Synapse
a clinical resource
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Low Back Pain Management

Andres Peña, MD

One of the most common problems in general practice is low back pain. It is reported that up to 90% of adults will suffer at least one episode of severe low back pain in their lifetimes. This problem also has tremendous economic costs, not only as medical expenses, but also as loss of productivity in the work place. In most cases, low back pain is self-limited and requires no intervention other than some rest and over the counter medications. Yet, what should one do when all of these methods fail? Here are some basic concepts about why back pain occurs and how to manage it.

The first step is to determine the pain generator. Back pain may originate from many places. It may or may not originate from the spine itself, and within the spine it may originate from the discs, facet joints, or nerve roots. It may also originate from the muscles, tendons, ligaments, or joints, such as the sacroiliac joint or hips. It may even be a referred pain from an entirely different area. It is also quite common to have more than one source of pain at the same time, such as myofascial pain as a reaction to pain originated from discs or facet joints.

The most common back pain is muscular. This pain is not necessarily related to high intensity efforts. It is not uncommon to have a patient presenting severe myofascial pain due to picking up a piece of paper. Also, the severity of the pain is not always related to the severity of the injury. The pain is described as the feeling of the back being locked up in a position, and often there is presence of a lump corresponding to a myofascial tight band ("my back is swollen"). The treatment for this pain initially should be a period of relative rest and slow re-introduction to activity. Bedrest is not advisable because light mobilization helps to prevent progressive spasm of muscles and allows faster return to full movement. Ice, heat, and topical over-the-counter medications are also recommended. Opioids should be reserved only for short term use for severe pain.

It is not uncommon to present with a series of episodes of muscular low back pain ("my back goes out once or twice a year"). There are multiple factors that make the muscular pain much more prevalent these days, such as the presence of obesity, deconditioning, and sedentary lifestyle. Smoking is also well known to aggravate the severity of myofascial pain, and recovery time is more prolonged compared to non-smokers. Strengthening, stretching, and endurance exercises are indicated to prevent the repeated recurrences of the pain episodes. Thus, lifestyle changes should regularly be discussed when a practitioner evaluates back pain.

When should a provider worry about a patient with low back pain? First, a provider needs to identify symptoms rather than pain such as numbness, tingling or weakness, signs of cauda equina compromise such as bowel and bladder incontinence or retention, and other pathology such as cancer or general conditions. A provider should examine the back and have the patient point out specifically where the pain is. Other evaluations such as lower extremity tone, strength, sensation and reflexes, at least a straight leg raise, and movement of hip and sacroiliac joints should be included.

When is an MRI indicated for low back pain diagnoses? MRI studies were conducted on normal control subjects and have shown abnormal findings including disc bulges in up to 52%, protrusions in 27%, and extrusions in 1%. Often disc bulges are present in patients with low back pain, but are not the pain generators. If the real generator of the pain is not identified, it can lead to treatment


Andres Peña, MD

continued on page 4

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Pursuit of Knowledge

Current Research Trials Available Through Dignity Health Neurological Institute

Clinic research is vital in the advancement of treatment options for people suffering from neurological disorders. It provides treatment and therapy options to patients who may not benefit from current standards of practice. That's why Dignity Health Neurological Institute has been involved in some of the largest and most important research trials, helping discover new treatments in acute care, preventative care, and quality of life improvement. Dignity Health first became involved with research in 1991 when it was a site for the original trial using intravenous t-PA in acute ischemic stroke. Since that time, Dignity Health has participated in 48 different clinical research trials. Patients are currently being enrolled into both outpatient and inpatient research trials at Dignity Health's Comprehensive Stroke Center at Mercy San Juan Medical Center, Primary Stroke Center at Mercy General Hospital and through multiple sclerosis and seizure clinics. The trials below are currently open for enrollment.

INPATIENT

Minimally Invasive Surgery Plus Rt-PA for ICH Evacuation Phase III (MISTIE III)

The MISTIE III intervention seeks to improve a patient's long-term outcomes after suffering from an intracerebral hemorrhage by removing clot from the brain through minimally invasive surgery, intermittent dosing of Activase (rt-PA), and drainage of the broken down clot. The study premise is that by removing the blood clot faster, injury to the brain will be reduced.
Principal Investigator: Alex Nee, MD

Ischemia Care Biomarkers of Acute Stroke Etiology (BASE)

The study will validate the clinical use of new biomarker blood tests to identify blood components that may differentiate between diverse stroke etiologies and clinical outcomes. In cases of ischemic strokes of unknown or "cryptogenic" etiology, the study will determine the ability of biomarker blood tests to predict etiology between cardioembolic and atheroembolic strokes. (Validates current ISCDX test.)
Principal Investigator: Lucian Maidan, MD

