Welcome to TNS!

I would like to welcome all new members of TNS. We have been working hard to incorporate all state wide academic institutions into the society. And, I am happy to report that we have had some great success. We extended a discounted group membership rate to many institutions and, so far, McGovern Medical School, Baylor Pediatric Neurology, UTSW Neurology, UTSW Pediatric Neurology, UTHSC San Antonio Neurology, Baylor/Scott and White group and Houston Methodist Neurology have taken us up on the offer. This has added more than 200 new members to the society. UT Austin is interested and will finalize their decision soon. We will continue to reach out to other academic departments and neurology communities across Texas.

“The TNS history is clear enough and its membership is valuable enough for many neurologists to join.”

The TNS history is clear enough and its membership is valuable enough for many neurologists to join. As president of the society, one of my goals was to not only increase membership, but to bring awareness of the society to academia—get them involved in leadership roles within the organization, involve their faculty in the conferences, show the value of being a member of TNS and I think we are making progress. As we all know, TNS is a melting pot of all types of neurologists—large practices to the solo practitioner; rural neurologists to city; academia to private practices—together we are stronger. Let’s keep the momentum going. Please remember to renew your membership by visiting the society website.

Have you saved the date for the TNS summer conference, July 20-21 at La Cantera in San Antonio? It is going to be a great conference as always. This conference will host a pediatric session on Friday morning followed by a movement disorder session in the afternoon. Saturday will be devoted to general neurology. More information about the conference can be found in this edition.

With neurology practices facing challenging times, we need to intensify our advocacy efforts to obtain legislation favorable to Texas neurologists and their patients: lobbying for cheaper medications, less restrictive regulations on neurology practices. etc. TNS has been successfully involved in legislative initiatives the past several years with the help of our lobbyist, Greg Herzog. I would like to take a moment and thank Greg for his years of service to the society. Greg has taken a new position and we have begun the process of hiring his successor. We wish Greg much success in his future endeavors.

Finally, I would like to thank Dr. Randy Evans for editing the society newsletter “Brocas.” It has become a respected periodical in our neurology community. As a reminder, please submit articles about your practices and challenges so that others will benefit from your experiences.

On a side note, TNS would be happy to help any neurology groups open chapters in their respective cities in order to advance its mission and utilize its resources for the betterment of neurology in Texas.

If you have any ideas to improve the performance of the society in any way, please do not hesitate to contact me at shaibani@bcm.edu.

I look forward to seeing you at the summer conference.
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 15th Annual TNS Summer Conference at La Cantera in San Antonio.

Katie Hendley program director, Bob Fayle, education committee chair, and the education committee (Ed Fox, Aziz Shaibani, Katie Hendley, Mary Ellen Vanderluck, and Erin Furr-Stimming) have planned an excellent program.

MIGRAINE VS TRANSIENT ISCHEMIC ATTACK

At times, it can be difficult to distinguish a migraine aura from a TIA. Up to 20% of patients with initially suspect TIA have migraine aura (Nadarajan V, Perry RJ, Johnson J, et al. Transient ischemic attacks: Mimics and chameleons. Pract Neurol 2014;14: 23–31). First presentations of migraine aura without headache can be challenging. Let’s consider a comparison of migraine aura to TIA, and new diagnostic criteria for TIA and migraine with aura to further explore this topic.

32 patients with TIA were compared with 32 patients with migraine aura without headache (MAWH) and 32 patients with migraine aura with headache (MA) (Fogang Y, Naeije G, Ligot N. Transient Neurologic Deficits: Can Transient Ischemic Attacks Be Discriminated from Migraine Aura without Headache? J Stroke Cerebrovasc Dis. 2015;24(5):1047-51). The typical duration of transient neurological deficits was less than 1 hour in TIA and more than 1 hour in MAWH and MA. Visual deficits occurred in the following: MAWH, 63%; MA, 41%; TIA, 10%. A combination of symptoms occurred in the following: MAWH, 69%; MA, 50%; and TIA, 34%. The onset duration was less than 1 minute for all patients with TIA.


Migraine with aura was diagnosed in 34 and 2 with stroke. Of the migraineurs, sensory aura was present in 79%, visual aura in 61%, and dysphasic aura in 21%. A combination of visual and sensory aura occurred in 30%, visual and dysphasic aura in 6%, sensory and dysphasic aura in 3%, and visual, sensory, and dysphasic aura in 12%. Most patients reported that the aura symptoms lasted less than 60 minutes per symptom. For many of the migraineurs, diagnosis was difficult because it was their first ever attack and headache was often absent or a non-migrainous type. Gradually developing aura symptoms or different aura symptoms occurring in succession were useful for diagnosing migraine. In a 5 year follow-up, none of the migraineurs had cerebrovascular events.

Diagnostic criteria for TIA

Lebedeva et al propose the following diagnostic criteria for TIAs to help distinguish from migraine aura (Lebedeva ER, et al. Explicit diagnostic criteria for transient ischemic attacks to differentiate it from migraine with aura. Cephalalgia. 2017[Epub ahead of print]):

A. Sudden onset of fully reversible neurological or retinal symptoms (typically hemiparesis, hemihypesthesia, aphasia, neglect, amaurosis fugax, hemianopsia or hemiataxia)

B. Duration < 24 hours

C. At least two of the following:

1. At least one symptom is maximal in < 1 minute (no gradual spread)

2. Two or more symptoms occur simultaneously

3. Symptoms in the form of deficits (no irritative symptoms such as photopsias, pins and needles etc)

4. No headache accompanies or follows the neurological symptoms within one hour

D. None of the following isolated symptoms (can occur together with more typical symptoms): shaking spells, diplopia, dizziness, vertigo, syncope, decreased level of consciousness, confusion, hyperventilation associated paresthesias, unexplained falls, amnesia

E. No evidence of acute infarction in the relevant area on neuroimaging

They tested the criteria on 120 patients with TIA, 1390 Danish, and 152 Russian migraineurs with aura. The sensitivity of the criteria were 99% in those with TIA, 95% in Danish migraineurs, and 96% in Russian migraineurs.

The investigators (Lebedeva ER, Gurary NM, Gilev DV, Olesen J. Prospective testing of ICHD-3 beta diagnostic criteria for migraine with aura and migraine with typical aura in patients with transient ischemic attacks. Cephalalgia. 2018;38:561-567) compared the main body of the ICHD-3 beta criteria for migraine with aura and migraine with typical aura to the beta appendix or alternative criteria (below). Of the 120 patients with TIA, the appendix criteria had a specificity of .94 for TIA. Slow spread of symptoms and succession of symptoms were the best discriminating features. See Table 1 for specifics.

Diagnostic criteria for migraine with aura

The recently published International Classification Headache Disorders (ICHD), 3rd edition now provides the following definition of migraine with aura to decrease the risk of misdiagnosing a TIA as migraine (Headache Classification Committee of the International Headache Society (IHS) The International Classification of Headache Disorders, 3rd edition. Cephalalgia.2018 Jan;38(1):1-211). Section C has increased the number of qualifying characteristics from at least 2 in the 2013 beta version to at least 3. The previously included syndrome, “migraine with prolonged aura,” has been abandoned.
Migraine with speech and/or language aura is probably artificial, and therefore not recognized in this

symptoms
Numbness may occur in its wake, but numbness may also be the only symptom.
the point of origin and affecting a greater or smaller part of one side of the body, face and/or tongue.
sensitivity has been developed and validated.
visual symptoms occur that may represent an aura. A visual aura rating scale with high specificity and
other cases, scotoma without positive phenomena may occur; this is often perceived as being of acute
the point of fixation that may gradually spread right or left and assume a laterally convex shape with
with aura, at least in some attacks. It often presents as a fortification spectrum: a zigzag figure near
aura is the complex of neurological symptoms that occurs usually before the headache of 1.2 Migraine
Distribution of patients with TIA according to diagnostic
criteria of A1.2 Migraine aura (alternative criteria [now the
main criteria in ICHD 3 as below]).

Table 1. Distribution of patients with TIA according to diagnostic
criteria of A1.2 Migraine aura (alternative criteria [now the main criteria in ICHD 3 as below]).

Notes:
1. When, for example, three symptoms occur during an aura, the acceptable maximal duration is 3x60 minutes.
2. Aphasia is always regarded as a unilateral symptom; dysarthria may or may not be.
3. Scintillations and pins and needles are positive symptoms of aura.

Comments: Many patients who have migraine attacks with aura also have attacks without aura; they should be coded as both 1.2 Migraine with aura and 1.1 Migraine without aura.

Field testing has compared the diagnostic criteria for 1.2 Migraine with aura in the main body of ICHD-3 beta with those for A1.2 Migraine with aura in the Appendix. The latter performed better in distinguishing migraine with aura from transient ischaemic attacks.

These are now adopted in ICHD-3, which no longer has Appendix criteria for this disorder. The aura is the complex of neurological symptoms that occurs usually before the headache of 1.2 Migraine with aura, but it may begin after the headache phase has commenced, or continue into the headache phase.

Visual aura is the most common type of aura, occurring in over 90% of patients with 1.2 Migraine with aura, at least in some attacks. It often presents as a fortification spectrum: a zigzag figure near the point of fixation that may gradually spread right or left and assume a laterally convex shape with an angulated scintillating edge, leaving absolute or variable degrees of relative scotoma in its wake. In other cases, scotoma without positive phenomena may occur; this is often perceived as being of acute onset but, on scrutiny, usually enlarges gradually. In children and adolescents, less typical bilateral visual symptoms occur that may represent an aura. A visual aura rating scale with high specificity and sensitivity has been developed and validated.

Next in frequency are sensory disturbances, in the form of pins and needles moving slowly from the point of origin and affecting a greater or smaller part of one side of the body, face and/or tongue. Numbness may occur in its wake, but numbness may also be the only symptom.

Less frequent are speech disturbances, usually aphasic but often hard to categorize.

Systematic studies have demonstrated that many patients with visual aura occasionally have symptoms in the extremities and/or speech symptoms. Conversely, patients with symptoms in the extremities and/or speech or language symptoms almost always also experience visual aura symptoms at least during some attacks.

A distinction between migraine with visual aura, migraine with hemiparaesthetic aura and migraine with speech and/or language aura is probably artificial, and therefore not recognized in this classification: they are all coded as 1.2.1 Migraine with typical aura.

