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BEST HOSPITALS U.S.News & WORLD REPORT NATIONAL NEUROLOGY & NEUROSURGERY 2020-21

AdventHealth Neuroscience Institute Welcomes New Physicians

Anwar Ahmed, MD

Executive Medical Director of Neurology

Board-certified neurologist Anwar Ahmed, MD, FAAN, has joined the AdventHealth Neuroscience Institute (NSI) as Executive Medical Director of Neurology. His special interests include movement disorders and tremor analysis in Parkinson's disease and related neurodegenerative disorders, as well as dystonia. Dr. Ahmed is also a fellow of the American Academy of Neurology. He came to the NSI from the Cleveland Clinic in Ohio, where he served in multiple leadership roles in the movement disorders and neurological restoration programs and the Huntington Disease Center of Excellence. A graduate of the esteemed Dow Medical College in Pakistan, he completed his neurology residency at Wayne State University's hospitals in Michigan followed by a fellowship in surgical approaches to movement disorders and motor physiology at Columbia-Presbyterian University Medical Center in New York and a clinical research fellowship in movement disorders at the Cleveland Clinic. His research and published works have focused on such topics as unusual movement disorders, treatment of tremor caused by multiple sclerosis, brain stimulation for movement disorders, and Parkinson's disease.

Ryan Mizell, MD

Board-Certified Neurologist, Neuroimmunology

Ryan Mizell, MD, is a board-certified neurologist whose primary focus is on treating patients with complex multiple sclerosis (MS) and neuroimmunology issues. After earning bachelor's degrees in exercise and sport science and biomedical sciences at the University of Florida (UF) and the University of South Florida, respectively, he completed a master's degree in biobehavioral science with a specialization in biomechanics at UF and earned his medical degree at the University of Central Florida. He then completed his internship and residency in adult neurology at the University of Louisville, followed by a fellowship in multiple sclerosis/neuroimmunology at the MS Center of Excellence at the Baltimore VA and University of Maryland Medical Center. Dr. Mizelll's research has involved investigating the associations between the thinning of retinal layers, cortical lesions, and leptomeningeal enhancement in people with MS using 7 Tesla MRI.

Updates in Neurology and Neurosurgery
AdventHealth Neuroscience Institute • Winter 2020 • Volume II, Issue I

Craig Brubaker, PhD
Vice President, AdventHealth Neuroscience Institute

AdventHealth Neuroscience Institute is Committed to Expanding to Meet Our Customers' Need for Access to Comprehensive Surgical and Subspecialty Care

The Neuroscience Institute (NSI) at AdventHealth continues to develop care models for patients with a diverse range of neurologic conditions in an innovative, accessible, holistic and patient-centered manner. We are committed to "making it easy" for referring physicians and patients, both regionally and internationally, to obtain timely access to highly specialized neurologists and surgeons.

Our quaternary hospital in Orlando continues to lead with investigator-initiated research, exploring new treatments such as Gamma Tile for brain tumors, and beginning a neurocritical care fellowship program. However, over the last year, we have also been expanding access points for surgical and medical programs. At our Celebration campus, new offerings include 24/7 neurosurgical and neurovascular stroke programs, a multidisciplinary neuro-oncology/neurosurgery clinic, and a functional neurosurgery program. Our North Star is ensuring we are providing customer-focused, value-based care throughout our Central Florida Division.

Our journey to providing top subspecialty neurological care also continues. We now have programs for movement disorders, neuromuscular conditions, headache and migraine care, neuroimmunology, behavioral neurology, epilepsy, and memory care. These programs are led by accomplished physicians in each of their areas. They will collaboratively focus on scaling each subspecialty, conducting research to further the body of evidence in their fields, and developing a national destination center for subspecialty neurology care in the Health Village on the Orlando campus.

AdventHealth is leaning into our national mental health crisis as well. We will offer a Spravato clinic for treatment-resistant depression as well as a second Mental Health Outlook Clinic for the uninsured population. Our divisional focus on substance abuse and identification of suicide risk will also continue to mature. This year, our Hope and Healing Center, in partnership with the Seminole County Sheriff's Office, will also open in Seminole County.

