produced intraventricular hemorrhage, a deep laceration of the left cerebrum, and bilateral subdural hematomas (Woodward JJ. Report of autopsy on President Lincoln, April 15, 1865, original in Surgeon General's office, Washington DC; Freidman WA, Peace D. A gunshot wound to the head--the case of Abraham Lincoln. Surg Neurol. 2000;53:511-5; Scalea TM, Carson SL, Mackowiak PA. Saving president Lincoln: an update for clinicians. Am J Med Sci. 2009 ;337:47-55).

Lincoln was cared for by Dr. Charles Leale, a 23 year old assistant surgeon, U.S. Volunteers, who had recently graduated medical school, and 30 year old Dr. Charles Taft at Mr. Peterson's house opposite Ford's Theatre. On exam, the President was comatose with a dilated left pupil, consistent with uncal herniation. They repeatedly probed the wound to prevent blood from accumulating within the skull. Lincoln died just over 9 hours after being shot. There is speculation that Lincoln would have survived his gunshot wound with today's medical care and had residuals of a right-sided hemiplegia and homonymous hemianopsia, along with persistent dyslexia, dysgraphia, and dysphasia.

SS 100X and SAM 26000

President Kennedy had been riding in a specially equipped Lincoln Continental limousine with the Secret Service code name, SS 100X. There was a discussion about putting the bubble top up which, in any case, was not bulletproof. J. Edgar Hoover had a bulletproof limousine at the time which was later used by LBJ. SS 100X was refitted by the Secret Service with armour, bulletproof glass, and run-flat tires and used by Presidents Johnson, Nixon, Ford, and Carter. Such amazing frugality and lack of superstition.

Air Force One (a call sign created after President Eisenhower's plane, Air Force 8610, had a near miss with Eastern Airline's flight 8610 which accidentally entered the same airspace in 1953) that day was the modified long-range 707, Special Air Mission 26000 which was put into service in 1962 and continued serving Presidents through Clinton until 1998, serving as a backup starting in 1972. On advice from Jackie, President Kennedy enlisted industrial designer Raymond Loewy who came up with the distinctive design (using the typeface and spacing of the first printed copy of the "Declaration of Independence", placement of the seal, and flag) and colors on the fuselage still used today. Among numerous notable occurrences on 26000, LBJ took the oath of office and was carried home for burial after his state funeral and Nixon went to China in 1972.

JFK's Physicians

It is also interesting to recall two of JFKs physicians. Janet Travell, MD (1901-1997) was the first White House female physician and stayed on as LBJ's physician. He became her patient in 1955 seeking treatment for chronic low back pain for which she gave him trigger point injections with procaine. She recommended that he use rocking chairs for his back pain. One of his 14 rocking chairs sold in 1996 for $453,500. She was a myofascial pain pioneer and is well-known as the co-author with the late David Simons of *Myofascial Pain and Dysfunction. The Trigger Point Manual.* (The terms "trigger point" and "myofascial pain" were coined by Steindler in 1939 and "myofascial pain syndrome" by Travell in 1952.) (In a preamble to the space program, as a young aerospace physician in the Air Force, Simons set an altitude record in 1957 ascending to 101,516 feet in an aluminum capsule suspended from a helium balloon in a 32 hour flight. He was at Brooks AFB from 1959-65 and directed a lab at the Houston VA in the 1970s.)

Max Jacobson, MD (1900-1979), born in Berlin, practiced in Manhattan and described himself as a multiple sclerosis researcher. In his practice he used "miracle tissue regenerator" shots which consisted of 30-50 mg amphetamines, vitamins, painkillers, and human placenta. He had numerous celebrity patients including Marlene Dietrich, Ingrid Bergman, Bette Davis, Anthony Quinn, Tennessee Williams, Elvis Presley, Winston Churchill, Judy Garland, Truman Capote, Rod Serling, Leonard Bernstein, Maria Callas, Eddie Fisher, Elizabeth Taylor, Richard Burton, Frank Sinatra, Mickey Mantle, Cecil B. DeMille, Alan Jay Lerner, Andy Warhol, Brian Jones, Yul Brynner, Nelson Rockefeller, and Zero Mostel. (Lertzman RA, Birnes WJ. Dr. Feelgood: The Story of the Doctor Who Influenced History by Treating and Drugging Prominent Figures Including President Kennedy, Marilyn Monroe, and Elvis Presley. Skyhorse, 2013).

He gave the injections to JFK and Jackie and made house calls to the White House 34 times by May of 1962 and flew on Air Force One to Europe. JFK had injections before his debates with Nixon, the 1961 Vienna summit with Khrushchev (before which the KGB broke into Jacobson's office), and major state addresses. Marilyn Monroe received an injection before she sang, "Happy birthday, Mr. President." Dr. Jacobson's Secret Service code name was "Dr. Feelgood."

Allegedly after an injection of too high of a dose of methamphetamine in his suite at the Carlyle Hotel in New York in 1962, JFK stripped off his clothes, began to dance around his room, and ran down the corridor in search of female company. A psychiatrist gave him an antipsychotic for the mania.

Upon the request of his brother, Robert, the attorney general, the FDA analyzed the solution. RFK advised him to stop getting the shots in 1962. JFK said, "I don't care if it's horse piss. It works."

Dr. Jacobson was immortalized with an Arethra Franklin hit as follows: "I got me a man named 'Dr. Feelgood' And oh yeah, that man takes care of all my pains and my ills...And after one visit to Dr. Feelgood. You'd understand why Feelgood is his name."

An investigation resulted from the death of one of his patients, former Presidential photographer Mark Shaw from amphetamine poisoning. Jacobson's medical license was revoked in 1975.

11th Annual TNS Summer Conference Preview

Waleed El-Feky, MD
TNS Summer Program Director

The 11th Annual Texas Neurological Society Summer Conference will be held at the La Cantera Resort in San Antonio, July 18-19, 2014.

Various topics important to the practicing neurologist including the management of normal pressure hydrocephalus, management of chronic migraine headaches, and cerebrovascular disease will be discussed. There will also be a video presentation of neuromuscular cases that you will not want to miss. An overview of the implementation of ICD 10, scheduled to take place October 2014, is on the agenda along with issues of Cyber security and the new HIPPA rules as it pertains to neurology practice.

As you can see, this is a meeting that is packed with valuable information. I hope you will take the opportunity to participate.

See you there!

Member News

Deceased- **Will "Tex" Bradley, MD**, died unexpectedly November 30. He was a long-time advocate for Neurology through the AAN, AANEM, and AMA. He practiced in Mansfield, TX and was past-president of the Tarrant County Medical Society. He was a good friend to many and a role model for Neurology advocacy.

Deceased- **Edward J. Rashit, MD** died unexpectedly on August 26th. One of the first neurologists in Houston, he was an excellent, caring physician and a good friend to many.

Legislative Update

Sara G. Austin, MD
TNS Legislative Committee Chair

FEDERAL: The good, and The bad and The ugly (Ha!, that saying actually applies pretty well this time).

The good: CMS had proposed a cap on EEG reimbursement for outpatient procedures earlier this year that would have significantly reduced reimbursements for outpatient EEG's. Neurologists made a TON of noise about that - TNS wrote a comment, many physicians personally wrote comments, and the AAN had lots of comments in person and in writing. CMS just let us know that they will not enforce the cap. That is very good news for us.

The bad: CMS agreed to specially review the changes to the EMG/NCS codes this year because we had such opposition to the cuts last year. They released the 2014 fees on 11/27/13 and there were slight increases in the EMG codes, but no change in the NCS codes. I have not heard what the next steps are for the AAN and AANEM.

The ugly: The SGR fix continues to be a problem. For some reason, the SGR fix was estimated to only be $136 billion this year, down from a high last year of $250 billion or something like that (it is 'on sale' as some have said). For that reason there has been some interest in Congress to do the permanent fix this year, and actually there has been bi-partisan work on it. The two committees in the House and the Senate that control Medicare (Ways and Means in the House, and the Finance committee in the Senate) wrote a joint, bipartisan discussion draft of legislation to repeal the SGR once and for all. The discussion draft proposed a 10 year freeze on physician reimbursements (I remind everyone that the Medicare fee schedule has only increased a total of 2% in the past 14 years, so this would be a cumulative span of 24 years (!) when Medicare fees have essentially stayed flat). In addition, they proposed a 'value based performance payment program' that would be budget neutral (if some payments went up, then other payments would have to go down to offset). The AAN position is that we really want the SGR to go away (there will need to be another temporary fix for a 20% decrease come January 1st if there is no permanent fix) but we don't think the E&M codes could tolerate 10 more years of no increase. We continue to reiterate that the E&M codes are markedly undervalued. It is ugly... and there doesn't seem to be any good answers out there, at least not yet.