POINT

This is an NIH sponsored, randomized, double-blind study to evaluate the effectiveness of aspirin+clopidogrel in patients with minor ischemic stroke and high risk TIA over 90 days. Patients arriving to the ED within 12 hours of their onset of symptoms will be evaluated for enrollment. All patients will receive aspirin, the dose to be determined by the physician (50-325mg/day) and patients in the combined therapy arm will receive a loading dose of 600mg clopidogrel/placebo followed by a daily dose of 75mg.
Principal Investigator: Lucian Maidan, MD

NEUROINTERVENTIONAL RADIOLOGY

Separator 3D

This randomized study assesses the safety and effectiveness of a new device in the revascularization of large vessel occlusions in acute ischemic stroke. This device is deployed during a cerebral angiogram and is designed to break up the clot which can then be retrieved into a reperfusion catheter.
Principal Investigator: George Luh, MD

HEAT

This randomized study compares the effectiveness of new generation Hydrogel coated coils versus the bare platinum coils in the endovascular treatment of aneurysms. Hydrogel coils are coated with a biosynthetic polymer that expands in body fluid. The hypothesis is that they will provide the highest degree

continued on page 6

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Atrial Fibrillation: Update 2016

P. Gearoid O'Neill, MD, FACC, FHRS

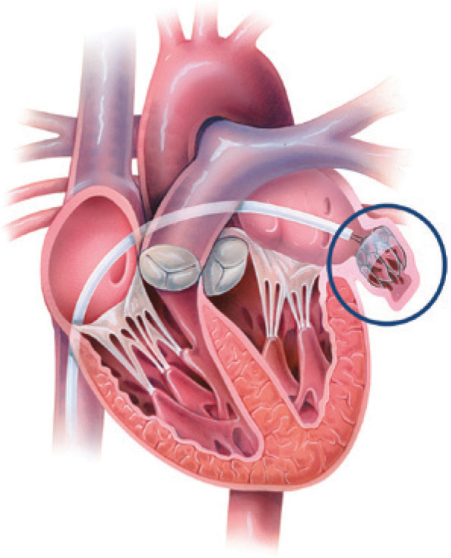
Atrial fibrillation (AF) is the most common cardiac arrhythmia we deal with. Its incidence increases with age. It is rare before the age of 40, but over 5% of patients who reach the age of 80 will have atrial fibrillation.

From a public health standpoint, its major significance is its association with embolic stroke. This stroke risk can be substantially reduced by effective anticoagulation, even in non-selected populations with less than ideal vitamin K antagonist (VKA) control. However, anticoagulation is inevitably associated with an increased risk of bleeding, some of which may lead to death or disability and consequences potentially worse than those related to ischemic stroke. Therefore, we have developed schemes to identify those at greatest risk of ischemic stroke while minimizing exposure for those at greatest risk of bleeding complications. These approaches do not yet have unanimous support from the various guideline-writing committees.

Catheter ablation is a technique being used increasingly to manage patients with AF. The technique is in continuous evolution. However, it is generally agreed that the most important component of the procedure is electrical isolation of the pulmonary veins.

In the cardiovascular world, the most popular current score for stroke risk is the CHA2DS2VASc (congestive heart failure, hypertension, age greater than 75 [doubled], diabetes mellitus, stroke/transient ischemic attacks [doubled], vascular disease, age 65-74, female sex category). A 0 score implies virtually no risk of stroke and no need to consider further anticoagulation.

Until recently, the vitamin K antagonist (warfarin) was the mainstay of antithrombotic treatment. The last few years have seen the introduction of novel oral anticoagulants (NOACS) including a direct thrombin inhibitor (dabigatran) and three different factor Xa inhibitors (rivaroxaban, apixiban, and edoxaban). These new agents were compared to warfarin in prospective randomized trials. A recent meta-analysis by Ruff et al. showed that NOACS reduced stroke and embolic events by 19% as compared to



warfarin. The benefit was mainly driven by a reduction in hemorrhagic stroke. The NOACs also significantly reduced all—cause mortality and intracranial hemorrhage. Bleeding complications were comparable to warfarin except that there was an excess of gastrointestinal bleeding when using the NOACs.

For patients unable to take anticoagulants, novel approaches have recently emerged. It is well recognized that intracardiac clots tend to form in the left atrial appendage (LAA) (Virchow's triad). It is estimated that more than 90% of cardiac emboli have their beginnings in the LAA.