Over the next ten years, the AdventHealth Neuroscience Institute will continue to focus on innovation while advancing neurology and neurosurgery care to meet the evolving needs of the local and national community with patient-centered strategies.

AdventHealth

AdventHealthNeuroInstitute.com

In This Issue

Christopher J. Baker, MD
Chief of Neurosurgery, AdventHealth Neuroscience Institute

AdventHealth Neuroscience Institute 2020 Highlights

These are exciting times at the AdventHealth Neuroscience Institute. We continue to expand our neuroscience services to the Central Florida community and beyond. Here are a few highlights:

- This summer we established a full-service neurosurgery program at AdventHealth Celebration, including a multi-disciplinary neuro-oncology clinic. Full-service interventional neuroradiology and stroke care began there at the end of October.
- Our early adoption of robotic-assisted spine surgery has been well received by patients. We just completed our 350th robotic spine case in the system.
- The neurocritical care department's fellowship program welcomed our first two fellows this year, generating a new wave of educational conferences.
- Increasing numbers of patients have been enrolled in the surgical epilepsy and minimally invasive brain surgery programs.
- We have expanded the number of offices where patients can go for neurosurgical spine and brain care in Central Florida.
- We have a revitalized movement disorder program under the care of Drs. Reddy and Ahmed to serve our community's deep brain stimulation needs.
- Our AdventHealth spine care navigation program continues to expand into more local ERs and care centers to connect back pain sufferers to the appropriate clinician.

Whether you are a prospective patient or clinician, give us a call if you think we can help.

Luis Allen, MD
Medical Director, Psychiatrist
AdventHealth Center for Behavioral Health

Virtual Inpatient Psychiatric Unit — The Future of Telemedicine in Behavioral Health

An estimated 20 percent of the U.S. population suffers from a mental health or substance abuse condition. This challenge is exacerbated by a significant shortage of psychiatrists and inpatient behavioral healthcare beds both nationally and locally, resulting in long care delays. Unfortunately, the gap continues to grow and by 2025, demand may outstrip supply by 6,090 to 15,600 psychiatrists according to a report from the National Council for Behavioral Health. To address these challenges and improve patient care, outcomes and value, the AdventHealth Center for Behavioral Health has created a Virtual Inpatient Psychiatric (VIP) Unit through the use of telemedicine.

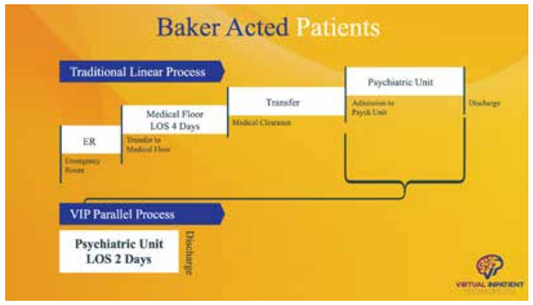
One of the first programs of its type in the country, the primary goals of this new model of care include the following:

- Improve initial response time
- Provide patients with quicker access to comprehensive behavioral health services
- Reduce inpatient length of stay (LOS)
- Serve as an immediate resource for ED physicians
- Serve as good stewards of limited inpatient beds

Providing Integrated Psychiatric Care

Traditionally, when a patient with a medical condition is Baker Acted in the state of Florida, they must be medically stabilized before transferring to the psychiatric inpatient unit to receive behavioral healthcare. This typically involves an average four-day LOS on the medical unit before inpatient psychiatric care can even begin. In addition, by law, a Baker Acted patient on the medical unit must have a "sitter" stay with the them 24/7 until they are officially under psychiatric care, an additional expense.