My guess is that the bipartisan draft legislation from Ways and Mean and Senate Finance too permanently repeal the SGR will not get anywhere, and that we will have another temporary fix. The advantage to Congress of keeping the SGR the way it is, is that they have to come up with a fix every year, which gives them a moving piece of legislation to attach their own bills to. In this legislative environment where hardly any legislation is getting thru, they are thankful to have something that has to get passed.

I say this every year, and it's always important, but please respond to the AAN requests for letters to your Congressmen when you get the email. You don't need to rewrite the letter or anything like that, just click and send. No one really reads it line for line, they just mark whether you are for or against, and that you bothered to write. I am sure we will need to make our voice heard, yet again, over the SGR debacle come January.

STATE: Here in Texas things don't seem like such a mess. It's been really nice having Greg Herzog on board (he's our new lobbyist – yes, the TNS is stepping up in the world and we now have our own lobbyist in addition to the help that the TMA provides). We have been monitoring the Dental board (they are interested in Dentists being able to order sleep studies). The TNS is a member of Texas Alliance for Patient Access (TAPA) and they continue to be active in order to assure that our tort reform laws are not diluted. Several neurologists are attending the Advocacy retreat that the TMA sponsors in Austin and, hopefully some of you have applied to Neurology on the Hill in Washington DC that is the first of March. It's always good to talk to our Texas Congress-people.

Stay active my friends!

New Driving Rules for Texas

Sara G. Austin, MD

The Medical Advisory Board for Texas has just updated the driving rules for our patients. The last revision was almost 25 years ago, so it was TIME. You will need to know the changes so that you can advise your patients. All of the rules were reviewed, including those pertaining to cardiac, neurologic, and endocrinologic diseases. A section on dementia was added, excessive drowsiness while driving was updated, and the seizure section underwent significant changes to better reflect current knowledge (there is now a three month driving restriction for most new seizure patients instead of six months and nocturnal seizures are no longer an exception).

I will be talking about the changes, and reviewing how the licensing system works in general at the winter conference in February (Saturday, March 1 at 4:45 pm). The guide itself will be available online in January and the TNS will have a link from our website (it is not available yet, however, we will notify you when it is). The guide was not previously available to the general public, but that also is changing.

I would like to especially thank the TNS member physicians who helped with the neurological disease section. This was a significant amount of work and time commitment. Many thanks to Dr. Jeremy Slater (epilepsy), Dr. Robert Fayle (sleep), Dr. Paul Schulz and Dr. Jacqueline Phillips-Sabol (dementia), Dr. Ronald DeVere (dementia), and Dr. John Lincoln (MS). I am hoping that the guide better reflects current scientific knowledge (when it is available), and that it is also more in line with physician's practical recommendations.

American Academy of Neurology Update

2014 Physician Fee Schedule

There is good news for neurology in the Centers for Medicare & Medicaid Services publication of its 2014 Medicare Physician Payment Final Rule released November 27.

This good news follows the AAN's aggressive campaign against a proposal to cut EEG reimbursement and other services. The Academy collaborated with medical associations and state neurological societies, helped coordinate lobbying from patient groups, and rallied support from AAN members who contacted Congress to explain how these proposed cuts could ultimately affect our patients' access to receiving neurologic care.

In addition, the AAN convinced CMS to INCREASE the physician reimbursement for complete limb and extremity EMGs. This is a result of the AAN's successful lobbying of CMS during a recent refinement panel meeting.

Learn more about how the 2014 Medicare Physician Payment Final Rule will affect you at https://www.aan.com/practice/medicare/medicare-payments/.

Use the Neurology Compensation and Productivity Report to Compare Your Practice to Others

If your office is considering expanding your practice in the coming year, the AAN's 2013 Neurology Compensation and Productivity Report may help you determine whether it is the right decision. Compare your practice profitability and compensation packages to other practices in your community or nationally. Based on 2012 data from hundreds of neurologists and neurology practice managers, this is the most recent and reliable information on the neurology profession.

The Neurology Compensation and Productivity Report is a powerful, versatile tool that can help you:

- Compare your salary, productivity, and practice characteristics to peers
- Evaluate physician and non-physician provider performance compared to your peers
- Discover fair-market value based on your region, practice type, and more
- Analyze whether it makes sense to expand your practice
- Identify variances in key metrics for use in practice improvements

Learn more and access the report at https://www.aan.com/practice/practice-management-resources/

Practice Management Webinars

Register today at www.aan.com/view/webinar.

Registration Open for AAN Annual Meeting

Experience breakthrough research, exceptional education programming, and boundless networking opportunities at the 66th AAN Annual Meeting, coming to the Pennsylvania Convention Center in historic Philadelphia April 26 through May 3, 2014. https://www.aan.com/conferences/2014-annual-meeting/

AAN Attending TNS Winter Conference

AAN staff will be in attendance at the TNS Winter Conference to answer questions and obtain member feedback. Stop by our booth to discuss your membership and find tools and resources on important neurological issues. Contact dshowers@aan.com for more information.

Expert Opinion

Autonomic Testing

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The following three cases illustrate the symptoms and signs of autonomic dysfunction. We will review autonomic testing and available treatment options.

Case #1:

A 21-year-old college student presented with flu-like symptoms followed by bouts of excessive fatigue. His ability to participate in sports was limited by feelings of lightheadedness with activity. On walking, heart rate (HR) increased to 180 beats per minute (BPM). Neurological examination was normal. Serum and cerebrospinal fluid evaluations were unrevealing. Autonomic function testing was performed and results were consistent with a diagnosis of hyperadrenergic postural orthostatic tachycardia syndrome (POTS).

Case #2:

A 55-year-old man presented with a 3-year history of erectile dysfunction and urinary symptoms, followed by orthostatic symptoms, difficulty walking and speaking, slowness of movement, and tremor. On examination, he had dysarthric speech, masked facies, finger-to-nose dysmetria, bradykinesia in limbs, stooped posture, and a wide-based ataxic gait. MRI brain revealed atrophy in brainstem and cerebellum. Autonomic function testing showed severe vasomotor and mild cardiovagal dysfunction with normal post-ganglionic sudomotor function consistent with central autonomic failure. He was diagnosed with multiple system atrophy – cerebellar subtype (MSA-C).

Case #3:

A 57-year-old man presented with subacute onset of constipation, nocturia, and dry mouth. These were soon followed by orthostatic hypotension. His neurologic examination was normal, except for poor pupillary light reflex. MRI brain was unremarkable. Autonomic function testing revealed diffuse autonomic failure in a pattern involving both peripheral and central autonomic reflexes. Paraneoplastic antibodies including anti-Hu were negative, but ganglionic AChR antibodies were positive (4.08 nmol/L, normal <=0.02). Chronic immunosuppressive therapy with mycophenolate mofetil and prednisone and symptomatic therapy with midodrine, fludrocortisone, and pyridostigmine resulted in some improvement in his symptoms.

Questions:

1. What are the symptoms and signs of autonomic dysfunction?
2. What are the various types of diagnostic testing used to diagnose autonomic disorders?
3. What are the various options used to treat autonomic failure?

DISCUSSION:

The autonomic nervous system (ANS) is made up of the sympathetic, parasympathetic, and enteric nervous systems. The ANS innervates all organ systems, and accordingly the clinical manifestations of dysautonomia can be diverse. Detailed history, physical examination, and ancillary testing can identify the nature, extent, and cause of autonomic failure.

HISTORY:

Orthostatic hypotension (OH) is one of the most important manifestations of autonomic failure, but can present in different ways. Neurologists should inquire about symptoms of orthostatic intolerance, including syncope, pre-syncope, "coat hanger syndrome[1]" (neck pain in the suboccipital and paracervical regions), postprandial lightheadedness, and cognitive dysfunction. Other symptoms include gastroparesis, bowel/bladder/sexual dysfunction, sweating abnormalities, dry eyes, dry mouth, and sensitivity to bright lights. It is important to review all prescribed, over-the-counter, and herbal medications as they can independently affect autonomic function. Drug interactions can also lead to similar side effects.

PHYSICAL EXAMINATION:

In addition to a comprehensive neurologic examination, it is also important to check orthostatic vital signs and ask about skin changes and sweating abnormalities, look for pupillary dysfunction and for signs of small fiber neuropathy, Charcot joints, or joint hyperlaxity. The presence of these abnormalities could suggest underlying cause of autonomic dysfunction.

LABS:

Laboratory testing is based upon suspected etiologies: for example, fasting glucose (diabetic polyneuropathy), AM/PM cortisol levels (adrenal insufficiency), SPEP/UPEP (amyloidosis), anti-SSA/SSB (Sjogren's syndrome)[2], paraneoplastic autoantibodies[3] (particularly anti-Hu), ganglionic nicotinic acetylcholine receptor antibodies[4] (Autoimmune Autonomic Ganglionopathy, or AAG), or standing/supine catecholamines.