When patients are undergoing cardiac surgery and are known to be at increased risk of atrial fibrillation, the LAA is often surgically excluded either by amputation or oversewing it. Within the last few months, the FDA has approved the Watchman device. This is a mechanical device with the appearance of a badminton shuttlecock. It is delivered percutaneously through the femoral vein across the intra-atrial septum and deployed under transesophageal echocardiographic guidance. Over six weeks it endothelializes and excludes the LAA from the rest of the left atrium.

Catheter ablation is a technique being used increasingly to manage patients with AF. The technique is in continuous evolution. However, it is generally agreed that the most important component of the procedure is electrical isolation of the pulmonary veins. A variety of technologies are available to accomplish this, including

P. Gearoid O'Neill, MD, FACC, FHRS

continued on page 6

Charcot-Marie-Tooth Disease

Ryan Armour, DO

Charcot-Marie-Tooth disease is the term used to describe a group of inherited sensory and motor peripheral polyneuropathies. This is the most common inherited class of neurological disorders, affecting 1 in 2,500 people. There is genetic variability among patients, with autosomal dominant, autosomal recessive, and X-linked forms. Over 45 genetic mutations causing inherited polyneuropathies have been identified. New mutations are discovered each year.

The most common form of Charcot-Marie-Tooth disease is autosomal dominant, presenting with distal lower limb weakness in the first three decades of life. In general, patients with Charcot-Marie-Tooth disease will develop progressive distal muscle weakness and atrophy at a relative early age, depending on genetic and phenotypical variation. Clinical manifestations may include pes cavus and hammer toes. Patients may develop distal calf muscle atrophy, the so called "inverted champagne bottle" sign or "stork leg deformity." Bilateral foot drop and weakness of intrinsic hand muscles may occur as the disease progresses. On physical examination, there is typically loss of sensation in the distal extremities, although patients may not report or be aware of sensory loss. Deep tendon reflexes are usually absent. Pain in the feet is common. In addition to neuropathic pain, musculoskeletal pain associated with foot deformities may also develop.

Rare variants may have other associated neurological findings, including deafness, tremor, or diaphragm paralysis. Patients with certain genetic variations will even at birth manifest severe hypotonia, contractures, and respiratory failure.

Diagnosis of an inherited polyneuoropathy may be suspected in cases when symptom onset occurs at a relatively young age in the absence of other known underlying risk factors or when a strong family history is present. Nerve conduction studies and electromyography may demonstrate non-specific findings consistent with a generalized polyneuropathy. However, the most common types of Charcot-Marie-Tooth disease have hallmark unique abnormalities of nerve conduction velocities.

Genetic testing has become widely available through commercial laboratories. This has greatly decreased the need to perform nerve biopsies, which were performed in many cases in the past to aid with diagnosis.

Genetic testing has become widely available through commercial laboratories. This has greatly decreased the need to perform nerve biopsies, which were performed in many cases in the past to aid with diagnosis. Decisions regarding which specific gene sequencing or panels to order may be difficult and are often guided by clinical presentation and electrodiagnostic findings. Consultation with a provider experienced in diagnosis of inherited polyneuropathies and genetic counseling is recommended prior to ordering any genetic testing.

There is currently no known treatment to modify or slow progression of disease in patients with Charco-Marie-Tooth disease. Management is focused on supportive care. A combination of agents used to treat neuropathic pain as well as anti-inflammatories are often helpful to control pain. Shoe inserts or other orthotic devices may be also used to reduce pain and improve gait stability. Medications that have been known to cause or exacerbate neuropathies, especially certain chemotherapy agents, should be used cautiously or avoided if alternatives are available. A multidisciplinary approach with experienced neurologists, physiatrists, physical therapists, and podiatrists is often used for best results. ▪

Ryan Armour, DO

Low Back Pain Management—continued from page 1

failure, resulting in chronic pain and disability. An MRI is indicated if there is a consideration of interventional procedures or surgery. It is also indicated if there are reasonable questions about different pathology such as tumors or infections, or if there are clear neurological symptoms. Proper, accurate, and effective treatment may prevent future disability and chronic deterioration of the quality of life of our patients. ▪

Evidence Based Management of Intracerebral Hemorrhage—What's New

Alex Nee, MD

Intracerebral Hemorrhage (ICH) accounts for 15% of all strokes, or 65,000 cases per year in the U.S. ICH carries a 44% mortality, and of those who survive the initial insult, less than 20% of patients are able to achieve full recovery at six months. ICH continues to be a disease with high morbidity and mortality, possibly due in part to our incomplete understanding of the pathophysiology of the disease process and the lack of effective, evidence based treatments. This, unfortunately, leads to inconsistency in treatment and, therefore, variable outcomes. In the last five years, several published multinational, prospective, randomized trials have shed light onto ICH management and afford new treatment strategies.