When aura symptoms are multiple, they usually follow one another in succession, beginning with visual, then sensory, then aphasic; but the reverse and other orders have been noted. The accepted duration for most aura symptoms is one hour, but motor symptoms are often longer lasting.

Patients with aura symptoms arising from the brainstem are coded as 1.2.2 Migraine with brainstem aura, but they almost always have additional typical aura symptoms.

When the aura includes motor weakness, the disorder should be coded as 1.2.3 Hemiplegic migraine or one of its subforms. 1.2.3 Hemiplegic migraine is classified as a separate subtype because of genetic and pathophysiological differences from 1.2.1 Migraine with typical aura. Patients with 1.2.3 Hemiplegic migraine often have brainstem symptoms in addition.

Patients often find it hard to describe their aura symptoms, in which case they should be instructed to time and record them prospectively. The clinical picture then becomes clearer. Common mistakes are incorrect reports of lateralization, of sudden rather than gradual onset and of monocular rather than homonymous visual disturbances, as well as of duration of aura and mistaking sensory loss for weakness. After an initial consultation, use of an aura diary may clarify the diagnosis.

Migraine aura is sometimes associated with a headache that does not fulfill criteria for 1.1 Migraine without aura, but this is still regarded as a migraine headache because of its relation to the aura. In other cases, migraine aura may occur without headache.

Before or simultaneously with the onset of aura symptoms, regional cerebral blood flow is decreased in the cortex corresponding to the clinically affected area and often over a wider area. Blood flow reduction usually starts posteriorly and spreads anteriorly, and is usually above the ischaemic threshold. After one to several hours, gradual transition into hyperaemia occurs in the same region. Cortical spreading depression of Lea’s is the likely underlying mechanism.

The previously defined syndromes, migraine with prolonged aura and migraine with acute-onset aura, have been abandoned. It is not rare for aura to last more than one hour but, in most such cases, patients have at least two of the other characteristics of criterion C. Even when most of a patient’s attacks do not fulfill criterion C, it is usual that other attacks fulfill criteria for one of the recognized subtypes or subforms of 1.2 Migraine with aura, and this should be the diagnosis.

The few other cases should be coded to 1.5.2 Probable migraine aura, specifying the atypical feature (prolonged aura or acute-onset aura) in parenthesis. The diagnosis is usually evident after a careful history alone, although there are rare secondary mimics including carotid dissection, arteriovenous malformation and seizure.

Prodromal symptoms may begin hours or a day or two before the other symptoms of a migraine attack with aura. They include various combinations of fatigue, difficulty in concentrating, neck stiffness, sensitivity to light and/or sound, nausea, blurred vision, yawning and pallor. The term ‘prodrome’, which has replaced ‘premonitory phase’ or ‘premonitory symptoms’, does not include aura. Postdromal symptoms, most commonly feeling tired or weary, difficulty with concentration and neck stiffness, may follow resolution of the headache, persisting for up to 48 hours; these are less well studied.

### Table 2. Description: Recurrent attacks, lasting minutes, of unilateral fully reversible visual, sensory or other central nervous system symptoms that usually develop gradually and are usually followed by headache and associated migraine symptoms.

<table>
<thead>
<tr>
<th>Diagnostic Criteria</th>
<th>Patients with TIA (n=120)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.</td>
<td></td>
</tr>
<tr>
<td>At least two attacks fulfilling criteria B and C</td>
<td>7 (5.8%)</td>
</tr>
<tr>
<td>One attack fulfilling B and C</td>
<td>4 (3.3%)</td>
</tr>
<tr>
<td>B. One or more of the following fully reversible aura symptoms:</td>
<td>120 (100%)</td>
</tr>
<tr>
<td>1. Visual</td>
<td>12 (10.0%)</td>
</tr>
<tr>
<td>2. Sensory</td>
<td>60 (50.0%)</td>
</tr>
<tr>
<td>3. Speech and/or language</td>
<td>63 (52.5%)</td>
</tr>
<tr>
<td>4. Motor</td>
<td>45 (37.5%)</td>
</tr>
<tr>
<td>5. Brainstem</td>
<td>65 (54.2%)</td>
</tr>
<tr>
<td>6. Retinal</td>
<td>3 (2.5%)</td>
</tr>
<tr>
<td>C. At least three of the following six characteristics:</td>
<td>6 (5.0%)</td>
</tr>
<tr>
<td>1. At least one aura symptom spreads gradually over 5 minutes</td>
<td>2 (1.7%)</td>
</tr>
<tr>
<td>2. Two or more aura symptoms occur in succession</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>3. Each individual aura symptom lasts 5–60 min</td>
<td>45 (37.5%)</td>
</tr>
<tr>
<td>4. At least one aura symptom is unilateral</td>
<td>92 (76.7%)</td>
</tr>
<tr>
<td>5. At least one aura symptom is positive</td>
<td>1 (0.8%)</td>
</tr>
<tr>
<td>6. The aura is accompanied, or followed within 60 minutes, by headache</td>
<td>7 (5.8%)</td>
</tr>
</tbody>
</table>

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classification: they are all coded as 1.2.1 Migraine with typical aura.

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The new DNR bill (SB 11) ...and how it affects you

Sara Austin, MD, Legislative Chair

I’m hoping that you have already heard of this change to the DNR law in Texas, but if not, here is a bird’s eye view. This bill became active as of April 1, 2018 so it’s already in effect.

When you read it you might think it’s confusing. Don’t worry, you have not lost your mind, it is very confusing. There are some parts that seem to even confuse the lawyers. Because this bill only deals with in-hospital DNR’s, your hospital is most likely weighing in, and you should be aware of and follow their directives for now. At the end of this article I added some information about the process this bill went thru to become law. If you are interested in the politics, this one is interesting.

The stated purpose of the bill was to make DNR orders more transparent, and to encourage open discussion among patients, family members and the healthcare team. Sounds good …

Here is what we ended up with.

“DNR” only refers to attempted cardiopulmonary resuscitation. It does not pertain to other decisions that we make at the end of life. This law only deals with DNR orders written in a hospital. Out of hospital DNR orders are not covered in this bill.

Here are a few of the specifics. They are written as stipulations about what makes a DNR order valid.

A competent hospital patient can write, sign and date his own DNR. In that case no witnesses are needed.

If the DNR request is ORAL, then there are a few hoops to jump through. It has to be witnessed by 2 people; one of whom can’t be an employee of the attending physician or the hospital if that person is involved in direct care of the patient; an officer of the hospital; or a family member who may inherit anything from the patient. It could be a nurse from the hospital as long as he is not taking direct care of the patient. So in this case, the attending physician and a nurse not in direct care of the patient could be the witnesses. There are more complex rules if the DNR request is not written and not oral (something like a gesture). You will need to look that up.

The order itself can only be written in the chart by the ‘attending physician’. Unfortunately, there is no legal definition of ‘attending physician’. My hospital has decided that it has to be the primary hospitalist for the patient. Consultants and residents can’t write the order, even if the relationship with the patient is long standing or very close. Other hospitals may have a different interpretation.

A patient can revoke a DNR order at any time REGARDLESS OF THEIR MENTAL CAPACITY. A DNR can also be revoked AT ANY TIME by a person who holds the medical power of attorney for the patient (MPOA) or is the legal Guardian of the patient. These persons are defined by law. Simple next of kin are not given this privilege. The DNR can be revoked by these people even if it was against the express written wishes of the patient, and could even conceivably be revoked right at the end of life.

The law is very specific about DNR’s written for children (persons under the age of 18). If you deal with this issue in your practice, you need to read these carefully and probably discuss with your hospital legal team.

If a DNR decision is made by a surrogate (the patient is incapacitated), the patient has to be declared first to have a terminal or irreversible condition. The qualified relative acting as surrogate would be a spouse, a reasonably available adult child, parents, or the nearest living relative (in that order).

If the patient has no qualified acting relative, then the attending physician, plus another physician not participating in the care of the patient, with ethics committee input, can write for a DNR.

A physician alone can write a DNR for a patient if: a) it is not contrary to the known wishes of the patient AND, b) the patient’s death is imminent AND, c) the DNR order is medically appropriate. There is no legal definition of ‘imminent’. If the physician writes the order for an incapacitated patient without talking to the family, there is a requirement of notification of the family. This is important and is a change from what we are used it. You will need to make reasonable attempts to discuss with the family prior to writing the order, and if that can’t be done, then the family needs to be notified as soon as possible.

This law wants to make sure that physicians are not writing ‘silent’ or ‘stealth’ DNR orders (i.e. the physician is putting a DNR order in the chart without the knowledge or consent of the patient or family). I personally would never do that unless the ethics committee weighed in…. but there was testimony from families that this was happening. So, if a DNR order is written under the scenarios in the last 2 paragraphs, there is a duty to notify family, preferably prior to the DNR being written, but if that is not possible, then as soon as possible.

If the physician is not aware of a DNR order, they are not liable for failure to effectuate the order. A physician is subject to review and possibly disciplinary actions for intentionally failing to effectuate a known DNR order, or for intentionally concealing or cancelling or falsifying a DNR order, or for writing a DNR order that is in violation of this statute.

I don’t know about you, but I find this law nerve-racking. It’s very hard to read and understand and it seems to assume that physicians were taking advantage of patients.

The TMA has several publications about this law including a summary above is not complete. Please read the TMA summary to make sure you understand all of the details.

Here is some background about how it passed this last legislative session.

This bill was initially drafted in the House by Neurosurgeon Greg Bonnen (R-Friendswood). The TMA, Texas Neurological Society, and Texas Hospital Association (THA) had many concerns about the bill and we had numerous meetings and dis-
At the end of February, 211 AAN member advocates from 49 states, accompanied by two patients, one caregiver, and Academy staff, made the annual pilgrimage to Washington, DC for Neurology on the Hill. AAN advocates visited 297 congressional offices, posted 1,878 tweets using #NOH18, which produced 3.043 million shares social media impressions—a 66-percent increase in impressions over last year—and took lots of pictures of everyone with members of the House and Senate. Some legislators posted about their visits with AAN members. They got to see a lot of enthusiasm and activism for neurology!

Thanks to successful efforts of the AAN and its members, the primary “ask” for recent NOH events—the FAST Act to strengthen stroke teleneurology across the country—was finally enacted into law in February. This accomplishment enables advocates to personally thank members of Congress who helped pass the legislation. And it also allowed the AAN to put forward an updated list of priorities for congressional action.