AUTONOMIC FUNCTION TESTING:

Most labs that perform autonomic testing evaluate sudomotor (sweating), cardiovagal (parasympathetic), and adrenergic (sympathetic) function.

The quantitative sudomotor axon reflex test (QSART) evaluates postganglionic sympathetic sudomotor function[5]. During this test, capsules are applied to standard recording sites: forearm, proximal leg, distal leg, and proximal foot. Acetylcholine is iontophoresed into the skin via a constant current applied for 5 minutes. Acetylcholine activates the axon terminal; the impulse travels antidromically to branch point and then travels orthodromically down a different nerve ending to release acetylcholine from the nerve terminal. The acetylcholine binds to muscarinic receptors on eccrine sweat glands and results in sweat output. Both the onset latency and sweat volumes

can be measured and compared with normative data[6]. Abnormal responses (absent or reduced sweat volume) indicate a peripheral (postganglionic) sudomotor axon lesion. In length-dependent small fiber neuropathies, absent or reduced sweat volume may be seen first in the distal foot or leg, with abnormalities developing more proximally as the neuropathy progresses. In POTS, sudomotor abnormalities are typically patchy in distribution[7]. QSART is unaffected in pure central (MSA) and preganglionic disorders. In AAG, QSART responses are typically consistent with postganglionic dysfunction, with the severity of dysfunction being directly proportional to ganglionic α3 AChR antibody levels[8, 9].

The thermoregulatory sweat test (TST) is a less commonly used but informative way to assess central and peripheral sudomotor pathways[10]. In this test, the subject is enclosed, unclothed, in a heated environment with the intention to raise the core body temperature. An indicator powder that changes color when wet is applied to the body, and the pattern of sweating on the skin surface can be observed. The TST evaluates the thermoregulatory sympathetic pathways from the hypothalamus to eccrine sweat gland, and patterns of abnormal sweat distribution are indicative of various lesions[11]. TST can be used in conjunction with QSART to more accurately localize the autonomic lesion. For example, patients with MSA can experience progressive sweat loss due to a preganglionic lesion; TST may show global anhidrosis, but QSART remains normal[12], confirming that the pathological process is central.

The heart rate (HR) response to deep breathing (HRDB) test measures cardiovagally-mediated afferent and efferent pathways of parasympathetic function[10]. HR is recorded via continuous electrocardiogram and BP is measured with a noninvasive beat-to-beat device (Finometer). The patient performs cyclic deep breathing at a rate of 6 breaths per minute, the rate of breathing at which the RR variation is found to be maximal[13]. The HRDB range is the average of the differences between the HR during inspiration and expiration and is compared with normative data for age[14]. This test is a useful marker in patients with diabetes, has been used in various diabetic studies, and is a recommended screening tool for diabetic autonomic neuropathy[14].

The Valsalva maneuver (VM) provides information on both parasympathetic and sympathetic function[10]. During this test, the patient blows into a closed tube with an air leak to maintain expiratory pressure of 40 mmHg for 15-20 seconds, while HR and blood pressure (BP) are continuously recorded. The Valsalva ratio (VR) is an indicator of parasympathetic tone and is the ratio of the maximum HR over minimum HR[5] and is compared with normative data for age[15]. A low value suggests cardiovagal impairment and is often used along with HRDB as a marker of parasympathetic dysfunction.

Dynamic alterations during VM provide information about adrenergic function, particularly the vagal and adrenergic components of the baroreflex. The normal blood pressure waveform recorded during the VM is divided into phases I through IV. Phase I is a transient rise in BP caused by suddenly raised intrathoracic pressure due to the act of blowing into a closed tube. Early phase II corresponds with a drop in BP due to reduced preload. Late phase II corresponds to a small rise in BP due to a baroreflex-mediated efferent sympathetic discharge. Phase III is a transient fall in BP as the patient stops blowing. This is followed by phase IV, during which a gradual increase in BP is caused by an increase in total peripheral resistance; the BP initially overshoots and later returns to baseline. HR typically increases during VM, undershoots during phase IV of the blood pressure waveform, and then returns to baseline.

Various autonomic abnormalities can be detected during VM. If there is impairment of the vagal component of baroreflex response, HR response to fall in BP will be attenuated. In hyperadrenergic POTS, there is a deeper early phase II, smaller late phase II, and larger phase IV[16]. In adrenergic failure, early phase II of BP waveform will progressively deepen with loss of late phase II, phase IV may fail to overshoot, and the time for BP to recover to baseline (pressure recovery time) may be delayed. The sympathetic index, or the hemodynamic response to VM, can be determined by measuring the difference between the baseline BP and the BP at the end of phase 2; this correlates with OH seen in response to tilt table testing and aids in quantifying the degree of sympathetic failure[17].

Another test of adrenergic function is the head up tilt (HUT) table test, during which the patient is initially in supine position, then passively tilted to head up position at 60-70 degrees[10]. HR and BP are measured in the supine position and in standing position at minutes 1, 3, 5, and 10 post-tilt. Normal transient findings during HUT include reduction in systolic BP <10 mmHg, modest rise in diastolic BP, and modest rise in HR by 5-20 beats per minute (BPM). In neurogenic OH, a fall in systolic BP >20 mmHG or diastolic BP >10 mmHg with a blunted compensatory HR response is seen typically within 3 minutes of HUT. In patients with lesser degrees of adrenergic failure, OH may not develop until up to 10 minutes of HUT[18]. Delayed OH has also been described and may not be detected without HUT of longer duration[19]. In POTS, within 5 minutes of HUT there is an increment of HR > 30 BPM and usually HR >120, but without change in BP. In vasodepressor (neurocardiogenic) syncope, there is a transient increase in BP due to sympathetic surge, followed by abrupt fall in BP without decrease in HR. In vasovagal syncope, there can be a transient sympathetic surge but followed by abrupt fall of both BP and HR.

The composite autonomic scoring scale (CASS) was developed by Low et al at the Mayo Clinic to grade the degree of patients' autonomic failure[20]. A CASS score is the sum of the sudomotor, cardiovagal, and adrenergic scores. The sudomotor score (maximum of 3 points) is based on the QSART evaluation, cardiovagal score (maximum of 3 points) is based on the results of HRDB and VR, and the adrenergic score (maximum of 4 points) is based on the Valsalva maneuver and tilt table test. A CASS of 2-3 indicates mild autonomic failure, 4-6 moderate autonomic failure, and 7-10 severe autonomic failure.

Plasma norepinephrine (NE) levels measured in the supine and standing positions can be used to measure function of the sympathetic noradrenergic system[21]. Normally, NE level doubles upon standing (orthostatic increment). In POTS, standing NE exceeds 600 pg/mL in about half of all patients; this is considered a hyperadrenergic response. With preganglionic autonomic failure, such as is seen in MSA, NE

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level is normal in supine position and fails to increase upon standing[22]. With postganglionic autonomic failure, such as is seen in pure autonomic failure, supine NE levels are low. NE levels are dynamic and can be altered by common medications and should not be interpreted in isolation.

TREATMENT:

Symptomatic treatment remains the major option in most cases of autonomic failure secondary to neurodegenerative causes, such as MSA or Parkinson's disease. However, immunotherapy is indicated in AAG or other immunological diseases with autonomic manifestations. Orthostatic hypotension remains the most important manifestation and therapy involves both non-pharmacological and pharmacological methods. Elevating the head end of the bed when sleeping, compression stockings or abdominal binders, crossing legs, oral volume expansion, and liberalized salt intake may improve symptoms of OH and POTS[23]. Fludrocortisone is given to increase intravascular volume and help with OH. Potassium levels might need to be monitored while on fludrocortisone. Midodrine is another choice of therapy for OH, is usually given in divided doses, and should be front-loaded during the day to prevent severe supine hypertension at night. Pyridostigmine has also been shown to help with OH, mostly when given with small dose of midodrine. A low impact exercise-training program starting with recumbent bicycle has been found to be beneficial particularly in patients with POTS[24] and beta blockers remain another option. Avoiding exacerbating factors such as dehydration and inactivity is important.

In the case of suspected or proven antibody-mediated causes of autonomic failure, one may consider a trial of IVIg, therapeutic plasma exchange, or oral/IV chemotherapeutic drugs[25]. AAG responds well to plasma exchange, prednisone and chronic immunosuppressive therapy, but patients will continue to need some symptomatic therapy as well. If the cause is suspected to be paraneoplastic in etiology, identification and appropriate treatment of the underlying malignancy is paramount.