Hypertension is common after ICH and if inadequately treated leads to significant increase in the mortality rate. Surprisingly, earlier papers, often based on small group and retrospective studies, showed conflicting data, and some even suggested that acute lowering of BP might either be harmful, with higher mortality, or had no effect on the degree of hematoma volume expansion.

In the last five years, several published multinational, prospective, randomized trials have shed light onto ICH management and afford new treatment strategies.

In 1999, the AHA published the first ICH Management Guideline. Due to safety concerns, a rather lax goal of MAP 130 mm Hg or less was suggested. In 2008, the result of the INTERACT trial was published. It is the first large (n=404) prospective, randomized controlled trial comparing the SBP reduction with a target of 180 to intensive control of 140 mm Hg at one hour after ICH. The result showed a trend toward lower hematoma growth and no increase in adverse events in the intensive BP control group. This was followed by INTERACT II in 2013 (n=2839) which showed that intensive BP control (<140 mm Hg) is not only safe but can be effective for improving functional outcome. The BP reduction of 140 mm Hg or less is the Class I, level of evidence A recommendation of the 2015 AHA ICH management guideline.

Similar to early published papers in medical management, there were mixed data on the benefit of surgical intervention in supratentorial ICH patients. In 2005, despite initial promising data supporting the benefit of surgical intervention, phase 3 of the STICH trial, a prospective trial of 902 patients randomized to either a surgical or a medical arm, showed surgical patients tend to do worse compared to the medically managed patients if ICH is > one cm from the cortical surface and GCS less or equal to eight. However, there was a favorable trend toward surgery if the ICH is within one cm of the cortical surface.

MISTIE III, the final phase of the 10-year trial, is currently underway. Dignity Health Neurological Institute is one of the participating sites at Mercy San Juan Medical Center.

This latter subcategory of patients was the focus of investigation of the STICH II trial with results published in 2013. It confirmed that early surgery does not increase the rate of death or disability at six months and might have a small but clinically relevant survival advantage for patients with spontaneous superficial ICH without intraventricular hemorrhage.

The lack of convincing advantage of conventional surgical intervention over medical management may be disappointing, but not completely unanticipated. One often cited reason is that the benefit gained by hematoma reduction is negated by the induced surgical trauma. As such, minimally invasive techniques such as the one employed in the Minimally Invasive Surgery + rt-PA for ICH Extraction (MISTIE) trial has garnered international interest. Using stereotactic guidance, a catheter was inserted directly into the center of hematoma via a small burr hole. This was followed by serial injections of rtPA to liquefy the hematoma and allow drainage via the inserted catheter. Compared to medical management, MISTIE II in 2013 showed an improvement of long term outcome; shortening of the overall hospital and long-term care facility stay and an estimated acute care cost savings of $44,000.

MISTIE III, the final phase of the 10-year trial, is currently underway. Dignity Health Neurological Institute is one of the participating sites at Mercy San Juan Medical Center.

For references, please email us at dignityhealthneuro@dignityhealth.org. ▪

Alex Nee, MD

Pursuit of Knowledge — continued from page 2

of occlusion and packing density of the aneurysm, leading to increased protection against recanalization and need for retreatment. Dignity Health Neurological Institute is currently one of the top ten enrollers in the nation out of 30 active sites.
Principal Investigator: George Luh, MD

OUTPATIENT

Multiple Sclerosis: RESPOND

This multicenter open-label 12-month observational study evaluates the clinical effectiveness and impact on patient-reported outcomes of oral tecfidera (dimethyl fumarate) delayed-release capsules in patients with relapsing forms of multiple sclerosis after suboptimal response to glatiramer acetate.
Principal Investigator: John Schafer, MD

Multiple Sclerosis: OPERA Trail

This randomized, double-blind study evaluates the efficacy and safety of Ocrelizumab, a monoclonal antibody targeting B cells, in comparison to Interferon Beta-1a (Rebif) in patients with relapsing multiple sclerosis. Five patients have been enrolled, and we are currently in the follow-up phase.
Principal Investigator: John Schafer, MD

Multiple Sclerosis: TEVA Confidence Study

A randomized parallel group open-label study is to assess medication satisfaction in patients with relapsing remitting multiple sclerosis (RRMS) treated with subcutaneous injections of Copaxone (glatiramer acetate) 40 mg/mL three times a week compared to 20mg/mL daily.
Principal Investigator: John Schafer, MD