Top on the advocates list was asking Congress to support legislation to reform drug pricing to ensure patients have access to needed medications. This included a request that lawmakers support the Fair Accountability and Innovative Research (FAIR) Drug Pricing Act, a bill that requires transparency from pharmaceutical companies when they plan to increase drug prices more than 10 percent within a year.

“High drug costs can have a severe economic impact on our patients and certainly drive up the expense of health care in our country,” said AAN President Ralph L. Sacco, MD, MS, FAHA, FAAN. “The AAN and its Neurology Drug Pricing Task Force believe action must be taken by lawmakers to ensure that prescription medications are accessible for patients with complex, chronic neurologic conditions.”

The AAN’s advocates also asked lawmakers for increase funding for the National Institutes of Health (NIH), including new funding for research on non-opioid treatments for pain. More research is needed to understand the impact of pain medications on the brain, so therapies can be developed to promote healing and recovery. Additionally, the Academy Advocated for continued support and funding for the BRAIN (Brain Research through Advancing Innovative Neurotechnologies) Initiative.

To address regulator burden, advocates asked their members of congress to support the Standardizing Electronic Prior Authorization for Safe Prescribing Act of 2018, which encourages greater adoptions and use of electronic prior authorization (ePA) in Medicare Part D. Widespread adoption of ePA will streamline communication between the payer, physician, and pharmacy, improve patient care, and potentially result in fewer prior authorization requests.

It was another successful and energizing Neurology on the Hill, we hope you will join us next time! If you are interested in attending in the future, go to the Public Policy page on aan.com for more information. Neurology on the Hill 2019 will be held February 25-26, with the application opening this fall. For any questions email the AAN’s Advocacy team at advocacy@aan.com
What I learned while taking care of Shostakovich

Bernard M. Patten, AB, MD, FACP, FRSM, FTNS, FAAN

ABSTRACT

In 1973 Shostakovich was admitted to the medical neurology branch of the Clinical Center at the National Institutes of Health. He was found to have spinal cord and multiple cervical root compressions and sent back to Russia for treatment. During the visit, the author learned 1. That Soviet oppression was real. Direct censorship of even great artists was the rule, despite the enormous waste of time and energy. 2. That Soviet medicine at the time was poor. 3. That mistakes were made in the management of this great musician’s problems. 4. That VIP’s sometimes get lousy care and 5. That politically managed medicine and politically managed science sometimes equals disaster.

BACKGROUND

In 1973 Dmitri Dimitriyevich Shostakovich came to the United States seeking a diagnosis and treatment for his chronically progressive nervous system disease that had caused weakness and atrophy of his right hand. The medical visit was sponsored by the U. S. State Department and the Soviet Union under the condition that the great composer would make no direct statements unless they had been filtered through and approved by the Soviet agents who came with him.

Due to the complexity of his medical problems, Shostakovich (nicknamed “Mitya”) was admitted to the medical neurology service at the Clinical Center of the National Institutes of Health in Bethesda, Maryland.

On admission, I found him to be a sad, bitter, decrepit, depressed man who was shy, nervous, and awkward. His distress was magnified by the constant presence of his Soviet handlers and the fear that he might say or do something wrong. He obviously thought it was absurd that he might say or do something wrong. He had practically nothing to eat during his stay at the Petrograd conservatory.

Lesson 1: Soviet oppression was real. Direct censorship of even great artists happened despite the enormous waste of time and energy involved.

SHOSTAKOVICH’S MEDICAL PROBLEMS

My patient was in chronically poor health. He suffered from severe emphysema probably caused by the Russian cigarettes (the name of which I can't recall) that he chain smoked daily. His heart was moderately diseased with residual damage from the heart attacks in 1966 and 1971. Chest X-rays showed old inactive lymphatic tuberculosis which he had contracted in the Spring of 1923, but there was no evidence of the lung cancer that would kill him in 1975, two years after he left the Clinical Center at Bethesda. From trivial falls, the patient had suffered two broken legs (right and left). His bones were demineralized probably from poor nutrition in his youth (he had practically nothing to eat during his stay at the Petrograd conservatory). Excessive smoking and possibly some genetically controlled metabolic bone disease probably contributed to the weak bones. His cervical spine was short, stiff, and had limited ranges of motion in all directions. There was tenderness over the fifth, sixth, and seventh cervical vertebrae. There was a history of injuries to the neck from falls. He was extremely nearsighted with the usual retinal changes of extreme myopia. Because of poor eyesight he was rejected when he volunteered for service against the Nazi invasion of Russia on June 22, 1941.

SHOSTAKOVICH’S NEUROLOGICAL PROBLEMS

The patient said that he did not know when his hand started to get weak, but it must have been before 1959. By 1966, even before the heart attack, the patient was unable to play the piano in concert due to right hand weakness. The atrophy and weakness had been diagnosed in Moscow as “Chronic Polio,” a disease not recognized in America at that time or anytime – a disease which the Soviet physicians made up to explain the weakness. Chronic polio does not exist. Polio is an acute viral illness, never chronic. There has never been a case of Polio lasting 14 years (1959–1973). The diagnosis of chronic polio may have been a way that Soviet physicians kept their true diagnosis from Shostakovich or it may have been their name for chronic progressive spinal muscle atrophy, a type of motor neuron disease. They could not have meant post-polio syndrome as Shostakovich never had polio and his illness started late in life and progressed more rapidly than post polio syndrome.

The neurological examination showed that the patient had a severe spinal cord compression at the seventh cervical level with increased reflexes and spasticity below that level. The right hand was atrophic and virtually useless. Sensory changes were present in the distribution of cervical roots five, six, and seven, more on the right than left. From the examination it was clear that Soviet physicians had not fully known about the true nature of their patient's illness.

Lesson 2. Soviet medicine was poor. The ignorance of Soviet physicians was vast. Any qualified neurologist should have been easily able from examination to determine that the patient had a compression of his cervical spinal cord from a subluxation of the cervical vertebrae.

SHOSTAKOVICH’S PSYCHOLOGICAL AND PSYCHIATRIC STATUS

My patient had problems all right: None psychiatric. He has had no hallucinations, delusions, or illusions. His reality testing
was normal. True, he appeared nervous and had multiple tics. But he had none of the known neuroses. Instead, he had realistic reasons to be afraid. Stalin had been in power. Now the equally bad Brezhnev had taken over. The Soviet government was increasingly repressive; artistic works were judged by the standards of Soviet ideology. Anything modern or dissonant music was denounced as “formalistic.”

For example, The Nose (Shostakovich’s first opera) was slammed by party critics. The next opera, Lady Macbeth of Mtsensk, provoked charges of writing “modernistic bourgeois” music and (the more serious charge) the crime of “musical formalism.” This came from Stalin himself who, after act one of the opera, stomped out of the theater, livid and enraged over what he called “that degenerate music.” The next day Stalin dictated an article for Pravda entitled “Muddle or Music.” The next day, January 28, 1936, the article appeared in print. It shocked the Soviet musicians and the musical world by denigrating the opera.

Even more ominous: The article ended with an undisguised threat, a threat from Stalin himself who had unlimited power and was used to using that power and had on many occasions used that power in the most disgusting hideous ways. In those days, if I had Stalin as an enemy, I would live in fear. You would too. So, in my view, Shostakovich’s nervousness was fully justified by the grim objective reality in which he had to live. Conclusion: He was not depressed; he was appropriately unhappy with his fate.

Recall that Stalin was searching for scapegoats for the failures of his five year plans. Accusations of sabotage, espionage, wrecking, musical formalism, capitalist sympathies, anti-proletarian ideas, hoarding, etc. etc., became convenient methods for both transferring blame and eliminating political opponents by show trials, death squads, exile to Siberia, long prison terms at hard labor, etc. etc. etc. Thus, the universal climate of fear, distrust, and suspicion that characterized the Stalinist era and the era that followed Stalin that our man, Shostakovich, was forced to deal with.

Not only was Stalin against him. The Central Committee of the Communist Party released a resolution (March 1948) that all musical works should have a Socialist content. Then, believe it or not, the party closed the Soviet Union to all Western music. The music of Schönberg, most of Stravinsky, Hindemith, Bartok, and Weber, (I am not making this up) was banned. Music was to be evaluated only on the basis of “doctrinal purity.” Sergey Prokofiev and Shostakovich were singled out for their “unhealthy individualism and artistic pessimism” and their “spirit of negative criticism, despair, and non-belief.”

Tikhon Khrennikov, appointed by Stalin to administer Soviet music, attacked Shostakovich at the first Composers’ Congress:

“Armed with clear Party directives, we will put a final end to any manifestations of anti-peopel formalism and decadence, no matter what defensive colouration(sic) they may take on.” The Congress “unanimously condemned “formalists” Shostakovich, Prokofiev, Khachaturian, and other leading composers.

According to R.J. Rummel (Lethal Politics: Soviet Genocide and Mass Murder Since 1917), Stalin and the Soviet government were responsible for 61,911,000 nonmilitary deaths. By contrast, Hitler and the Nazis were responsible for 20,949,000 nonmilitary deaths, roughly one-third the Soviet number.

These figures on Soviets deaths are not “Red Scare” numbers prepared by Mc-Carthryite propagandists. If anything the information now coming out of the former USSR shows that the estimates are too low. In his book Testimony, Shostakovich said, “You have no idea what it’s like to live in a totalitarian state. To tell a joke to a friend, you must go to the bathroom, run the water full force, whisper the joke into your friend’s ear, and then laugh in cupped hands. [To survive] It was not enough to love Soviet power. Soviet power had to love you.”

He should know: Shostakovich was purged twice, in 1936 and in 1948. Then he was rehabilitated twice. Then he was denounced again, for his usual big sin, formalism. His works were periodically banned. When he was fired from his teaching job, he had to play the piano at silent movies to make a living. What a waste!

On several occasions (probably with a gun to his head), he had to apologize to the public and to Stalin, and regretfully, denounce fellow musicians who were imprisoned or executed. He wrote a symphony (no. 13, called Babi Yar) that acknowledged the Holocaust at a time when official Russia did not. Consequently, his family’s privileges and his own were withdrawn. According to Professor Greenberg (cf. notes), one punishment was cutting the water off at the Shostakovich family’s apartment. At other times, Shostakovich kowtowed to the politburo and the Kremlin, toed the Party line, and publicly said what he was told. Much of this duplicity, necessary for survival, caused guilt and self-loathing – the secret inspirations (I believe) behind much of his music.