The manner in which autonomic dysfunction can present is diverse and variable, depending on the etiology and the components of the autonomic nervous system which are affected. A basic knowledge of common presenting signs and symptoms, as well as the available objective testing of autonomic function, lends the opportunity to accurately diagnose and often successfully treat symptoms that can otherwise be disabling to the patient.

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Expert Opinion

Muscle Cramps

A practical approach to diagnosis and management

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Case #1:

A 42-year-old male with 6 months history of painless twitching of the thigh muscles at rest that was visible by his wife and friends. No trigger factors were reported. He also complained of painful short-lived unprovoked contractions of the calves, thighs and abdominal muscles, insomnia, fatigue, and feet numbness.

Examination showed that the patient was nervous and hyperreflexic but there was no focal atrophy or weakness. Scattered fasciculations were noted on the thighs.

Laboratory findings: CK was 425 IU/L. EMG: frequent fasciculations in the thighs muscles. No fibrillation or positive sharp waves were noted. NCS was normal.

These muscle cramps are most likely due to:

1- Peripheral nerve hyperexcitability disorder.
2- Amyotrophic lateral sclerosis.
3- Hyponatremia.
4- Hypocalcemia
5- McArdle's disease

Case #2:

A 65-year-old male with 6 months history of painful muscle cramps in the legs that occurred at night and after activity. Stretching of the affected muscle temporarily relieved them. He also noticed painless twitching of muscles of the legs and arms and difficulty walking.

Examination revealed infrequent fasciculations in the calves, thighs and chest muscles, hyperreflexia, mild wasting of the calves. Ankle flexors and extensors were 4/5, knees flexors and extensors were 4/5. He had normal sensation and tongue strength. Laboratory findings: CK level was 840 IU/L.

In this case, the slightly increased CK level:

1- Indicates that the cramps are due to myopathy and muscle biopsy is indicated.
2- Does not help differentiate myopathic from neurogenic cramps.
3- It's not caused by muscle cramps.
4- Does not resolve with effective treatment of muscle cramps.
5- Is incidental

Case #3:

A 17-year-old boy who could not participate in school PE activities due to severe painful cramping of the calves and thighs that occured 10 minutes after starting running. Few times when he insisted on completing the run, the cramps improved after 40 minutes. When examined a day latter, he had normal strength but his CK was 15,000. After few days of rest and rehydration, the CK level was normalized.

The most likely cause of these muscle cramps is:

1- Anxiety from running.
2- Glycogen storage disease
3- Lipid storage disease
4- Neurogenic disease
5- Mitochondrial syndrome.

Answers:

Case #1: 1
Case #2: 2
Case #3: 2

Questions:

1- What are muscle cramps?
2- How common are they?
3- What are they confused with?
4- How are they clinically classified?
5- What are the causes of muscle cramps
6- What is peripheral nerve hyperexcitability disorder?
7- What is the significance of elevated CK in cases of muscle cramps?
8- What is the role of EMG in diagnosing muscle cramps?
9- What is the appropriate work up for a patient with muscle cramps?
10- What are the treatment options of muscle cramps?
11- What is the prognosis of muscle cramps?

1- What are muscle cramps:

Muscle cramps are painful muscle contractions that usually last seconds to minutes. They usually occur at rest and get relieved with stretching of the affected muscles. They can affect any muscles in particular, calves and thighs muscles.

2- How common are they?

35% of people experience muscle cramps at some point in their lifetime. Most people experience muscle cramps with strenuous exercises.

3-What are they confused with?

Some times sustained contractions happen without pain such as in dystonia and myotonia. Other times, focal or diffuse pain occurs without muscle cramps (myalgia) such as in fibromyalgia. Muscle spasm means sustained muscle contraction with or without pain. It is a non-specific term.

Muscle stiffness without pain is sometimes prescribes by patients as muscle cramps. This may be caused by myelopathy, Parkinson disease, and stiff person syndrome.

4- How are they classified?

The first differentiating question is whether the cramps occur consistently with physical activity or at rest. Activity induced cramps are usually myopathic (metabolic or mitochondrial myopathies). Resting muscle cramps that waken patients up at night are usually neurogenic.

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5- What are the causes of muscle cramps?

A-Neurogenic muscle cramps; they originate from the terminal motor branches. Common causes are:

- Axonal neuropathy: patients with diabetic or uremic neuropathy for examples start complaining of distal muscle cramps before or during the development of feet numbness and pain.
- Motor neuron disease like ALS. Early in the course of the disease, muscle cramps are common.
- Radiculopathies and Plexopathies.
- Peripheral nerve hyperexcitability disorder.

B- Myogenic cramps: metabolic myopathies are characterized by exercise-induced cramps in the used muscles. With glycogen storage disease such as McArdle's disease, cramps improve with continuation of exercises due to mobilization of lipid as a source of energy; this explains the second wind phenomenon. Lipid storage disease usually lead to delayed cramps (toward the end or after the exercises).

The most characteristic EMG feature of metabolic cramps is that they are silent. That is why they are called contractures.

C- Drug induced: there are many medications that can cause cramps, the most common of which is the statins. 20-30% of patients on statins develop muscle cramps that can be crippling. This can be isolated or associated with muscle weakness and elevated CK. Other medications include B blockers and diuretics.

D- Hypovolemia and electrolytes imbalance (hyponatremia, hypokalemia, hypocalcemia, and hypomagnesemia). This explains some exercise-induced cramps when loss of water and sodium thorough sweating is compensated with water only. Severe muscle cramps in dialysis patients may be due to hypovolemia and electrolytes disturbances.

E- Idiopathic muscle cramps: most cramps have no clear etiology identified; the most common is the senile nocturnal muscle cramps that can cause severe sleep deprivation in elderly.

6- What is peripheral nerve hyperexcitability disorder?

This disorder was called benign fasciculation syndrome. It is a syndrome that spans a spectrum of disorders and includes: benign fasciculations syndrome, fasciculations-cramping syndrome, myokymia, neuromyotonia, and Morvan's syndrome.

It is caused by increased irritability of terminal motor nerve branches due to disturbed voltage potassium channel function. An autoimmune etiology is suggested by the presence of antibodies against VGKCs in the blood of 50% of these cases. Other antibodies are also prevalent such as Striational antibodies and AChR antibodies. Feet numbness is common and anxiety may have an organic basis since VGKC antibodies react to hippocampal cells and in severe cases, hallucinations occur (Morvan's syndrome).

7- What is the diagnostic role of high CK in muscle cramps?

Mild elevation of CK (up to a 1000 IU/L) is common in muscle cramps regardless of their cause and it is due to mechanical disturbance of muscle membrane function because of the cramps. The CK level usually improves with correction of the cramps regardless of the cause. Elevated CK should not be used as an argument for metabolic etiology unless it is more than mild elevation.

8- What is the role of EMG in diagnosing muscle cramps?

- Muscle cramps if captured during EMG, correlate with high frequency (150HZ) discharges of motor units with normal MUPs configurations, durations, and amplitudes. Repetitive nerve stimulation leads to "after discharges" due to hyperexcitability.
- In patients with PNH disorder, frequent fasciculations are noted with no fibrillations or positive sharp waves. The presence of widespread denervation would suggest ALS.
- Distal denervation with low CMAPs amplitudes and absent sensor responses would suggest axonal neuropathy, a common cause of muscle cramps.
- Silent EMG in the presence of muscle cramps would be consistent with metabolic myopathy.

9- What is the appropriate work up plan for a patient with muscle cramps.

- History is crucial to define the type of cramps and to differentiate them from other simulating conditions such as dystonia, myotonia, myalgia, etc.
- Examination is very important to look for fasciculations, weakness, atrophy, sensory impairment in the feet, etc. This may help diagnosing the underlying cause such as neuropathy or ALS.
- CK level and EMG: significance is mentioned above.
- Blood testing: thyroid function test, serum electrolytes, serum calcium, phosphorus, BUN, and serum creatinine.
- VGKC antibodies are expensive and not covered by most insurance companies. If they can be done, they may help identifying an underlying autoimmune mechanism. Practically this rarely changes the plan of treatment since often, these cramps respond to membrane stabilizing agents.

10-What are the treatment options for muscle cramps?

- If there is an underlying causes such as ALS, neuropathy, hypothyroidism, statins, therapy, electrolytes imbalance, muscle disease, obviously, these need too be addressed.
- Symptomatic treatment is usually effective. There are not many large clinical trials to prove efficacy of any drug to treat muscle cramps. Quinine sulphate is usually effective but due to side effects like prolonged Qt interval, tinnitus, GI upset, liver dysfunction; it was withdrawn from the market in 1994. It is available as an antimalarial drug.
- Membrane stabilizing agents are usually effective. Carbamazepine 200 mg BID or oxcarbazepine 300 mg BID are the most commonly used. Monitoring of sodium level is important with these agents. Gabapentin and Baclofen are also reported to be effective.

continued on page 12

Resident Section

A Subacute New Daily Persistent Headache in a Young Man

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Subacute new daily persistent headache can be challenging to diagnose.