By contrast, through the VIP Unit, behavioral healthcare is provided in a parallel manner from the time the patient arrives at the hospital. Using telemedicine, our multidisciplinary team, which includes a psychiatrist, psychiatric social worker, psychiatric nurse and psychiatric discharge planner, begins providing psychiatric care while the patient is still on the medical unit. The team immediately begins assessments, family intervention, medication and scheduling of appointments as needed. In fact, some patients are now psychiatrically stabilized before they are medically stabilized, removing the Baker Act and eliminating the need and cost of a sitter.



Improved Outcomes

Implementation of the VIP Unit has increased the standard of care, patient satisfaction and staff satisfaction while decreasing overall LOS, sitter utilization, readmission rates, wait time for psychiatric services and cost. A virtual psychiatric bed is a fraction of the cost of a traditional inpatient psychiatric bed. In fact, every Baker Act released saves $1,741.84 based on a two-day inpatient psychiatric unit LOS and a four-day average LOS on a medical floor with sitter utilization. In addition, this new virtual model of care ensured that AdventHealth was already prepared with a critical telemedicine infrastructure when COVID-19 hit.

Future Plans

One VIP Unit currently serves 10 Orlando area AdventHealth campuses, including Orlando, Winter Garden, Winter Park, East Orlando, Apopka, Altamonte, Celebration, Kissimmee and the Lake Mary ER. Future plans include expanding the unit to additional AdventHealth locations in Florida.

In addition, knowing that there is a shortage of providers and it can take over 30 days to receive psychiatric outpatient care within the community, our team is currently building off its inpatient success to develop a Virtual Outpatient Clinic pilot. As part of this model, we are exploring having an inpatient see the same psychiatrist for follow-up outpatient care, providing a level of familiarity and continuity of care that is especially important for the geriatric population.

Chetan K. Patel, MD
Executive Medical Director, Spine, AdventHealth Neuroscience Institute
Section Chair, Robotics & Navigation, North American Spine Society

Is Augmenting Reality the Next Frontier in Spine Surgery?

Each year, surgeons perform more than one million instrumented spinal procedures in the United States. While the rise in computer-assisted surgical navigation and robotics technology has improved outcomes, significant challenges remain. Attention shift — the need for surgeons to look away from the patient during the surgical procedure to access information on a screen — remains the greatest challenge and can decrease both the surgeon's cognitive and motor task performance. Augmented Reality (AR) could provide a solution that will improve both surgical efficiency and patient outcomes by super-imposing contextually relevant patient information so that it is easily and readily available to the surgeon without ever looking away from the patient to a screen.

Exploring the Application of AR in Spine Surgery — Opportunity and Challenges

Many industries, including medicine, are looking to AR as the next big opportunity. As with any new technology, the goals are to make something easier, improve efficiency or achieve a better outcome. In the case of spine surgery, this means improving patient safety and clinical outcomes while also reducing overall procedure time. Furthermore, by avoiding repetitive neck twisting and improving ergonomics, this technology has the potential to decrease neck discomfort.

For the last seven years, I have extensively explored the various options for incorporating AR into spine surgery, evaluating different approaches as the technology has evolved. I have found benefits and opportunities in what is currently on the market. As a result of this experience, I have focused my work on developing a different approach that focuses exclusively on a spine surgeon's needs that can be met with existing technology in a cost-efficient package called iSight™. The evolution of these efforts is listed below along with the strengths and primary challenges encountered with each:

1. Google Glass

Strengths — lightweight with excellent ergonomics, low cost, minimal learning curve

Opportunities — resolution insufficient, display too peripheral, monocular display, suboptimal lag and poor battery life, adds the step of wearing a headset during surgery

2. Entirely Custom AR System (Hybrid OR, Hololens, Magic Leap, Xvision)

Strengths — excellent displays, binocular/3D display, mitigates attention shift, imperceptible lag, high level of processing power, some can project 3D holographic objects

Opportunities — most bulky and heavy, high cost, learning curve, some systems with poor localization of local anatomical structures, poor battery life, not compatible with other systems, adds the step of wearing a headset during surgery (except Hybrid OR)