On my orders, the nurses paged me when the KGB agents left for the night. Without them, Shostakovich was a new person – friendly, happy, funny, and interesting. The nervousness and the tics were no longer in evidence.

The story he told that I liked the best, the one we both laughed at, and the one that clearly shows much of his private character as opposed to the public mask, was the story of his studentship at the Leningrad Conservatory:

One day, he was informed that he would be required to pass an oral exam in Marxist ideology. Convinced that he would fail, he joked about his “pianistic reliability versus his political reliability.” The exam was given December 1926 and was administered by a commission. The question was, “explain the differences, from sociological and economic standpoints, between the work of Chopin and Liszt.”

Shostakovich broke into hysterical laughter so strong that it would not, could not stop. He was dismissed from the exam without having answered a single question. Instead of answering a question, he had laughed his head off and was carried out of the room.

In my view, this question is so emblematic of the stupidity of Party Hacks that when I heard it, I rolled off my chair laughing just as Shostakovich did.

LABORATORY RESULTS

The myelogram confirmed the some spinal cord compression with impingement.
of nerve roots as they exit the spinal cord. The cervical subluxation was considered significant by radiologists.

**TREATMENT**

I suggested surgery to stabilize the cervical vertebrae, to try to stop the progressive weakness by decompression of the spinal cord, and to give a chance for recovery of function.

**FOLLOW-UP**

Soviet leaders, Brezhnev included, doubted that their doctors could have been so wrong. They asked me to consult others to confirm or deny my diagnosis. Consequently, I asked for a consultation by Daniel Drachman, a professor at John Hopkins. Dan felt that we should have additional consultation from the chairman of his department of neurology so he brought Guy McCann along to help. After detailed review of the data, repeated examinations, much soul-searching, and, I believe, calls to other people around the country, the two consultants gave it for their opinion that the cervical spine should be decompressed. But Dan told me that I was playing with fire. If something went wrong, then the Soviets would blame the U.S. for damaging their national hero. Dan suggested that I send the patient back to Moscow with a strongly worded letter giving the recommendation that surgery be done there. The State Department agreed that this course seemed prudent, but that I should do whatever I thought was best. There was never a question of money as the United States National Institutes of Health had agreed to pay for any and all medical expenses.

Lesson 3. I made a mistake. I should have been more careful and not sent the patient back to Russia without personally knowing the situation there or the Soviet state of the art in surgery.

Back home, Shostakovich was again informed that they now agreed that there was spinal cord compression, but they thought that the spinal cord compression was an incidental finding and that the real cause of the problem was “Chronic Polio.” They added that even if the spinal compression was causing the problem, such an operation could not be safely done in the Soviet Union. On this point, they were right. Later on, in 1986, when I visited the Soviet Union, I saw that Soviet medicine was at least 40 years behind the times and that Soviet ignorance greater than I had ever imagined. The misinformation, propaganda, politically managed science had taken its vast toll. Not only did Soviet doctors not know much, what they thought they did know was actually wrong! They believed their own nonsense; they believed their own bullshit. The Soviet physicians I met and talked with believed that they were infallibly right as they believed the forces of history were infallibly on their side.

Subsequently, Shostakovich expressed his disappointment with American doctors:

“(American doctors) … bragged that they would cure me without question, they had made such great progress in the field, etc. And now all they talk about is courage.”

Dmitri Shostakovich, Testimony, page 214 (reference below).

Lesson 4. VIPs get lousy medical care sometimes.

Lesson 5. Politically managed medicine and politically managed science=disaster often.

**CLOSING QUOTE**

“No, I can’t go on describing my unhappy life, and I’m sure that no one can doubt now that it is unhappy. There were no particularly happy moments in my life, no great joys. It was grey and dull and it makes me sad to think about it. It saddens me to admit it, but it’s the truth, the unhappy truth.”

Dmitri Shostakovich, Testimony, page 214.

**SUBSEQUENT COURSE**

The weakness and disability continued to progress. Shostakovich became an invalid, then bedridden. He died on August 9, 1975 of cancer of the lung. A civil funeral followed. The body is interred in Novodevichy cemetery in Moscow. The obituary was signed by Breshnev who called Shostakovich “the greatest composer of our time” and a “hero of the Soviet people.”

**PERORATION AND CONCLUSION**

If Shostakovich were here with us, I think, he would say that he was no hero. In the Soviet Union heroes died young. By 1953, the year Stalin died, there were few anti-Stalinists above ground. Nope! Shostakovich was a survivor, not a hero. His music is a testament to what he saw and felt in a world so grim that none of us can imagine what it was like to be him.

**CODA**

I called the record room of the National Institutes of Health Clinical Center, the hospital where I had taken care of Shostakovich for over two weeks. They told me they have no records about Shostakovich and they have no record of his admission to the clinical center. Then I called Dan Drachman at John Hopkins and asked him to fish out his record of his consultation. The next day, Dan called back. “The file is gone. We have no record of my ever having seen him. Our records department can’t explain this and neither can I. Guy’s records are gone too.”

I sent Dan this narrative of what I remember about the case. Dan said that is the way he remembers it. “The cervical spine and nerve roots were impinged and he needed surgery.”

**CONCLUSION**

It is hard to believe that Soviet agents removed records from the Clinical Center and from John Hopkins Hospital. The records must have been removed by agents of the American government acting under authorization from the State Department.

**REFERENCES**


The countdown is on for TNS Summer Conference 2018!
Please join us on July 20-21 at La Cantera in San Antonio, for one and a half days of great CME lectures.

This year, we will start Friday morning with a pediatric neurology session, followed by a movement disorders focus in the afternoon for the general session. Saturday morning will touch on various topics including a lecture from an AAN representative discussing tele-neurology for the general neurologist. Invite your neurology colleagues and we will see you in San Antonio!

CASE HISTORY
This is an African-American man in his 30s with slurred speech for about 6 months worse when tired, fatigue on chewing, and trouble swallowing liquids. For about 3 months, he has noticed twitching in the arms and legs, painful muscle cramps even with minimal physical activity and at rest, generalized fatigue, and shortness of breath. No recent heavy exertion.

He played in the NFL for 7 years and had a few concussions. He has had cognitive and affective symptoms.

Past medical history of obstructive sleep apnea.

Neurological examination showed mildly slurred speech, weakness of the tongue, and scattered fasciculations in the arms. Strength of the extremities muscles was normal. DTRs were hyperactive. Plantars were flexor. Jaw jerk was normal.

LAB: EMG showed increased firing frequency of the genioglossus, diffuse denervation of both upper extremities muscles, and patchy fasciculations of the tongue. Thoracic paraspinal muscles could not be tested due to poor relaxation. Left leg EMG was normal.

CK level was 1367 IU/L. Comprehensive metabolic panel, TSH, and free T4 were normal. Urine urobilinogen was 4.0 (<2). Acetylcholine receptor binding antibody was negative. MRI of the brain was normal.

Questions: What is the diagnosis? Why is the CK elevated? Is there a relationship between repetitive concussion and ALS?

DISCUSSION

The CK can be elevated in ALS. In a study of 238 patients with ALS, the median serum CK was 151 U/L (range 20-2574) with levels less than 1000 in 99% (Tai H et al. Creatine kinase level and its relationship with quantitative electromyographic characteristics in amyotrophic lateral sclerosis. Clin Neurophysiol. 2018 May;129(5):926-930). The CK levels were significantly higher in males than females (p<0.001). CK can also be more modestly elevated in African-American males (Black HR, Quallich H, Gareleck CB. Racial differences in serum creatine kinase levels. Am J Med. 1986 Sep;81(3):479-87).

ABSTRACT

A 57 year old immunocompetent female presented to our hospital with two months of progressive gait instability, confusion, hallucinations and anorexia. Magnetic resonance imaging of the head (MRI) demonstrated an asymmetric white matter abnormality involving the cerebral hemispheres and brainstem, not unlike encephalitis. Infectious and autoimmune disease evaluations were unremarkable. A brain biopsy revealed diffuse large B-cell lymphoma. Primary central nervous system lymphoma (PCNSL) in immunocompetent patients is rare. An intracranial mass or masses on brain imaging is the classic finding in PCNSL. This is one of few case reports to note an atypical PCNSL without enhancing mass lesion, also known as lymphomatosis cerebri.

INTRODUCTION

Primary central nervous system lymphoma represents 2% of all brain tumors. Diffuse large B-cell non-Hodgkin lymphoma accounts for the majority of PCNSL. The typical age distribution is 50 to 70 years. Clinical presentations include seizure, change in mental status, focal neuropathic deficits and signs of increased intracranial pressure. The radiographic lesion is classically a white matter solitary non-hemorrhagic mass with well circumcised borders and homogeneous enhancement. Cerebrospinal fluid (CSF) analysis usually shows an elevated protein concentration and a lymphocytic predominant pleocytosis. Malignant cells may be present in CSF. Definitive diagnosis is by histologic examination of brain tissue that demonstrates lymphoid infiltration. Untreated, PCNSL is rapidly progressive with a survival of 1.5 months following diagnosis.

Treatment is whole brain radiation and chemotherapy with a five year survival rate of approximately 30%.

CASE REPORT

A 57 year old female with history of major depression presented to our hospital for worsening gait instability and confusion over two months. Her symptoms began when she and her husband were traveling through the western United States. She initially developed ataxia that was preceded by malaise. Her husband noted gradual loss of orientation even after she returned home from travel. Her confusion was followed by visual hallucinations involving deceased family members.

An outside facility diagnosed her with viral encephalitis of unknown etiology as a MRI of the brain revealed an extensive infiltrating process involving both cerebral hemispheres with extension into midbrain and pons. Her CSF at that time revealed elevated white blood cells (WBC) (16/uL) and protein (53 mg/dL). At presentation to our hospital, she was unable to ambulate secondary to ataxia. She was alert and orientated, however demonstrated confusion while describing her symptoms. Her husband disclosed that she had low grade fevers as well as a 30 pound weight loss in the setting of anorexia. On exam, the patient had bilateral clonus and hyperreflexia. Her CSF revealed elevated white blood cells (WBC) (16/uL) and protein (53 mg/dL). 