Case Report:

A 29 year old male without significant past medical history presented with a subacute headache. He was initially seen one week prior in the emergency room for a headache lasting 4 weeks, which began while working in an oil field. He described it as pressure behind his left eye radiating from the left frontotemporal region to the top of his head and sometimes to his occiput. It was severe in nature, nonpulsatile, with associated phonophobia, photophobia, nausea, and decreased left facial sensation. He was taking 2400mg of ibuprofen daily until the pain became unbearable.

He presented to his PCP who treated him for what he thought was sinusitis with antibiotics and steroids. The steroids initially helped but later the headache returned with the same quality and severity. He was evaluated two times in the ED subsequently and both times a phenergan and Depakote cocktail resolved the pain temporarily. On the second ED visit, a LP and MRI/MRA were performed, and were normal. The patient returned seven days later with the same quality headache but was also noted to have horizontal diplopia on exam. He was given amitriptyline and sumatriptan and asked to follow up with his neurologist.

Two months later he presented to the ED with horizontal diplopia and no resolution to his headache. His physical exam was significant for left gaze palsy in his left eye, left eye ptosis, and numbness on the left side of his face. No other focal weakness or paresthesias were present. Repeat MRI showed an extraaxial left cavernous sinus mass extending into the foramen ovale measuring 19 x 6 mm, possibly consistent with meningioma or lymphoma. Subsequently, a LP was performed which showed monocytes and rare lymphocytes, with no atypical or malignant cells. Five days later, he underwent a CT-directed needle biopsy of his left foramen ovale mass. The final pathologic diagnosis was non-diagnostic due to a poor specimen sample.

His symptoms continued to worsen, despite being treated with multiple medications including steroids. He was re-admitted 4 days later, and underwent image-guided left-sided craniotomy for an excisional biopsy of his cavernous sinus lesion. The pathology was reported as meningioma WHO grade 1. Biopsy of his dura of the sphenoid wing was reported as showing no neoplasm or malignancy. Intraoperatively, the lesion appeared to be en plaque meningioma spread along the surface of the dura; the dural biopsies did not confirm this.

Approximately 20% of the mass was resected. He will receive radiation via cyber knife for the remainder of the mass. His ptosis has improved, as well as his diplopia and facial sensation. He experiences significant headache, partially controlled with Lyrica and opiates.

Discussion:

Meningiomas are the most common extraaxial brain and spinal tumors, although lymphomas, sarcomas, metastatic tumors, schwannomas, hemangiopericytomas and inflammatory masses also occur adjacent to the brain and spinal cord.

WHO classification of meningiomas includes thirteen morphological types and three grades:

Grade I: Meningioma

Grade II: Atypical Meningioma

Grade III: Anaplastic Meningioma

The patient in this case had a grade I meningioma which comprise 20%-25% of all intracranial tumors. There exists a female to male ratio of 2:1 in adults, and nearly 10:1 are found in the spinal cord versus the brain. Most are benign, roughly 80%, but a subset is aggressive with high grade histology, high recurrence rates, and substantial morbidity and mortality.[1]

Locations of meningiomas are usually along the cerebral convexity and, to a lesser extent, in the parasagittal region, sphenoid wing, parasellar region and spinal canal. Loss of chromosome 22 is associated with multiple meningiomas. This can be seen in patients with NF 2 who also have loss of chromosome 22.

Meningiomas involving the cavernous sinus may start in the sinus, or grow into it as part of a larger tumor involving the medial sphenoid wing, orbit, other areas of the middle fossa, clivus, or petrous bone as seen in this case. Multiple cranial nerve deficits (II, III, IV, V, VI) can be involved, causing a variety of abnormalities [4]. Our patient developed diplopia, external opthalmoparesis, ptosis, and hemi-facial numbness; explained by involvement of cranial nerves III, VI, V and VII.

Generally, the extent of surgical resection and histological grade represent the most important prognostic variables. The extent of the tumor is defined by enhanced MRI. Calcifications can be seen on CT or GRE. If a major surgical procedure is planned, angiography is needed to define the tumor vasculature, with the option to embolize supplying blood vessels including the internal carotid and meningeal vessels[3].

The 10-year recurrence rate for total resection (Simpson grade 1) is 9% whereas for subtotal resection the rate is 40%. There is very limited data on recurrence by location in the cavernous sinus; most of the data suggests high rate or recurrence, probably from difficulty of complete resection (1). Our patient's meningioma had the characteristic "en plaque" appearance seen intraoperatively. This is a pattern of diffuse carpet-like tumor spread along the dural surface, which does not affect prognosis[5].

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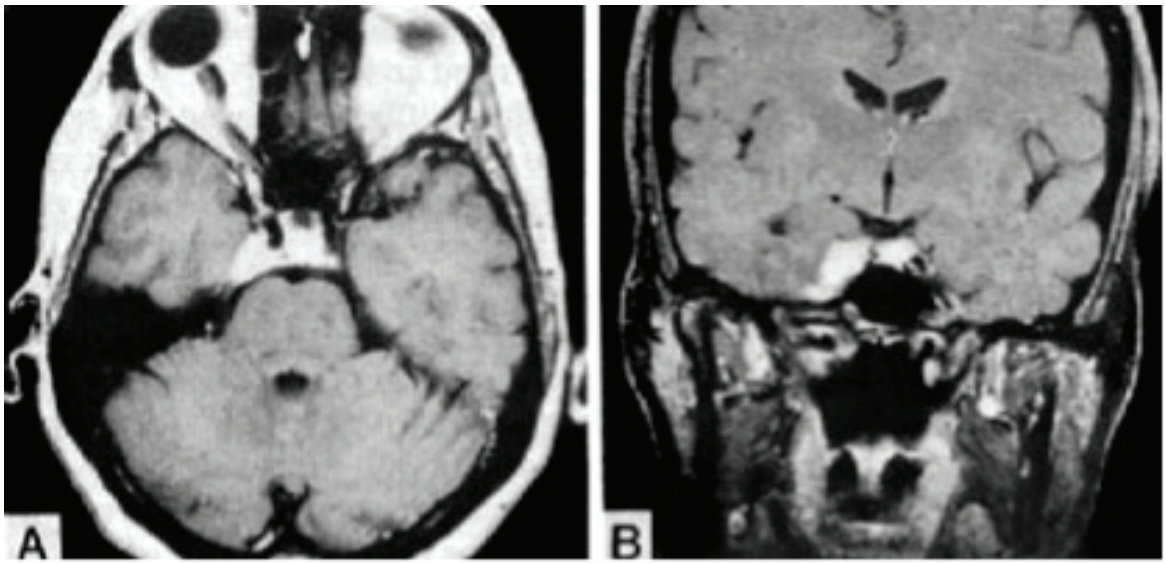
The decision regarding treatment is often difficult because the symptoms may be mild or non-progressive. The natural history in some patients may be one of minimal or no growth for long periods of time[4]. There is risk of significant cranial nerve morbidity with surgical treatment, and the long-term results of new surgical treatments and radiation therapy modalities are unknown. Gamma knife surgery is a safe and effective treatment, but high dose radiation could lead to modifications of the vascular wall leading to unintentional occlusion of the affected vessel[6]. At the present time, surgery is indicated in younger patients with worsening symptoms[2]. Radiation therapy is used when there is re-growth following subtotal removal and in older patients with worsening symptoms. Patients of any age with non-progressive or mild symptoms are observed. Given the age of this patient and the subtotal resection (20%), he will receive stereotactic radiation.



Cavernous sinus meningioma showing growth into Meckel's cave in a patient who presented with facial numbness[2].

Special thanks to Drs. Brent Bluett and Brian Vaillant for their numerous contributions to this article.

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2013 Poster Winners

Congratulations to the following winners of the Poster Competition during the 16th Annual Winter Conference:

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Second Place

Jitesh Kar, MD
Third Place

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Expert Opinion
Muscle Cramps

continued from page 10

- A Cochrane review failed to show evidence for magnesium supplementation
- There are a variety of unstudied anecdotal treatments including placing a bar of soap near the feet between the sheets during sleep and keeping the sheets and blanket at the end of the bed loose and not tucked in.

11-What is the prognosis of muscle cramps:

The prognosis of muscle cramps largely depends on the underlying cause. Senile muscle cramps are usually chronic. PNH induced cramps may cease after 1-2 years of treatment with membrane stabilizing agents.

Case Reports

Pseudohypoparathyroidism and unusual pattern of calcification of the basal ganglia.