3. iSight™

Strengths — lightweight with excellent ergonomics, excellent display, binocular/3D display, mitigates attention shift, imperceptible lag, good battery life, low cost, minimal learning curve, can use with or without surgical loupes, can be used with almost all existing imaging, navigation and robotics systems

Opportunities — adds the step of wearing a headset during surgery

Evolving the AR Approach to Benefit Patients and Surgeons

The iSight™ AR system has been in use since May of 2020. As expected, it has mitigated attention shift away from the patient with the potential of improved safety and efficiency. In my current cases to date, it has resulted in a 25-55% improvement in the time required to place pedicle screws. This reduction in time certainly means less anesthetic time but may also result in less blood loss and improved clinical outcomes. Once this study is complete, I am looking forward to publishing my results that evaluate the clinical outcomes.

Using a lightweight headset has been comfortable and has reduced neck discomfort in complex multilevel surgeries. The most surprising part of this journey however has been to learn that the system has a minimal learning curve. The ability to utilize current navigation and robotics technology that already exists in my operating room was the key to reducing cost and intuitively using the AR system without the need to acquire new skills.

The Future of AR in Spine Surgery

As the simultaneous localization and mapping (SLAM) technology improves, registration of local patient anatomy and accurate display of holographic visualizations will dramatically improve. As mobile computing power and efficiency improves, the headsets will continue to become lighter and less bulky. This should enable us to use holographic projections that facilitate planning and execution of every step of surgery, making AR an indispensable tool for all spine surgeons. The goal for incorporating AR into spine surgery should be to enhance the accuracy, safety, and efficiency that ultimately culminate in improved clinical outcomes. I believe that it is our obligation not just to deliver the best possible care today, but to create innovative solutions that exceed what we can do today. If we can envision a better future, it is our responsibility to help create it.

To learn more about this technology, or to participate in the live surgery visitation program, please email Sheri Peterson, Director AdventHealth Medical Group Spine Health at Altamonte at Sheri.Peterson@AdventHealth.com.

AdventHealth NSI's Chetan Patel, MD, Presented "Pushing the Frontiers of Spine Surgery Through Advanced Technologies and Robotics" at International Meetings

North American Spine Society (NASS) 2020 Annual Meeting
Virtual Experience | October 7-10, 2020

Eurospine 2020 Annual Meeting
Virtual Annual Meeting | October 6-9, 2020

Herbert Newton, MD
Medical Director
Neuro-Oncology Program
AdventHealth
Cancer Institute

AdventHealth Opens Multidisciplinary Brain Tumor Program at Celebration

A A multidisciplinary neuro-oncology clinic at AdventHealth Celebration opened on August 12, bringing together leading physicians across multiple specialty areas to help decrease the time between diagnosis and treatment for patients diagnosed with all forms of neurological cancerous and non-cancerous brain tumors. In a single-day appointment, patients meet with and are evaluated by a medical oncologist, neurosurgeon and radiation oncologist to create a comprehensive treatment plan close to home.

The new clinic extends the program currently found at AdventHealth Orlando. Conditions treated at the clinic include meningioma, pituitary tumors and skull-base tumors, among others. Patients are also be able to undergo screening for procedures such as Gamma Knife Radiosurgery and the Optune tumor treating field system, previously only available at AdventHealth Orlando.

For more information or to refer a patient, call Brain Services Navigator Aiko Boggs, BSN, RN, at 407-303-7944.

Chandan Reddy, MD, FAANS
Neurosurgeon
Founder, Deep Brain Stimulation Program
AdventHealth
Neuroscience Institute

Anwar Ahmed, MD, FAAN
Executive Medical Director of Neurology
Adventhealth
Neuroscience Institute

New Treatment Options Available for Neurological Patients: Deep Brain Stimulation, Normal Pressure Hydrocephalus Program, Botulinum Toxin Program for Movement Disorders, MR-guided Focused Ultrasound for Essential Tremor

The AdventHealth Neuroscience Institute continues to pursue and implement new technologies and treatments to improve the quality of life and clinical outcomes for neurological patients.