Magnetic resonance imaging of the head and neck and MRI of the cervical and thoracic spine were unremarkable. Routine serum tests were normal. CSF showed elevated WBC (18/uL) and protein (70 mg/dL). No malignant cells noted in CSF. Culture of CSF was negative. Acyclovir 10 mg/kg intravenous infusion every eight hours was started for possible viral encephalitis but was discontinued once her HSV 1 and 2 returned negative. An EEG was abnormal, suggestive of diffuse nonspecific dysfunction with no epileptiform activity. Additional tests evaluating for infectious processes, including human immunodeficiency virus, Lyme disease, Enterovirus, West Nile, Varicella, Hepatitis, Mycoplasma, Mumps and Toxoplasmosis and Cryptococcal were all found negative. Solumedrol 500 mg was given twice daily for five days to treat possible autoimmune encephalitis. Serum studies for anti-nuclear antibody, rheumatoid factor and angiotensin converting enzyme were unremarkable. There had been moderate improvement of the patient’s cognition while on high dose steroids. She was discharged to a rehabilitation facility for further care while waiting for autoimmune antibody tests.

The patient returned to our hospital for worsening confusion three weeks after discharge. On exam, she had mild dysarthria and ataxia. She was not oriented. MRI of brain demonstrated interval disappearance of the enhancement of the right posterior basal ganglia and appearance of right temporal, right peritral white matter and right dorsal corpus callosum enhancement. CSF studies revealed elevated WBC (62/uL) and protein (67/mg/dL). She developed a fever and became minimally responsive. Soon found to be Clostridium Difficile positive and treated with Vancomycin 500 mg per nasogastric tube every eight hours. Computed tomography of the chest, abdomen and pelvis showed no evidence of masses or neoplasms. Cultures of CSF continued to be negative. One oligoclonal band was found in CSF. Paraneoplastic autoantibody panel was negative. Neuronal nuclear antibodies Hu, Ri and Yo immunoglobulins were not detected.

A right frontotemporal craniotomy was performed for biopsy of the right
temporal pole lesion. The pathology histologic features of the lesion were consistent with a diffuse large B-cell lymphoma that was confirmed by immunohistochemistry (Figure 3). Due to the patient's clinical condition and prior wishes, the patient's husband decided to proceed with comfort measures. She expired five days later. Her family gave consent for a case report to be written.

**DISCUSSION**

The non-specific signal abnormalities on this patient's MRI of the brain were indistinguishable from infectious or autoimmune encephalitis. A diagnosis of tumor was not initially considered as no discrete mass was demonstrated on any imaging of her brain. This is one of the few case reports to describe diffuse primary central nervous system B-cell non-Hodgkin lymphoma without a discrete mass lesion. Lymphomatosis cerebri is a term first used in 1999 to identify this form of PCNSL. This PCNSL variant presents with non-specific clinical and radiologic findings, making diagnosis difficult. It is often mistaken for encephalitis. Epidemiology and treatment is identical to classic PCNSL. Prognosis, however, is poorer for lymphomatosis cerebri due to delay in diagnosis. This variant of PCNSL should be considered as a differential diagnosis for patients aged 50 to 70 years presenting with non-specific imaging signal abnormalities as well as unremarkable infectious and autoimmune evaluations.

The authors have no conflict of interests.

**REFERENCES**


**Fig. 1.** Unenhanced and enhanced MRI scans of brain. Image A and B are axial T2-weighted fluid attenuated inversion recovery (FLAIR) scans. Image A demonstrating signal intensity involving the white matter around the thalamus that is extending into the frontal, temporal and occipital lobes. Image B shows involvement of the splenium and genu of corpus callosum. Images C and D are axial T1 fat saturated (FS) scans. Image C and D shows involvement of the midbrain and pons greater on the right compared to left.

**Fig. 2.** Unenhanced and enhanced MRI scans of brain. The image is an axial T1-weight FS scan with appearance of right temporal, right periatrial white matter and right dorsal corpus callosum enhancement.

**Fig. 3.** Hematoxylin and eosin stain of the right temporal pole brain lesion. Malignant lymphocytes are large with a moderately abundant cytoplasm and the nuclei are ovoid with prominent nucleoli.
The relationship between sciatic nerve pain and the piriformis muscle was first described by Yoean in 1928. The piriformis syndrome, also known as “wallet sciatica” or “fat wallet syndrome” was further elucidated by Friberg in 1934, Vinkle in 1937 and Thiele in 1937. The term “Piriformis Syndrome” was first coined by Robinson in 1947. Historically, the pain associated with the piriformis syndrome was felt to be caused by prolonged or excessive contraction of the piriformis muscle. With recent progress in understanding hip anatomy and sciatic nerve kinematics, there have actually been a number of areas defined within the deep gluteal space where the sciatic nerve can be entrapped. For this reason, the nomenclature “Piriformis Syndrome” has been replaced with the term “Deep Gluteal Syndrome” to better describe the presence of pain in the buttock and hip caused by non-discogenic and extrapelvic entrapment of the sciatic nerve.

The anatomic relationship and close proximity between the piriformis muscle and sciatic nerve predisposes the sciatic nerve to compression at the region of the muscle as it passes through the greater sciatic notch. The “Piriformis Syndrome” which historically included pain in the buttocks area and hip or posterior thigh was also often associated with radicular pain due to a non-discogenic sciatic nerve entrapment in the subgluteal space. Those symptoms which were previously totally attributed to abnormal pathology in the piriformis muscle are now part of the larger Deep Gluteal Syndrome entity. Multiple orthopedic and neurological disorders may result in nerve entrapments within the subgluteal space; all conditions inclusive within the DGS. Examples include Fibrous Bands compressing neurogenic structures, the Piriformis Syndrome, the Gemelli-Oblurator Internus Syndrome which is sciatic nerve entrapment caused by a stretched or altered obturator internus muscle, the Quadratus Femoris and Ischiofemoral Syndrome which is defined by hip pain related to narrowing of the space between the ischial tuberosity and femur and/or a fibrous band which traps the sciatic nerve, and entrapment of the sciatic nerve due to abnormal hamstring pathology including strain, tendon detachment avulsion fractures, apophysitis, tendinopathy and entrapment during hip motion (Ischial Tunnel Syndrome). In many instances, patients are attributed a diagnosis associated with lumbar sacral spine pathology when the etiology of the pain is actually related to structures within the deep gluteal region. This report will be focused on the deep gluteal syndrome with emphasis on the piriformis/sciatic nerve relationship which still represents the most common entrapment neuropathy in the subgluteal space.

ANATOMY/FUNCTION

The piriformis muscle is a flat, band-like structure located in the buttocks near the top of the hip joint. The muscle has its origin from the sacroiliac joint, bridges the SI joint, and connects to the greater trochanter of the femur. The piriformis is the only muscle that courses transversely through the greater sciatic notch and serves as a key landmark to all the important nerves and vessels that pass from the pelvis, through the greater sciatic notch, to the deep gluteal region. All the structures from the greater sciatic notch pass either above or below the piriformis muscle. The Superior Gluteal Artery, and Superior Gluteal Nerve pass above the piriformis muscle. The Sciatic Nerve, Pudendal Nerve, Nerve to the Obturator Internus Muscle, Posterior Cutaneous Nerve of the Thigh, Pudendal Nerve, Internal pudendal vessels, Nerve to obturator internus, Nerve to quadratus femoris.

From Piriformis Syndrome to Deep Gluteal Syndrome

From uncommon controversial diagnosis to probable commonly missed diagnosis

Stuart B Black MD, FAAN
Chief of Neurology: Baylor University Medical Center at Dallas, Co-Director Neurosciences: Baylor Scott & White Neuroscience Governance Council
5. A divided nerve passing through and above the muscle heads (hypothetical)
6. A sciatic nerve passing above the muscle (hypothetical)

The piriformis muscle is important in body movement because it stabilizes the hip joint and lifts and rotates the thigh away from the body. By rotating the joint and turning the leg and foot outward, it enables us to shift our weight from one foot to another when walking plus maintains our balance. The muscle is involved in almost every motion of the hips and legs.

**SIGNS AND SYMPTOMS**

Sciatic Nerve compression in the deep gluteal region is best defined as a symptom due to an anatomic variant as opposed to a disease such as a primary neuropathy. Sciatic pain is usually a result of extrinsic lesions involving the sciatic nerve distribution. In the case of the piriformis syndrome, if sciatic pain is involved it is most often due to an abnormal condition of the piriformis muscle and/or an extrinsic lesion as a fibrous band which entraps the nerve causing absent sciatic mobility during hip and knee movements. Fibrous bands compressing the sciatic nerve have been described at the level of the greater sciatic notch down to the inferior border of the piriformis muscle. Pathological hypertrophy of the piriformis muscle resulting in asymmetric enlargement may compress the sciatic nerve; a condition referred to as dynamic sciatic nerve entrapment by the piriformis muscle. In addition, the variability in position of the sciatic nerve as it transverses the piriformis muscle was previously described as a risk factor to entrapment but no concrete evidence has documented that the variances play a role in the sciatic nerve entrapment.

Prolonged or excessive contraction of the piriformis muscle may precipitate deep gluteal pain. In addition, abnormalities in the piriformis muscle and/or sciatic nerve may result in extreme gluteal and low back pain, often associated with any activity associated with flexion of the hip, walking, sitting, reclining, lifting, or even standing. Presenting clinical symptoms of radicular pain due to sciatic nerve entrapment within the pelvis may also define the DGS. Deep gluteal pain may be intermittent and paroxysmal and/or persistent and unrelenting. The degree of pain can definitely limit activities and result in sleep deprivation.

**DIAGNOSIS**

Despite the severity of the symptoms in different patients, it is unusual to find any focal sensory or motor neurological findings in the deep gluteal syndrome. Thus, while there are several well described clinical signs described in the literature to help differentiate the deep gluteal syndrome from lumbar spine disease, there is no specific gold standard on neurological examination to definitively diagnose the DGS. While symptoms of the deep gluteal syndrome are usually unilateral, it can be bilateral and having had the condition diagnosed once greatly increases the chance that it will recur in one hip or the other at some future time. This is generally due to the etiology of the condition which is frequently related to anatomic abnormalities in the pelvis and/or hip joints often causing subtle gait disorders which can, over time, precipitate the pathological changes and subsequent clinical signs and symptoms. As one colleague with expertise in DGS recently commented to the author “…deep gluteal syndrome will occur with abnormal positions of the femur in the acetabulum; creating non-obvious abnormalities in gait or an irregular gait where normal pelvic movement is displaced to the hip. Essentially the hip becomes the pelvis. This causes abnormal motility and abnormalities in the deep gluteal fossa structures which translates into pain and possible sciatic nerve entrapment pathology”. 4

The above quotation emphasizes that diagnostic localization of deep gluteal pain is dependent upon the etiology of the pathological condition. As already discussed above, different structures can be involved in sciatic nerve entrapment within the gluteal space. Thus, while there are different etiologies to non-discogenic sciatic nerve entrapment, large studies have confirmed that the most common site of entrapment was beneath the piriformis muscle in up to 67.8% of patients with the sciatic foramen a distant second at 6% of patients. There is also a broad spectrum of causes for DGS with different pathologies to include acute trauma, iatrogenic, inflammatory/infectious, vascular, gynecologic and space occupying lesions. Lumbar sacral spine pathology must also be ruled out.