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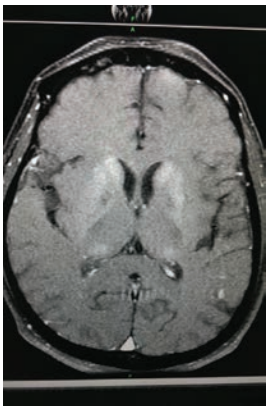

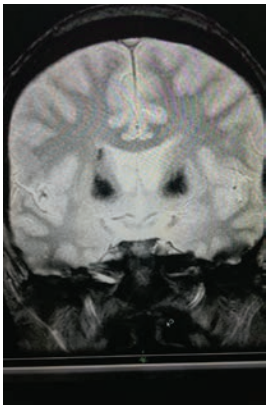

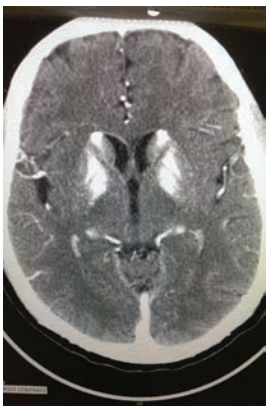

A 49-year-old male presented with a chief complaint of positional vertigo. He also complained of fatigue and joint pain. His medical history included epilepsy since age 12, migraines, dyslipidemia, vitamin D deficiency, vitamin B12 deficiency, and pseudohypoparathyroidism.

Physical and neurological examinations were normal. MRI of the brain and IACs revealed calcification of the basal ganglia in the caudate and putamen with enhancement. Two neuroradiologists concluded that it could represent either prominent physiologic calcification, mineralizing microangiopathy, or Fabry disease. The patient denied a history of head trauma or hypoxic encephalopathy. There was no family history of MELAS or Huntington's disease. A follow up CT of the head with and without contrast at confirmed bilateral calcifications of the basal ganglia.

The patient's magnesium was noted to be 2.6 and out-of-range. His sed rate was normal. A CBC showed a hemoglobin of 12.4 and a hematocrit of 36.8. His iron-binding capacity was 247 and low. His % saturation was 59 and high. His ferritin was 190. An ANA was negative.

The patient's pseudohypoparathyroidism is treated with Calcitriol 0.25 mcg daily and calcium citrate 600 mg daily.

DISCUSSION

It is suspected that there is a causal relationship between the patient's unusual pattern of calcification and his diagnosis of pseudohypoparathyroidism. Endocrine disorders such as hypoparathyroidism and pseudohypoparathyroidism may be associated with calcifications in the basal ganglia, globus pallidus, putamen, dentate nucleus, and thalamus[1].

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Myelitis as a result of Nitrous Oxide Inhalation and Vitamin B-12 deficiency

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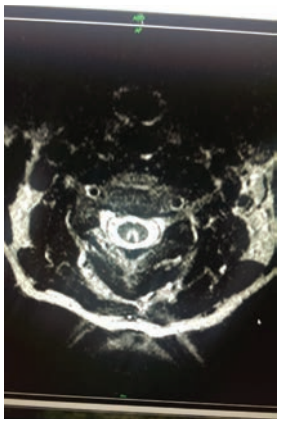

A 40-year-old male presented with a two-month history of "scary, debilitating electric pain in the solar plexus" and intermittent numbness and tingling into the arms and legs after neck flexion. He had a 10-year history of upper back pain and head trauma as a child after being accidentally hit in the head with a baseball bat. He drank 1-2 alcoholic beverages a day. The patient had abused nitrous oxide in the past 15 months. Neurological examination showed increased patellar reflexes. Initial MRI of the cervical spine without contrast showed increased signal in the lateral aspect of the posterior columns bilaterally extending from C1-C2 to about C5-C6 (figure). **What is the most likely diagnosis?**

LABORATORY: CBC and CMP were normal. Vitamin B-12 409 (normal 250-1100), MMA 0.6 (expected range 0-0.4), homocysteine 21 (normal 5-12), ceruloplasmin 21 (normal 16-66), Vitamin D, 25 OH 25 (optimal 30-100), serum copper 983 (normal 665-1480), serum zinc 65, (normal 66-110), NMO IgG of <1.6. and FTA-ABS was non-reactive.

MRI of the brain with and without contrast was unremarkable. A follow-up MRI of the cervical spine with contrast showed no enhancement.

DISCUSSION AND FOLLOW-UP: The primary diagnosis is B12 deficiency with localized abnormality restricted to the posterior columns. This may be seen with nitrous oxide inhalation. Differential diagnoses that were excluded included infectious disorders, and zinc or copper deficiency myelopathy.

The patient was started on Nascobal nasal spray 500 mcg/0.1 mL one spray in one nostril once a week and Lyrica 75 mg qid.

One month later, the patient returned to the office. He reported a 50% decrease in his symptoms. There was zero tingling except with neck flexion which was decreased. He requested to remain on Nascobal and to taper off Lyrica 75 mg qid over 1 month. He quantified the amount of nitrous oxide he was inhaling. He had zero exposure 5 months before the start of symptoms; however, in the last 12-15 months, he reported inhaling several boxes of nitrous chargers in a week. Each nitrous charger contained 8 g of nitrous oxide, and there were 25-50 chargers in a box.

Medical Economics Corner

The Texas Neurological Society Website

Stuart B Black MD, FAAN
TNS Medical Economics Committee Chair

Why Do It?

If one were to reflect on the historical aspects of medical practice, the scientific fundamentals of medicine and the art of medicine revolved around a sound pedagogic foundation. Medical education and the basis of clinical practice was directed toward the time-honored fundamental personal relationship between doctor and patient. The traditional fee for service is now being equated to excessive reimbursements for quantity of services as opposed to rewards for quality of care. Future reimbursements for physicians will be tied to "outcomes" and "value". The medical economic definition of value is designated as quality divided by cost. Physician fees are being set by bureaucratic agencies with the Federal Government taking the lead. The current medical economics environment also has an influence on the population of young people entering medical schools today. There are approximately 18,000 new physicians graduating American medical schools annually; a number that does not meet the impact of an unbalanced medical workforce. The estimated shortage of physicians in the U.S. by 2015 will be 63,000; with deficiencies on the horizon of 91,000 doctors by 2020 and 130,000 doctors by 2025 (some reports say the deficiency may be up to 200,000 by 2025). Because of the concern of physician shortages, the number of medical schools will be increasing with the hopes of graduating an additional 7000 new medical students annually over the next decade. However of the approximate 800,000 physicians in the United States, one out of three is over the age of 55. About 1/3 or approximately 250,000 are expected to retire in the next 10-15 years. In addition, epidemiological surveys indicate that young physicians are also focused on work-life balance. A 2012 study in the Archives of Internal Medicine found that physicians were nearly twice as likely to be dissatisfied with their work-life balance as workers in other occupations. Other studies indicate that the number of hours physicians will work each day have and will continue to decrease due to more physicians working three-quarters of the time or part time. Reports indicate that physicians today log 51 hours per week when the entire work force is averaged. As one investigator stated,"… working part time for 20 years is like working full time for 10 years."

A 2013 review of the supply and demand analysis of the current and future US Neurology workforce was reviewed and published in Neurology. While the demand for neurologic services is expected to grow 63% by 2025 for people age 65-74 and 47% for people age 75 and older, by 2025, there will be 19% fewer Neurologists than will be needed to care for our aging population. Another 2013 study in Neurology: Clinical Practice indicated that neurology wait times for a new patient visit have increased 40% since 2010. The present-day government rules and regulations imposed upon the medical profession coupled with the changing economic environment have a significant impact on the future of Neurology. While no occupation is immutable, the pressure to reduce the cost of medical care combined with the countervailing social and political forces are so pervasive that some experts believe the practice of medicine could be morphed into an art that will be quite different than the tradition which historically structured our noble profession. In this context, while public and private payers continue to experiment with new payment models which are designed to trim healthcare expenditures, the question proposed in the title of this article "Why Do It," is in reference to the development of the TNS website Medical Economics Corner (MEC). Why Do It is probably best answered by the acknowledged need and responsibility to keep the TNS membership as updated as possible on the rapidly changing medical economic environment. A desired goal would be for the TNS MEC to become a resource tool to help fellow Texas Neurologists navigate through the increasingly complex healthcare delivery system changes.

The speed upon which cultural change, technology and science has advanced is daunting. In the past 10 to 15 years information technology has exploded. The regnant integration of Solid state data storage, broad band internet, smart phones, iPods, iPads, and Wi-Fi represent just a touch on some of the recent developments that have changed our society and behavior patterns. Google went from a silly-named search engine to the conglomerate it is today. Facebook, Twitter, My Space and LinkedIn did not exist. Recent innovative changes in medicine have included such advances as targeted drug therapies for cancer, minimally invasive and robotic techniques which have revolutionized surgery, functional MRIs and mapping of the human genome; to name a very few. Given the expeditious impact that change has on our environment and existence, it is a challenge for anyone practicing medicine today to predict what form will emerge ten years hence.