Deep Brain Stimulation

Deep brain stimulation (DBS) is now a standard-of-care treatment option for patients with advanced Parkinson's disease (PD), essential tremor (ET) and generalized dystonia. A lead is surgically implanted in the subthalamic nucleus (STN) or the internal segment of the Globus pallidus (GPi) for PD and in the thalamus for ET, using image-guided stereotactic techniques in the awake patient. Leading DBS mechanism researchers postulate that the chronic delivery of high-frequency electrical pulses modulates disease-induced pathological neural activity, both at the site of stimulation and across the sensorimotor basal ganglia thalamocortical (BGTC) circuit. Notably, clinical outcome is dependent upon precise lead localization (millimeter-scale), and targeting inaccuracies often limit therapeutic benefit due to insufficient coverage of the target region itself and/or the development of stimulation-induced sensorimotor (e.g., paresthesia, muscle contractions) or non-motor (e.g., cognitive, affective) side-effects.

At AdventHealth, we employ advanced techniques, including stereotactic brain imaging and brain mapping, to precisely place the DBS lead at the desired target for the patient. We also take great care in selecting movement disorder patients for DBS surgery. Pre-operative steps include neuropsychological testing, physical therapy evaluation, brain magnetic resonance imaging (MRI), medical clearance, off/on medications responses, videotaping patient movements at baseline, and team discussion for patient selection.

After selection, patients undergo DBS surgery with a highly trained neurosurgeon (Chandan Reddy, MD) at the AdventHealth Celebration campus. Successful surgery requires the following steps: anatomical localization, physiological localization, implantation of a DBS lead, and pulse generator (general anesthesia-stage II). Pre- and post-operatively, the patient also meets a movement disorder neurologist (Anwar Ahmed, MD) at AdventHealth in Winter Park. Postoperative DBS care typically involves careful chronic programming and medication adjustment.

Normal Pressure Hydrocephalus (NPH) Program

Through our Normal Pressure Hydrocephalus (NPH) Program, we screen patients with gait difficulty who have additional symptoms of memory loss and urinary control problems. Through comprehensive evaluation, patients are selected to undergo surgical intervention (ventriculoperitoneal shunt placement) by our team of providers, including a movement disorder neurologist, neurosurgeon and neuropsychologist. Patients undergo an inpatient spinal drain trial and physical therapy evaluation before proceeding for brain shunt placement.

Botox Program for Movement Disorders

Our botulinum toxin (Botox) program for movement disorders program offers treatment for a variety of movement disorders using electromyography (EMG)-guided procedures. Patients with tremors involving certain parts of the body may also gain benefit from Botox injection. In addition, Botox can also be injected for other indications such as spasticity and hypersalivation.

MR-guided Focused Ultrasound for Essential Tremor

Currently FDA-approved for essential tremor (or tremor predominant Parkinson's), MR-guided focused ultrasound (MRgFUS) for tremor is a method to lesion the brain without brain surgery. Concentrated focused ultrasound heats up a specific target under MRI guidance where you can see the brain heating in real time. The target is > 60 degrees Celsius for a permanent lesion and 50 degrees Celsius for a test lesion. This creates a small lacunar infarct. MRgFUS also opens up the blood brain barrier for the delivery of novel drugs, and this method could be used to improve the therapeutic effect of drugs at the target.

Melvin Field, MD
Medical Director, Minimally Invasive Brain Surgery
AdventHealth
Neuroscience Institute

Minimally Invasive Brain Surgery Program Studies the Long-term Recurrence Rates After Undergoing Endoscopic Endonasal Pituitary Tumor Surgery

Pituitary tumors are one of the more common benign tumors of the skull base, representing between 10-15% of all intracranial tumors requiring medical attention. Although found incidentally in most people, with growth, they can cause visual loss, diplopia, and hormonal hyper or hyposecretion.