But the common denominator related to etiology has historically been “trauma”. In the past it was theorized that individuals who regularly exercise by running, bicycling and other forward-moving activities may be more susceptible to developing DGS; especially if lateral stretching and strengthening exercises were not routinely done. However, evidence for these sports related explanations for developing DGS is scant and not substantiated. While acute trauma may definitely be a cause of DGS, repetitive trauma such as too much sitting without physical activity can also cause DGS. Even more recently, there is recognition that the symphonic balance and interrelationship between hip function and hip biomechanics and pathology also directly affect the deep gluteal space. As the above quotation emphasized, the torsion alignment of the femur in the acetabulum can result in altered hip/pelvic motility resulting in abnormal pelvic kinetics which can also play a major role in the development of DGS.

Thus, in addition to acute trauma, a detailed understanding of the anatomy, biomechanics and pathokinematics of hip function is also important in appreciating disorders of the subgluteal space. There has been much recent progress in understanding the relationship between hip anatomy and sciatic nerve kinematics. This relationship can also result in direct involvement in the development of sciatic nerve entrapment within the sub-gluteal space. In addition to direct impingement on the sciatic nerve by the piriformis muscle, it is not uncommon to develop fibrous bands which can constrict and entrap the sciatic nerve. Similar abnormalities may occur in the gluteal muscles, hamstring muscles and the gemelli-obturator internus complex. Therefore, in diagnosing non discogenic sciatic nerve pathology, a thorough assessment of the hip is also important to help
From Piriformis Syndrome to Deep Gluteal Syndrome (cont.)

recognize specific problems in different individuals. Experts and subspecialists who have extensive publications in DGS have developed a comprehensive approach to establishing the diagnosis:

1. Understanding posterior hip pathology
2. Understanding nerve kinematics
3. Knowing the unique clinical factors on history and physical examination that can help define the specific site where the sciatic nerve is entrapped,
4. Utilize appropriate imaging
5. Define the differential diagnosis
6. Understand the different treatment options

Diagnosis of the deep gluteal syndrome continues to evolve with more understanding and recognition of the various sites where the sciatic nerve can be entrapped as well as the multiple different potential conditions which can cause abnormal pathology, directly and indirectly, within the deep gluteal space.

Physician leaders in the diagnosis and treatment of patients with DGS have developed a common language and technique for performing the physical examination on patients presenting with deep gluteal pain. The examination includes some of the earlier traditional tests used on physical examination to help identify the piriformis syndrome. Many of the same clinical tests are now used to identify patients presenting with signs and symptoms indicative of the deep gluteal syndrome. The names of some of the tests and signs are as follows: the Lasegue test, Pace’s sign, Freiberg’s sign, Beatty’s maneuver, FAIR test, the Hughes test, and the Piriformis sign. The reader could find details regarding these tests and signs on the internet. Electrophysiological tests including posterior tibial and peroneal H reflexes have been used in the past but most currently agree that EMG/NCVs are of limited value in diagnosing DGS. Imaging modalities have included CT, MRI, scintigraphy, ultrasound and Diagnostic Injections; again, with variable value depending upon operator experience and the technical quality of the procedure.

The gold standard today for DGS diagnostic imaging is high resolution 3-T MRI. 3-T MRI of the pelvic structures and hip is unquestionably the most sensitive and informative diagnostic examination currently available. The high-resolution MRI permits detailed imaging of the pelvic anatomy, including the nervous tissue, with sensitivity which has essentially changed the diagnostic capabilities in confirming DGS with the associated precision needed to identify the underlying pathology. Magnetic Resonance Neurography is also available although still considered by some insurance companies to be “investigation-al.” High Resolution 3-T MRI can detect the presence of entrapment, irritation and swelling within the sciatic nerve. 3-T MRI can also detect compressive fibrous bands which previously escaped detection. Hypertrophy and edema of the piriformis muscle and other structures is also clearly demonstrated. Neurography can determine whether a patient has a split sciatic nerve or a split piriformis muscle and pinpoint the level of entrapment. Detecting the deep gluteal anatomy with this degree of specificity on 3-T MRI permits more accurate treatment options; including surgery when indicated.

The treatment for deep gluteal syndrome varies according to the pathology. For most patients, even those with DGS associated with entrapment of the sciatic nerve, conservative treatments including physical therapy, lifestyle modification, NSAIDS, muscle relaxants, and avoidance of the contributory activities if recognized, are successful in reducing or relieving the associated pain. In chronic patients, the rehabilitation programs are usually associated with specific exercises which differ considerably from physical therapy designed for lumbar spine disease. For this reason, it is important to be certain that the physical therapist is familiar with DGS and hopefully works in tandem with a physician who specializes in this disorder. Many patients with intractable signs and symptoms require a daily home exercise program which may be a life long commitment.

When patients fail to respond to simple conservative therapy, or in patients with intractable pain which limits daily activities and are associated with sleep deprivation, imaging guided intra-articular and extra-articular injections, and/or injections of an anesthetic with steroids directly into the piriformis muscle is very helpful. Earlier localization of the piriformis muscle using a fluoroscopy-guided contrast injection technique was not very successful because fluoroscopy does not allow direct visualization of the soft tissue. Ultrasound-guided injections are more successful and still a preferred technique of many specialists. However, while ultrasound is more affordable, the gold standard for piriformis muscle injections are those done with a CT-guided technique. Botulin toxin has also been reported as an effective adjunct to physical therapy, however, experienced specialists in DGS have reported that botulin toxin potentially produces more scar tissue around the sciatic nerve while others have reported piriformis atrophy with repeated injections of botulinum toxin. Botox is, however, still used with caution in patients with DGS.

In more complex patients with intractable and disabling symptoms, patients who fail conservative therapy, endoscopic assessment and decompression surgery is another option. In expert hands, endoscopy allows for a complete extrapelvic sciatic nerve visualization and safe nerve decompression in the deep gluteal space. The dif-
different surgical techniques can be extremely complex and should only be performed by experienced physicians who specialize in DGS surgery. The surgical technique of DGS endoscopic decompression of the sciatic nerve also requires a surgeon with significant hip arthroscopy experience and with familiarity with the gross and endoscopic deep gluteal space anatomy.

SUMMARY

For many years, the piriformis syndrome had been a controversial diagnosis with many denying its existence as a cause of gluteal pain and sciatic nerve entrapment. With better understanding and direct visualization of the subgluteal space anatomy, plus increased knowledge from cadaver dissections, what was known for years as the piriformis syndrome became better understood under the definition of the deep gluteal syndrome. The DGS clinically defined multiple potential causes of sciatic nerve entrapment within the pelvis. Endoscopic evaluation of the pelvis and 3-T MRI imaging has revolutionized the profession’s recognition of the clinical signs and symptoms of pathologic abnormalities within the deep gluteal space.

But the deep gluteal syndrome remains an underdiagnosed condition. In clinical practice symptoms of DGS are still frequently attributed to lumbar sacral spine disease and sometimes hip pathology. Is it possible that some “failed back patients” and/or patients with chronic low back pain with gluteal pain and radicular symptoms really have symptoms related to the DGS with symptoms secondary to an entrapment neuropathy in the pelvis? Since the pain of degenerative lumbar spine disease overlaps with the pain of DGS, can patients, or even experienced physicians, clinically distinguish between the two entities? Since both degenerative lumbar spine disease and DGS may occur simultaneously with similar risk factors (athletics, trauma, prolonged sitting, aging, etc., etc...), how does the physician and patient differentiate the etiology of severe low back pain and gluteal/radiculal pain on a clinical basis?

So, now it is time to get personal! The author, yes “me”, falls into that category of patients who has both degenerative LS disease and DGS. Both conditions were documented by subspecialty examination and confirmed by advanced neuroimaging with both CT and MRI. My pelvic imaging on 3-T MRI reveals a huge piriformis muscle, markedly larger than the contralateral side, with a fibrous band entrapping the sciatic nerve at the level of the piriformis muscle. The sciatic nerve is edematous and extremely large (the neuroradiologist referred to it as a “hot dog”) due to entrapment by both the piriformis muscle and the fibrous band. In addition, I have multilevel degenerative disc disease and had a prior L5/S1 microdiscectomy with excellent results. My attending physicians include one of the leading authorities (if not THE leading authority) on DGS, an outstanding cognitive and technically skilled Neurosurgeon, and an experienced and learned Neurologist—yes, “yours truly”. Risk factors? I have been a competitive athlete all my life and engaged in contact sports throughout my youth. Sitting long periods of time at the desk is not my issue but I have also been a cyclist for over 30 years. Could sitting on a bike saddle for long rides as well as mountain biking matter? Probably yes as biking is a risk factor for both lumbar spine disease and DGS. I have also been a “gym rat” all my life and still try to exercise 1-2 hours a day; a lifelong routine. I indeed do experience daily discomfort, but fortunately, I am rarely in pain. The quality of my life is excellent with minimal, if any, physical restrictions. In terms of activities, I obviously remain fully functional except for morning discomfort from both LS disease and the DGS. But then, as a friend and respected colleague remarked, “...if you are 70 years old and wake up without hurting, you are probably dead.” The question is, can I as an experienced Neurologist differentiate the pain from LS disease and DGS? The answer is NO; or almost no. Sometimes there are distinguishing factors but overall, both conditions produce almost identical symptoms within overlapping anatomy. Again, I am one of the more fortunate patients because my symptoms are manageable and in no way restrict my activities. But there are many debilitated individuals with DGS who must undergo corrective endoscopic surgery in order to have an acceptable quality of life. Then too, how many individuals are there with DGS who have not been properly diagnosed and receive ongoing ineffective treatment for LS spine disease and/or hip pathology? The number of patients is obviously unknown but those individuals will never improve until the appropriate diagnosis is established.