2013 was a year of transition in medicine which included provisions which took effect related to the Affordable Care Act (ACA). The launch of the Medicare bundled payment pilot was designed to evaluate the model of bundling reimbursements for physician services, acute inpatient hospital services, outpatient hospital services and post-acute care services for an episode of care. The 10% Medicare bonus for primary care (which actually took effect in 2011 and expires at the end of 2015) continued through 2013. The movement for Patient-Centered Medical Homes (PCMH) was on a fast track in 2013. This may also be tied to the many financial rewards for quality (many tied to meaningful use Stage 1) as well as penalties for lack of quality which will be part of the

2014 ACA changes. More and more Accountable Care Organizations (ACOs) were formed which serve as a home for the rapid expansion of PCMHs. Reimbursements for physician and hospital services decreased in 2013 but less so for Primary Care Physicians (PCPs) than for specialists as Neurologists, who were excluded from all primary care incentives in the ACA; despite the fact that most Neurologists bill over 60% of the CPT codes for E&M services. The ACA also included the Physician Payment Sunshine Act which requires pharmaceutical, medical device, biological, and medical supply manufacturers to report all financial rewards of $10 or more given to physicians and hospitals. By 2013, more than three-fourths of physicians have adopted EHRs with a goal toward interoperability. Technological interconnectivity will also be a requirement for meeting meaningful use Stage 2 as part of the government incentive program. And of course, open enrollment in The Health Insurance Marketplace began on October 1, 2013.

January 1, 2014 will bring the "full implementation" of the Affordable Care Act. The new requirements will include the following: Prohibiting Discrimination Due to Pre Existing Conditions or Gender, Eliminating Annual Limits on Insurance Coverage, Ensuring Coverage for Individuals Participating in Clinical Trials, Tax Credits Available for people with income between 100% and 400% of the poverty line who are not eligible for other insurance coverage, Establishing the Health Insurance Marketplace where individuals and small businesses can purchase insurance, Increasing the Small Business Tax Credits, Increasing access to Medicaid, and the Individual Mandate which requires most U. S. residents to obtain health insurance coverage or pay a penalty.

2014 brings another important part of health care reform that can influence how physicians practice. It is the implementation of the Independent Payment Advisory Board (IPAB). The Board will be composed of 15 unelected members appointed to make recommendations to Congress on lowering Medicare spending. IPABs proposals would go into effect unless Congress enacts an alternative proposal of equivalent savings. The main mechanism available to IPAB to control spending is through decreases in reimbursements. Thus, IPAB essentially becomes the authority to set doctor reimbursement rates for Medicare and determines which procedures and drugs will be covered and at what price. Some strongly believe that IPAB will essentially be a health care rationing body which may not even have physician representation. By having the authority to stop certain treatments its members do not favor by simply setting rates to levels where no doctor or hospital will perform them, IPAB has enormous authority. The Board's proposals begin on September 2014.

The reporting of Quality Measures in 2014 will also be different. Beginning 2014, the reporting of Clinical Quality Measures (CQMs) will change for all providers. "Eligible Professionals (EPs) will be required to report using the 2014 criteria regardless of whether they are participating in Stage 1 or Stage 2 of the Medicare and Medicaid Electronic Health Record (EHR) incentive programs." CMS has also increased the number of measures that must be reported from three measures to nine measures. Clarification of EHR technologies will require that software products and EHR modules be tested for their capabilities to accurately capture, calculate and report the CQM results. In Stage 2 Meaningful Use the government has proposed unifying important components of the CQM and PQRS programs. For example the "smoking cessation measure" in the EHR incentive program will be calculated the same way when compared to the PQRS Program. This will actually be a beneficial step toward simplification for Stage 2 of Meaningful Use since the proposed set of CQM quality measures will align with the PQRS program. In 2014 EPs and EHR vendors will finally have a single method to measure the data for a specific measure. To be sure, compliance with Stage 2 Meaningful Use rules and regulations is extremely complex. The explanation and details of the PQRS program is already available to TNS members on the MEC website.

Alternative Payment Models are another important area that will be addressed in 2014 on the TNS website MEC. This paper has already alluded to the changes in reimbursements related to ACOs, Bundled Payments and Patient Centered Medical Homes. However, there are concepts in our specialty which focus on Single Specialty Neurology ACOs and Single Specialty Neurology Medical Homes. Telemedicine is another significant development in which Neurologists are engaged. There is much discussion among payers, including CMS, regarding instituting appropriate reimbursements for telemedicine. E-Consults are another mechanism for providing Neurological consultations for areas where Neurology is underserved. Practice consolidations and selling one's private practice is becoming more common. When a larger entity, such as a hospital, ACO or provider network, purchases an independent practice, there are important changes in compensation structure when transitioning from fee-for-service to a physician employment model. Many established Neurology practices are facing a litany of demands that are overwhelming their limited resources. The combination of decreased reimbursements for services rendered, ongoing rising overhead, and unendurable burden to not only stay academically current but to deal with the explosion of rules and regulations as exampled above lead numbers of our colleagues toward seeking employed positions. This trend toward employment may also generate yet another major topic for the TNS website MEC to address; specifically the potential important consequential considerations to consider before signing an employment contract.

It is not unusual to hear discussions and predictions that the physician fee-for-service model is disappearing. As Neurologists migrate to join larger entities, that could produce an unintended void for meaningful access to neurologic expertise; especially in less populated areas. While Neurologists are moving toward different types of practice models to survive the tsunami of paper work and potential penalties for noncompliance of the never ending

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new rules and regulations, patient care has transformed from analog to digital. As indicated above, compensation will become based on outcomes. The question is who will determine what those outcomes should be? Our senior physicians will tell you that they were taught to be clinicians by clinicians. The curriculum was focused on patient care. Given all the modern day forces that have altered the landscape of medicine, the question is how we educate the physicians of tomorrow? How can we construct a curriculum to meet all the unknown academic, economic, social, and political challenges of the future? Since "burnout" has become such an important consideration in our specialty, how can we encourage young physicians to enter into Neurology?

The excellent featured story in the September/October 2013 edition of "Practical Neurology" titled, "The survey of neurologists on career satisfaction and burnout," by Dr. Randy Evans is recommended reading. Evans', a past President of the TNS, found that 46% of responders had burnout. The career satisfaction items significantly associated with burnout reflected on "...widespread dissatisfaction with work schedules, government regulations, implementation of the Affordable Care Act and compensation." Only 17% of responders said they would go into Neurology again. Only 7% of responders indicated they would recommend that their child or close relative become a Neurologist. In the Medscape's 2012 Physician Lifestyle Report, Neurologists reported being among the least happy specialty with a burnout rate of 41%. In that study, similar to Dr Evan's study, the top stresses were: too many bureaucratic tasks, spending too many hours at work, income not high enough, present and future impact of the Affordable Care Act.

As can be seen from the content of this text, medicine, and especially Neurology, is under assault on many fronts. The development of the Texas Neurological Society website Medical Economics Corner (MEC) is focused on being proactive in addressing various medical economic issues that are important for our members to comprehend. The TNS Board encourages its membership to use this resource as an aid while trying to navigate the many new changes that are taking place in medicine and our specialty. We also encourage our membership to contribute articles to the MEC in areas of their interest and expertise.

From the TNS Lobbyist...

Greg Herzog

With the New Year, do not forget that the election season is in full swing. As you may have heard, there is extremely high turnover anticipated in the Texas political scene this election cycle. Already, highly contested elections for the Governor, Lieutenant Governor, Comptroller, Attorney General, and other statewide offices are being waged. The changes in these important offices can impact our important Tort-Reform protections, tax codes, scope of practice models just to mention a few.

Many of your local officeholders may also be in contested races. I encourage you to get involved with your local elected officials regardless of any partisanship. As physicians, these days you face challenges and opportunities from all sides and political stripes. Your relationship with your elected officials may be the deciding factor in an issue facing your profession in the future. Now is the time to engage candidates and elected officials!

I encourage you to become more engaged with your own local elected officials. Become the "key contact" for those that represent you in Austin and in Washington. Make this your New Year's Resolution on behalf of your patients and your practice.

It is important to understand in making this resolution that certain items matter and certain items do not:

- As a Key Contact for an elected official, your personal political stances should NOT matter. Your legislator(s) only needs to know that you are a constituent who cares about your patients well-being.
- As a Key Contact for an elected official, your roles within certain organizations should NOT matter. Your legislator(s) will want to know that you are in a group practice that cares about Tort Reform or that you are in Academia and are concerned about future GME funding.
- As a Key Contact for an elected official, the item that matters the most is your willingness to give of your time on behalf of your patients and your profession. Be a resource for elected officials when they have questions or concerns. If we do not educate elected officials, the lobbyists for our enemies will!