Multiple Sclerosis: MITIGATE

This is a multicenter double-blind, placebo-controlled study of montelukast on gastrointestinal tolerability in patients with relapsing forms of multiple sclerosis receiving tecfidera (Dimethyl fumarate) delayed-release capsules.
Principal Investigator: John Schafer, MD

Epilepsy: ARTEMIS

This is a randomized, double-blind placebo-controlled study of the safety and efficacy of intranasal midazolam in the outpatient treatment of subjects with seizure clusters.
Principal Investigator: Edwin Cruz, MD

Headache: EVIDERA

This is a prospective observational study to evaluate the tolerability and outcomes of prophylactic therapies in migraine headaches.
Principal Investigator: Alan Shatzel, DO ▪

Atrial Fibrillation: Update 2016 — continued from page 3

radiofrequency and cryoablation. The technique is moderately effective although there is a high recurrence rate, and patients may need repeat procedures. Those who do best are those in whom the AF is still paroxysmal, of relatively recent onset, and who do not have significant left atrial dilatation.

Does ablation reduce stroke risk? There is tantalizing data from retrospective and prospective registries that suggest that it does. Some patients present with stroke or TIA but without documentation of AF. Of course, not all strokes are related to AF but many may be. How can we search for AF? The standard EKG and 24-hour Holter have obvious limitations. We currently have available transcutaneous monitors that may be used for up to a month to record arrhythmias. If symptoms are less frequent, the implantable LINQ recorder which is about the size of a paperclip can easily be inserted under the skin and can accurately record arrhythmias automatically for up to three years.

Does ablation reduce stroke risk? There is tantalizing data from retrospective and prospective registries that suggest that it does.

All of these measures have substantially reduced the risk of stroke in those with known or occult atrial fibrillation. ▪

Brain Waves

Dignity Health Telemedicine Network Continues to Expand and Grow

The Mercy Telehealth Network was founded in 2008 from a generous donation from the Elliott Foundation. Two of the founding members, Alan Shatzel, DO and Deidre Wentworth, MSN, RN, had the vision to use telemedicine technology to virtually "get the neurologist to the patient's bedside" to assist with the assessment of patients suffering from stroke symptoms. In its first year of operation, the Mercy Telemedicine Network provided 16 telestroke consults at Mercy Hospital of Folsom.

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Fast forward to March 2016. The Mercy Telehealth Network is now the Dignity Health Telemedicine Network, or "DHTN" as it is more commonly known. The telestroke program supports 30 telestroke/neurology partner sites, averaging one telestroke consult every hour!

DHTN has introduced several clinical tools that are changing the way stroke care is handled in the emergency department. One such tool is known as "5-5-5." 5-5-5 is short for the process that represents three actions that are critical to achieve in five minutes or less: 1) Door to rapid medical assessment by the emergency department physician; 2) Door to radiology for a CT exam; and 3) Door to activation of the teleneurologist. This 5-5-5 process has helped DHTN partner sites achieve an average door to needle time (for the delivery of tPA) of 55-60%, which is 25-30% higher than many hospital results.

DHTN continues to expand in other areas such as telemental health, teleICU, telecardiology, telenephrology, multiple sclerosis, and Parkinson's disease. DHTN currently provides more than 2,000 telemedicine consults per month.

A New Nurse for the Mercy MS Center

Rachael Navarro, RN joined the staff of the Mercy MS Center in March. Ms. Navarro has more than seven years' experience in inpatient and outpatient neurological nursing. Ms. Navarro will work with Sofie Rogado, RN, who has been with the MS Center since 2013 to provide extensive education and support to patients of the Center.

MS Achievement Center Celebrates 2nd Anniversary

The MS Achievement Center marked the 2nd anniversary of its opening on February 20, 2016. Founded with a large grant and sustained by a second large grant from the Conrad N. Hilton Foundation and generous contributions from the Robert S. and Star Pepper Foundation and others, the Center is located at 7777 Greenback Lane in Citrus Heights. The weekly core wellness program provides nearly 70 people with disability from MS with physical and cognitive wellness and fitness, emotional and social support and education to better cope with the effects of the disorder. In addition to these core programs, a support partners' series, a book group, a writing group, and an evening "Living Well With MS" program are available. The Achievement Center works in collaboration with the National Multiple Sclerosis Society and is open to all persons with multiple sclerosis, regardless of their healthcare affiliation. The monthly charge is based on a sliding scale so that no one will be deprived of the service for financial reasons.

For information and for referrals call 916.453.7966 or visit online at http://www.dignityhealth.org/sacramento/services/neurological-care/services/mercy-ms-achievement-center. ▪

MS Achievement Center director, Brian Hutchinson, PT, MSCS, assists a patient in the Center's physical therapy suite.

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