Thus, the DGS still remains an underrecognized condition with a multifactorial etiology that often mimics the signs and symptoms of degenerative LS spine disease and sometimes hip pathology. Given the modern day diagnostic capabilities and the clinical and pathophysiologic knowledge of the deep gluteal space, the authenticity of the entity DGS is no longer questioned. 3-T MRIs and endoscopic recognition of the clinical pathology of the DGS, further substantiated by cadaver studies of the deep gluteal space and associated post mortum studies of sciatic nerve functions in the pelvis, unquestionably define the clinical entity and diagnosis of DGS. The piriformis syndrome indeed does exist, but is only one potential component of the spectrum which defines the deep gluteal syndrome. In addition, the DGS is potentially the etiology to sciatic nerve entrapment in the pelvis, with signs and symptoms not dissimilar from degenerative lumbar spine disease with radiculopathy.

In summary, the deep gluteal syndrome can cause entrapment of neurogenic structures within the pelvis and should be included in the category of other more commonly recognized entrapment neuropathies.

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Acute Stroke Thrombectomy: Extending the Treatment Window Beyond Six Hours

Jeremiah Johnson, MD, Assistant Professor, Dept. of Neurosurgery, Baylor College of Medicine

The history of effective acute stroke treatments is a brief one. In 1995, the landmark NINDS trial showed for the first time that a stroke treatment, IV tPA administered within 3 hours of symptom onset, improved 90 day functional outcomes. In 2008, the ECASS 3 trial extended the IV tPA window to 4.5 hours. IV tPA was established as an effective treatment for acute ischemic stroke (AIS) patients meeting criteria. However, there was a subgroup of AIS patients who continued to have poor outcomes despite IV tPA: patients presenting with large vessel occlusions (LVO). In a Doppler ultrasound study, investigators found post IV tPA target vessel recanalization rates of 30% for proximal MCA occlusions and 5.9% for carotid terminus occlusions; subsequently, only 16% of the proximal MCA occlusion patients and 0% of carotid terminus occlusion patients reached functional independence at 90 days. Clearly, more effective revascularization methods were needed for AIS patients with LVO.

ENDOVASCULAR STROKE THROMBECTOMY

In a series of randomized controlled trials published in 2013, first generation of endovascular LVO thrombectomy devices [Merci; Penumbra (1st generation)] did not show benefit over standard medical treatment. However, second generation stroke thrombectomy devices termed “stentriever” (Fig 1) became widely available in 2012 and were found to have improved target vessel recanalization rates. In 2015, five multicenter randomized controlled trials of similar design were published (MR CLEAN, ESCAPE, REVASCAT, SWIFT PRIME, and EXTEND IA) testing mechanical thrombectomy + standard medical care (SMC) versus SMC alone in LVO patient up to 6 hours after symptom onset. The results uniformly showed superior 90-day functional outcomes in the thrombectomy group vs SMC alone group. A meta-analysis of the pooled individual patient data from the 5 trials concluded that functional 90 day outcomes were achieved in 46% of patients in the thrombectomy group and 26.5% in the SMC alone group, representing a 2.5x fold reduction in disability (odds ratio, 2.49; 95% confidence interval, 1.76–3.53; \( P<0.0001 \)). Thus, endovascular thrombectomy in patients with vascular imaging proven anterior circulation LVOs presenting 6 hours or less from symptom onset was deemed Level 1, Class A and the new standard of care.

THROMBECTOMY WINDOW EXTENDED

In 2018, two additional trials DAWN and DEFUSE 3 were published in the NEJM addressing the question: can certain LVO patients beyond the 6-hour window or with an unknown time last known well benefit from mechanical thrombectomy? The DAWN Trial was a multicenter prospective randomized open blinded endpoint trial that randomized patients presenting with last known well (LKW) 6-24 hours and proven anterior circulation LVO (ICA terminus or M1) to receive stentriever thrombectomy + SMC versus SMC alone. For study inclusion, the patients also were required to have a National Institute of Health Stroke Scale (NIHSS) Score ≥ 10 (or 20) and meet pre-specified core stroke infarct volume size and not to exceed 1/3 of the MCA territory as measured on MRI DWI sequence or CT Perfusion. Trial enrollment was halted at 206 participants after interim analysis deemed the probability of treatment efficacy to be ≥0.986. Participants in the treatment arm were more likely to reach functional independence at 90 days 49% vs. 13% (odds ratio, 36%; 95% confidence interval, 24%-47%), 2x fold more likely to experience neurological improvement (odds ratio, 2.1; 95% confidence interval, 1.20-3.12), relative risk reduction of 70%, with an astounding low number needed to treat of 2 to achieve any lower level of disability. The DAWN trial demonstrated that in patients with severe stroke symptoms presenting between 6-24 hours and modest core infarcts sizes, excellent results are achievable with thrombectomy.

After the DAWN trial results were reported, a second similarly designed multicenter, randomized, open-label trial DEFUSE 3 was halted after early interim analysis similarly predicted treatment efficacy. Notable trial design differences in DEFUSE 3 compared to DAWN include, a more restricted time window to 6-16 hours, lower NIHSS scores included (NIHSS ≥6), and the required use of perfusion imaging (CTP / MRP) to select subjects. Patients were eligible for inclusion if infarct size was less than 70ml and a ratio of the volume of ischemic tissue on perfusion to core infarct volume was 1.8 or greater. Despite their modest design differences, the DEFUSE 3 trial results mirrored DAWN with 45% of patients in the thrombectomy group reaching functional independence compared with 17% in the standard medical care only group (risk ratio, 2.67; 95% CU, 1.60 to 4.48; \( P<0.001 \)). There was no significant difference in adverse events between the
groups in either trial. This study confirmed that in LVO patients presenting ≥6 hours from LKW, patients with favorable core to penumbra ratios, thrombectomy results in significantly improved 90 day functional outcomes compared to SMC alone (Fig 2). The 2018 AHA/ASA stroke management guidelines have been updated to include recommendations related to the new data (Table 1).

When interpreting the results of the 2 extended window thrombectomy studies, there are a few important caveats. First, there was a significant percentage of patients in the trials who were “wake-up strokes” or “unwitnessed strokes” where the time of symptom onset may have been relatively recent compared to the LKW. Second, the percentage of LVO patients with a witnessed symptom onset >6 hours before presenting to care that will have a small core infarct volume (favorable collaterals) is unknown, but is presumed to be relatively small. For example, a meta-analysis of the 5 RCT time-based thrombectomy trials published in 2015 found that at 7.3 hours after symptom onset, the treatment benefit was no longer statistically significant. Thus, the core vs deficit mismatch and core vs penumbra mismatch used in DAWN and DEFUSE, respectively are highly effective at selecting out the patients who will benefit from treatment, but it is important to recognize that as the hours pass, core infarcts are ever expanding and there will be significant attrition of thrombectomy candidates. Thus, rapid diagnosis, transfer and time to revascularization remain a fundamental to achieving a high rate of good outcomes in patients with severe symptoms secondary to large vessel occlusion. In summary, this new data shows us that patients presenting with NIHSS ≥6, suspected LVO and ≥6 hours from LKW should be screened with neurovascular imaging. If LVO is confirmed, perfusion or DWI imaging is recommended to determine whether they are a candidate for thrombectomy.

REFERENCES:

TABLE 1
AHA/ASA 2018: Updated Guidelines for the Early Management of Patients With Acute Ischemic Stroke

- DAWN and DEFUSE 3 showed a clear benefit of “extended window” mechanical thrombectomy for certain LVO patients who could be treated out to 16-24 hours.

- In anterior circulation LVO patients presenting 6-24 hours of LKW, obtaining perfusion imaging (CT-P or MR-P) or MRI DWI sequence is recommended to determine patient thrombectomy candidacy.

- In select AIS patients 6-16 hours of LKW with anterior circulation LVO and otherwise meet DAWN or DEFUSE 3 eligibility criteria, mechanical thrombectomy is recommended.

- In select AIS patients 6-24 hours of LKW with anterior circulation LVO and otherwise meet DAWN eligibility criteria, mechanical thrombectomy is reasonable.
External Neuromodulation Devices for Primary Headaches

Brian Loftus, MD

Conflict of Interest Disclosure - Speaker Bureau for Electrocore (maker's of Gammacore)

Between now and 2020, we will see an explosion of treatments for primary headache become available. This article will cover the relatively new neuromodulation devices. Wikipedia defines Neuromodulation as “the alteration of nerve activity through targeted delivery of a stimulus, such as an electrical stimulation or chemical agents, to specific neurological sites in the body.”

GammaCore® is a device that the user placed over their vagus nerve in the neck in order to stimulate the underlying vagus nerve. To stimulate the vagus nerve, the user turns the device on, places it on their neck, and ramps up the intensity until they feel a pulling on their lip. It will run for 2 minutes from the time that it is turned on and then will automatically turn off. This is referred to as a stimulation cycle. The current device is demonstrated on my neck (Fig. 1) but a new device with rounded tips is expected shortly (Fig. 2).

GAMMACORE® FOR ACUTE CLUSTER HEADACHE PAIN

It is FDA approved for acute cluster headache and acute migraine. The approval was based on data from 2 randomized, double blind, sham-controlled trials called ACT1 and ACT2. Both studies enrolled patients with both acute and chronic cluster. In the ACT1 trial, performed in the US, the patients treated an acute cluster headache with 3 stimulation cycles in quick succession to the right vagal nerve (6 minutes total). The first time the patients tried it, 34% of treated patients had mild to no headache at 15 minutes from onset of the first stimulation, compared to 10% of sham treated patients. This was statistically significant despite there only being 38 active patients and 47 sham patients in this portion of the study. In the ACT2 trial performed in Europe, the patients treated an acute cluster headache with 3 stimulations cycles in quick succession to the vagal nerve on the side of the attack, waited 3 minutes, and then, if so desired, repeat 3 additional stimulation cycles. Looking at their first headache treated, 50% of the active group and only 15% of the sham group reported mild or no headache pain at 15 minutes. This was not statistically significant as there were only 14 patients in the active group and 13 patients in the sham group.