For your convenience here is the link to discover who represents you in Washington and Austin. http://www.fyi.legis.state.tx.us/Home.aspx

One thing has become certain after the past few years: If physicians do not take an interest in politics, politics will continue to take an interest in YOU!

Expert Opinion

Treatment of Seizures in Patients with Significant Drug Interactions and Co-Morbidities

Lola Morgan, MD and Jose E. Cavazos, MD, PhD
South Texas Comprehensive Epilepsy Center
University of Texas Health Sciences Center at San Antonio

CASE HISTORY: A 66 year old right handed male with history of coronary artery disease and hyperlipidemia managed with aspirin and simvastatin who presents with recurrent episodes of blank stare, garbled speech with loss of consciousness for the past 6 weeks. Neurologic examination is unremarkable. MRI brain reveals moderate deep white matter disease and an EEG reports epileptiform discharges emanating from the left fronto-temporal region.

QUESTION: What factors will influence choice of treatment for seizures in a patient with a history of cardiovascular disease?

EXPERT OPINION: Many patients who have cardiovascular disease (CAD) are managed medically based on clinical recommendations for lipid lowering and use of antiplatelet agents. Because development of epilepsy is common in the elderly, it is useful to be aware of potential interactions for medications utilized for the highly prevalent condition of coronary artery disease.

Review of basic pharmacology provides the framework to understand drug-drug interactions. Drugs undergo biotransformation primarily in the liver along with other tissues such as the intestines, skin, lungs and kidneys, typically aiming to change compounds into more hydrophilic molecules that can be more easily excreted by the kidneys. The biotransformation processes include phase I (oxidation, reduction and hydrolysis) occurring in the subcellular structure of the microsomes and are mediated by the cytochrome P450 family of enzymes. Environmental and genetic factors can significantly influence the activity and result in clinically relevant variations in a patient's metabolism of a drug[1].

Many first generation and several second generation antiepileptic drugs (AEDs) share a common feature of enzyme induction (see Table 1) which can result in an increase in the metabolism of different substrates targeted by the particular cytochrome p450 enzyme along with a decrease in the action of the inducer. Additionally, coadministered drugs can be affected by the process with an acceleration of their own metabolism, a process known as autoinduction[2].

Knowledge of these basic tenets of biotransformation assists in the selection of anticonvulsant therapy in the setting of multiple potential drug-drug interaction. Statins have become a mainstay of treatment for hyperlipidemia. The goal of management of hyperlipidemia is to utilize a statin to lower the low-density lipoprotein cholesterol level to 70 to 100 mg per dL in patients with coronary artery disease[3]. Statins are metabolized by the cytochromic p450 system, in particular the 3A4 family, and would be expected to have reduced serum levels in the presence of an 3A4 enzyme inducing antiepileptic medication. This interaction has been demonstrated between atorvastatin and phenytoin where bioavailability of atorvastatin was reduced by phenytoin coadministration. It was observed that dose adjustment may be required to maintain adequate atorvastatin exposure when coadministered with phenytoin. It has also been proven in the combination of simvastatin and carbamazepine. Atorvastatin and Simvastatin are metabolized by the 3A4 iso-enzyme family of the cytochromic p450 system. Carbamazepine and phenytoin are inducers of 3A4 (see table 2). In contrast, lamotrigine is not an inducer or inhibitor of the 3A4 iso-enzyme family. No interaction between atorvastatin and lamotrigine was observed when both medications were co-administered[4]. A less effective statin, pravastatin is unaffected by 3A4 induction. Because of the importance of statin use in patients with coronary artery disease and stroke, knowledge of the properties of the antiepileptic medications is essential for appropriate selection or alternatively, dosing of the statin to counteract the interaction.

Antiplatelet therapy is an important component of CAD management because platelet aggregation at atherothrombotic plaque sites can produce clinically significant thrombosis and resultant MI. The most common antiplatelet agents used in the United States are aspirin and clopidogrel[5]. Aspirin has several important interactions with antiepileptic medications with which a clinician should be aware. Of note, salicylates may enhance the adverse effect of zonisamide, topiramate and acetazolamide resulting in an increase in the metabolic acidosis which can be observed during use of these medications. All three anticonvulsants share carbonic anhydrase inhibition. Clinical symptoms of metabolic acidosis include drowsiness, hyperventilation, vomiting, confusion and lethargy. The onset may take days to weeks to manifest.[6,7] The mechanism of this interaction is unclear. Salicylates appear to reduce carbonic anhydrase inhibitor protein binding and decrease carbonic anhydrase inhibitor excretion by the kidneys. In addition, carbonic anhydrase inhibitor-induced decreases in plasma pH might result in a higher concentration of nonionized salicylate, which can more readily enter the central nervous system resulting in clinical symptoms[8,9]. While the effect appears to be dose dependent so that cardiac patients taking low dose aspirin are at lesser risk, it is still advisable that the combination of aspirin and an antiepileptic medication containing the carbonic anhydrase inhibitory mechanism be avoided. If this is not possible, close monitoring of metabolic acidosis is warranted.

Aspirin additionally can have effects on other anticonvulsant medications. In particular, the serum level of valproic acid can be increased resulting in clinical symptoms of toxicity[10].

It has been noted that aspirin may increase the serum level of phenytoin; however, little change in the free fraction of phenytoin is observed. Therefore, no symptoms of toxicity are observed. It is advisable to monitor both a free and total fraction when checking levels of phenytoin[11].

It is notable that clopidogrel does not have any clinically significant interactions with any of the anticonvulsant medications. This absence of interactions is noted for both

continued on page 18

enzyme inducing and non enzyme inducing antiepileptic medication.

CASE HISTORY: A 45 year old right handed male presents to the emergency room after having a witnessed seizure described by her spouse as eye deviation to the left, head version to the left followed by a fall with a generalized seizure. The patient underwent brain MRI which revealed a mass in the right frontal lobe described as a hyperintense lesion on T2 surrounded by vasogenic edema. A brain biopsy is performed and histology reveals glioblastoma multiforme. He is seen by a neuro-oncologist who plans for resection followed by radiochemotherapy.

QUESTION: What is the best selection of antiepileptic medication for the patient while he is receives definitive treatment?

EXPERT OPINION: Glioblastoma multiforme accounts for 50-60% of all primary brain tumors in adults and carries a median life expectancy of 15 months[12]. Seizures occur in 30-50% of patients with glioblastoma multiforme and they remain at increased risk of recurrent seizures[13]. Seizure control is an important issue in care in neuro-oncology and influences quality of life. Careful selection of an antiepileptic medication regimen can optimize clinical outcomes.

Current standard of care for glioblastoma multiforme consists of surgical resection (if possible) and radiation with adjuvant and concomitant treatment with temozolamide[14,15,16]. A retrospective study of glioblastoma patients (of which 35% were treated with temozolamide) noted that patients receiving non-enzyme inducing medications (primarily valproic acid) demonstrated both improved survival and greater hematologic toxicity as compared to those patients receiving enzyme-inducing antiepileptic drugs[17]. The authors proposed that this difference could result from the lack of enzyme induction in the primarily valproic acid group or enzyme inhibition by valproate (i.e., increased chemotherapeutic agent concentrations and effects) or some combination of these effects. According to temozolomide prescribing information, temozolomide oral clearance is an average of 5% lower with concurrent valproic acid[18].

A subsequent analysis was performed to assess whether antiepileptic drugs modulate the effectiveness of temozolomide and resulting survival. Patients receiving valproic acid had more thrombocytopenia and leukopenia than patients without an antiepileptic drug or patients taking an enzyme inducing antiepileptic drug only. The overall survival of patients who were receiving an antiepileptic drug at baseline versus not receiving any antiepileptic drug were similar. Patients receiving valproic acid alone appeared to derive more survival benefit from temozolomide and radiotherapy than patients receiving an enzyme inducing antiepileptic drug or patients not receiving any antiepileptic drug. The findings suggest that valproic acid may be preferred over an EIAED in patients with glioblastoma who require an antiepileptic drug during temozolomide-based chemoradiotherapy[19]. Future studies are needed to determine whether valproic acid increases temozolomide bioavailability or acts as a sensitizer for radiochemotherapy. The results conclude that selection of antiepileptic drug in patients with glioblastoma should be carefully considered because it may affect survival. The findings also favor the use of non-enzyme inducing antiepileptic medications to allow use of modern chemotherapy that often show increased hepatic metabolism if patients are given an antiepileptic drug which is an enzyme inducer. Common medications used in this setting include levetiracetam because its availability in oral and intravenous formulation, and comparatively a lack of drug interactions. Valproate is an alternate choice.

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