Since the mid 1990's, endoscopic pituitary surgery has continued to gain widespread acceptance as the preferred method for removing tumors of pituitary origin. Today, most pituitary centers around the world consider endoscopic pituitary surgery the gold-standard in the management of surgical pituitary tumor disease. Prior to the endoscopic endonasal pituitary tumor revolution, microscopic transsphenoidal transseptal or sublabial approaches were generally performed. Depending on the study, recurrence rates vary between 12-40% with these traditional techniques. Currently, thousands of publications, abstracts, and presentations around the world have argued the value of endoscopic pituitary surgery, but very few discuss the long-term outcomes of the approach. Previous studies have identified factors associated with recurrence such as Knosp Score, subtotal resection, pre-operative visual loss, and tumor invasion beyond the sella, but in spite of the popularity and seemingly universal acceptance for this approach, very little exists regarding the long-term durability of the procedure.

The minimally invasive brain surgery team at Advent Health Orlando has been performing the Endoscopic Endonasal Approach (EEA) for Pituitary Tumors since 2003. Each year we assess hundreds of pituitary tumor patients through the program and utilize a multidisciplinary approach in their management in conjunction with neurosurgery, endocrinology, otolaryngology, radiation oncology, and interventional neuroradiology. In an attempt to understand the long-term outcomes and recurrence rates via the endoscopic endonasal approach, we recently reviewed our results in patients with at least 4 years of follow-up and compared them to the long-term results of those who had undergone traditional approaches from the published literature. Our results were presented at the 9th World Conference of NeuroEndoscopy.

Methods

Indications for surgery included visual compromise due to chiasmal/optic nerve compression, hormonally active tumor not amendable to medical therapy, or documented growth with pre-existing chiasmal compression in an otherwise healthy individual. A total of 300 patients were included in the study. All surgeries were done with a Neurosurgical-Otolaryngological team and included a pre-operative Navigation Protocol magnetic resonance imaging (MRI) and computerized tomography (CT) through the sella and skull base. For cases involving recurrent or multicystic/lobular disease, intraoperative MRI was also utilized. Seventeen percent of patients in the study had prior surgery, and 16% of patients had symptomatic secretory tumors. Ninety-four percent of the tumors in our series were macroadenomas, and 26% had radiographic evidence of cavernous sinus involvement. Our routine postoperative imaging protocol included a MRI pituitary with and without gadolinium contrast medium (Gad) on postoperative day 1 and then 3 months postoperatively, 1 year, 2 years, 4 years, and 8 years after surgery.

Results

With an average follow-up of 8.79 years (range: 48-189 months), 20 (6.67%) patients developed recurrent disease. The average time to recurrence was 49.25 months (range: 3-90 months). Twelve patients required additional treatment for tumor recurrence (4%) with 2 undergoing re-exploration EEA, 5 Gamma Knife Radiosurgery, 2 open craniotomy due to recurrent disease lateral to the internal carotid artery, 1 fractionated XRT, and 2 medicinal suppressive therapy. Of the 20 recurrences observed during the study period, 7 (35%) involved hypersecretory tumors and 4 (20%) involved previously recurrent tumors. Nineteen (95%) of the recurrent tumors in our series were initially macroadenomas.

Recurrent/Progressive Disease with > 4 Year's Follow-up

Hypersecretory Disease	**History of Previous Surgery**
ACTH — 2/10 — 80% PFS	4/51 — 92% PFS
GH — 4/30 — 85% PFS	**No History of Previous Surgery**
PRL — 1/8 — 87.5% PFS	16/249 — 94% PFS
Macroadenomas	**Microadenomas**
19/283 — 93% PFS	1/17 — 94% PFS

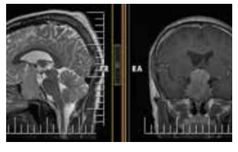
Figure 1. Progression Free Survival in patients undergoing EEA based on preoperative tumor type with greater than 4 years of follow-up from time of surgery