Looking at all attacks in the US study (max 5 attacks treated – average 4.2 in active group, 4.4 in sham group), 15.4% of the active group and 6.1% of the sham group were pain free at 15 minutes. In the European study (all attacks over 2 weeks limited up to 4 per day – average 7.2 in active group, 6.2 in the sham group), 35.2% of the active group and 7.4% of the sham group were pain free at 15 minutes. These results were both statistically significant and given the improved results of the Europeans versus the Americans, the European treatment paradigm – 3 stimulation cycles, wait 3 minutes, and then repeat 3 additional stimulation cycles (if desired) is recommended.

In both studies, the chronic cluster patients failed to respond. Therefore, the device is not approved or recommended for treatment of acute cluster headache pain in chronic cluster patients.

Neurologist should be mindful that this data is not as potent as inhaled oxygen. In Cohen’s study, 78% of oxygen treated patients versus 20% of air treated patients were pain free at 15 minutes. Compared to oxygen, the GammaCore® device is easier to carry. Tank refills can be problematic for cluster patients and finding a vendor to service our cluster patients is getting progressively more difficult.

GAMMACORE® FOR ACUTE MIGRAINE PAIN

The GammaCore® device has been...
approved by the FDA for the treatment of acute migraine pain. This was based upon a single, double-blind, sham-controlled trial called the Presto Trial. The Presto data has been presented but not yet published in a peer-reviewed journal. The treatment was one stimulation cycle on each side, wait 15 minutes and repeat. At 2 hours, after data was collected, another stimulation cycle on each side could be repeated. Pain free (1st use) for active treatment vs sham was 12.7% vs 4.2% at 30 minutes, 21% vs 10% at 60 minutes, 34% vs 19.7% at 2 hours. 50% responder rates (pain mild or pain free for more than 50% of headaches treated) was 47.6% vs 32.3% at 2 hours.

For comparison, pain freedom at 2 hours for Sumatriptan/naproxen sodium vs placebo was 24%, 15%, 10%, and 7% respectively.7

**SPRING TMS BY ENEURA**

The Spring TMS is a device that delivers a 0.9 Tesla strength magnetic pulse each time it is activated and the user holds it against the back of the skull with the target being the occipital lobe. (Fig. 3)

Unlike the GammaCore® device, the Spring TMS device has not been tested against Sham for migraine prevention. Despite being technically the easiest neuromodulation device to develop a sham control, all we have is an open label observational study, called Espouse8 where patients kept a one month diary, and were then treated and followed for 3 months. The treatment protocol was 2 pulses, wait 15 minutes, followed by 2 more pulses twice daily as well as the ability to treat acute headaches with 3 pulses, wait 15 minutes, retreat with 3 pulses if desired, wait 15 minutes and retreat with another 3 pulses if desired. On average, patients entering the study had an average of 10 headache days per month and by month 3 were having about 3 less headache days per month. 46% of patients had a greater than 50% reduction in headache days. Acute medication usage decreased by 3 days per month as well.

For comparison, Topiramate 100 mg demonstrated a decrease of headache days from 6.9 to about 4.9 days vs 5.9 days for placebo in one of its pivotal trials.9 The 50% responder rate was 49%. Therefore, the benefits for the SpringTMS was about the same as Topiramate 100 but with no significant side effects. Unfortunately, the lack of a sham control makes it harder to interpret the data and may ultimately make insurance coverage much harder to obtain.

The Spring TMS device has been shown effective in treating patients during the acute phase of migraine with aura during double blind, sham controlled, randomized trial.11 The study was designed for the patient to treat during the aura phase. The primary outcome was pain freedom at 2 hours which met statistical significance (39% vs 22%). Migraine with aura relatively uncommon compared to Migraine without aura.

The cost of the eNeura device is about $250 per month with pricing varying with the length of rental.

**CEFALY DEVICE**

The family of devices called Cefaly (Fig. 4) is FDA approved for both acute migraines and migraine prevention. The devices work by stimulating the left and right supraorbital and supratrochlear nerves. There is one program for acute headache and a different program for headache prevention. There are 3 devices sold. One that does only the acute treatment (Cefaly® Acute), one that does only the preventative treatment (Cefaly® Prevent, and one that does both (Cefaly® Dual). Unlike the other devices in this article, the patient buys their device (up to $500 - 60 day no questions asked returns allowed) and then only have to spend for the electrodes (about $25 per month).

For acute use, we have limited open label data12 that indicates about a 3 point drop of the VAS score at one hour. Active treatment was between 7mA and 16 mA, 100 Hz, 250 microsecond pulse width. In this study, 30 patients with acute migraine were treated with Cefaly one hour acute treatment protocol. At one hour (end of stimulation period), the average pain score was decreased by 57% from baseline and this was mostly maintained at 2 hours (53%). A 10 point visual analog scale was utilized and the starting score average was about a 5.7. Given typical acute migraine studies have used a 4 point scale, it is hard to compare this to more typical migraine treatments.
A double blind, sham controlled, study appears to have been completed\(^{13}\) but I can only find secondary reporting from the IHC.\(^{14}\) Acute therapy is essentially the same as the open label trial. Sham stimulus was 1 Hz, pulse width of 250 microseconds and a max current of 5 mA. In this study, there was a statistically significant 65% vs 32% reduction in pain on the visual analog scale compared with baseline for the treated group vs the sham group at one hour. Pain freedom for the treated group was statistically significantly better than sham at 1 hour (32% vs 6%) but not two hours (19% vs 8%, P value .136). The use of the VAS instead of a more typical migraine scale makes comparisons to other treatments impossible. What one can say is there is a group of patients who respond well to acute Cefaly stimulation and other than local discomfort, is essentially side effect free.

For preventative use, Cefaly has been studied in a double blind, sham controlled, migraine prevention trial in Belgium\(^{15}\). The sham was accomplished by delivering a stimulus with a maximum intensity of 1 mA (vs 16 mA for treatment) for 30 microseconds (vs 250 microseconds for treatment) at 1 Hz (vs 60 Hz). Therefore the sham group treatment was at best 1.6% of the stimulations of the control group but may have been zero percent if the intensity and duration was not long enough to trigger the targeted supratrochlear and supraorbital nerves. There is no mention in the article if the patients could feel the sham stimulation. The mean number of migraine days in the treated and sham controlled arms of the study at baseline was 6.54 vs 6.22. Although chronic migraine was not explicitly excluded, patients having a large number of tension headache days were excluded so it is likely that there were no chronic migraine patients in the study. The migraine days at month 3 were reduced by 30% in the treated group and 5% in the sham group. The findings were statistically significant for the treated group against baseline. It was not quite significant when comparing one arm against the other (the primary specified outcome).

Other outcomes – 50% responder rate (38% vs 12%), monthly migraine attacks, monthly headache days, and monthly acute migraine drug intake were all reduced. Patient satisfaction rate was 71% in the treated group. Other than fatigue after therapy and local discomfort, the treatment is well tolerated.

While the response to Cefaly appears to be modest, given the relatively low ongoing cost, the Cefaly device is certainly reasonable to try both for acute migraine and migraine prevention.

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15 Migraine prevention with a supraorbital transcutaneous stimulator, Schoenen J, et. al., Neurology Feb 2013, 80 (8) 697-704; DOI:10.1212/WNL.0b013e3182825055

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**HIPPA Addendum**

**ADDENDUM:** The Health Insurance Portability and Accountability Act of 1996 (HIPPA) was designed to protect electronic medical records. HIPPA at that time excluded medical records not in electronic form. Also excluded were government funded programs such as the National Institutes of Health Clinical Center in which the patient was not charged for medical care. Also excluded are research records made with the full written consent of the patient as all patients admitted to the clinical center were required to sign as a condition for care. Article One of the Constitution of the United States of America, section 9, paragraph 3 prohibits ex post facto law so medical records made before HIPPA even in electronic form are excluded.
Governor Abbott Names Chair And Appoints Evans And Patton To Texas Council On Alzheimer’s Disease And Related Disorders

AUSTIN – Governor Greg Abbott has appointed Joe Evans and Eddie Patton, M.D. to the Texas Council on Alzheimer’s Disease and Related Disorders for terms set to expire on August 31, 2021. Additionally, the Governor named Rita Hortenstine chairman of the council. The council facilitates the coordination of state services for victims of Alzheimer’s disease and related disorders.

Joe Evans of Beaumont is the general manager of Beaumont Occupational Services, a drug, alcohol, and occupational testing facility. He is president of Habitat for Humanity of Jefferson County Board of Directors. Additionally, he is a board member of the Garth House Mickey Mahaffy Children’s Advocacy Program and the Fellowship of Christian Athletes. Evans received a Bachelor of Science in history education from Florida A&M University.

Eddie Patton, M.D. of Sugarland is a general neurologist at Mischer Neuroscience Associates. He serves as American Academy of Neurology delegate for the American Medical Association House of Representatives and a Harris County Medical Society delegate for the Texas Medical Association House of Representatives. He is president of the Harris County Neurological Society and board member of the Texas Neurological Society, Harris County Medical Society, and the American Academy of Neurology Government Relations Committee. Patton received a Bachelor of Science in biology/pre-medicine from Xavier University of Louisiana, a Master of Science in biology from Alabama State University, and a Doctor of Medicine from Wayne State University School of Medicine.

Rita Hortenstine of Dallas has served on the Texas Council on Alzheimer’s Disease and Related Disorders since 2008. She has dedicated over a decade of service and volunteer work for persons living with Alzheimer’s and their caregivers. She is a member of the Darrell K Royal Research Fund for Alzheimer’s Executive Committee and Charter 100 Women’s Organization. She is a board member of the Alzheimer’s Association National Board and the Alzheimer’s Association Dallas Chapter, where she founded the RJ Roper Caregiver’s Awards program for Alzheimer’s caregivers and the Dallas Arboretum, where she initiated their Memory Garden Project for persons with memory loss and their caregivers.

Additionally, she represents Texas in two national public policy organizations, Us Against Alzheimer’s and Leaders Engaged On Alzheimer’s Disease (LEAD Coalition). Hortenstine attended the University of Missouri.

In Remembrance

Michael David Merren, M.D., age 75, passed away peacefully with his family at his side on Friday, January 19, 2018. He is preceded in death by his parents, Derb and Nancy; and his brother Joel Merren. Dr. Merren is survived by his beloved wife of 53 years, Helene Merren; their children: Richard Merren and wife, Yael Ouzillou; Stacey de la Grana and husband, Fausto; grandchildren: Isabela, Sofia, Eliza and Reuben; and his brother, Stephen Merren and wife, Judy Berger Merren.

Dr. Merren was a long time San Antonio neurologist and a past president of TNS.