Conclusions

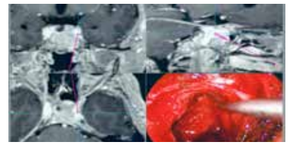
- Less than 7% of patients undergoing EEA for pituitary adenomas with > 4 years of follow-up develop tumor recurrence.
- Four percent of patients undergoing EEA for pituitary adenomas with > 4 years of follow-up require some form of additional treatment for recurrent disease.
- Fourteen percent of patients with symptomatic secretory adenomas undergoing EEA with > 4 years of follow-up develop tumor recurrence.
- Previous tumor resection does not predict recurrence when undergoing EEA.
- Tumor recurrence can be seen as early as 3 months after surgery but may occur over 7 years from the time of surgery as well.
- In our study, patients undergoing EEA for pituitary tumors had significantly lower tumor recurrence rate in comparison to the 29.1% long-term tumor recurrence rate cited in literature for transsphenoidal hypophysectomy ($\chi2(1)=4.08$, $p < 0.05$).

In summary, the Endoscopic Endonasal Approach is safe and effective as a primary neurosurgical treatment for surgical pituitary disease. Long-term follow-up suggests a low recurrence rate when compared to other treatment modalities. The risk of complication was also very low in our series when compared to other treatment options. This is one of the largest series to date looking at the long-term outcomes while utilizing this approach, and our data suggests that the EEA should be considered as the gold-standard for the surgical management of pituitary tumors.

Melvin Field, MD *(Neurosurgery) and* **Brian Spector, MD** *(Otolaryngology) working together during a routine Endoscopic Endonasal Pituitary Tumor resection*



Routine image of a pituitary macroadenoma amendable to the Endoscopic Endonasal Approach



An example of Image-guided Neuronavigation being used intraoperatively during an Endoscopic Endonasal Approach to confirm regional anatomy and lateral extent of tumor resection

Nivedita Jerath, MD, MS
Medical Director, Neuromuscular Medicine
AdventHealth Neuroscience Institute

AdventHealth's Neuromuscular Clinic Grows and Achieves National Recognition

Established in 2019, AdventHealth's Neuromuscular Clinic provides comprehensive, multi-disciplinary care, with electro-diagnostic and genetic testing for patients with amyotrophic lateral sclerosis (ALS), Charcot-Marie-Tooth disease (CMT), spinal muscular atrophy (SMA) and other neuromuscular conditions. The neuromuscular team is also currently conducting a number of hereditary neuropathy research projects, including clinical trials for CMT and chronic inflammatory demyelinating polyneuropathy (CIDP), and recently achieved key recognition and certification from two important partner organizations:

- Named a **Center of Excellence (COE) by the Hereditary Neuropathy Foundation** (HNF) for providing excellence in clinical care and research and collaborating with the HNF to serve as a patient community hub for clinical care, community engagement, research and training/education

- Named a **Certified Clinic by the ALS Association** for providing specialized care based on best practices

In addition, Neuromuscular Division Director Nivedita Jerath, MD, speaks throughout the country and serves as a national medical expert advisor for the **Periodic Paralysis Association**, a non-profit organization founded to foster awareness of periodic paralyses, promote science-based information regarding this class of disorder, and champion the interests of the periodic paralysis community.

The AdventHealth Neuromuscular Clinic currently serves patients from more than 22 states across the country, and in early 2021, plans to host its first "Movement is Medicine" conference in partnership with the HNF. This conference will bring together patients with hereditary neuropathies (CMT) and focus on the importance and fun of exercise while fostering new friendships and creating positive energy to promote healing. It will also be a time to celebrate the HNF Center of Excellence designation.

From left to right: Laura Patrick, PT; Jeannie Macaluso; Carlos Hernandez; Nivedita Jerath, MD, MS; Allison Moore; Ashley Hayden; and Craig Brubaker

From left to right: Carlos Bara, R.NCS.T; Amber Parkins, OT; Laura Patrick, PT; Nivedita Jerath, MD, MS; Samantha Purlee, LPN; Laura Russell, LSW, and behind both Samantha and Laura is Rebekah Wright (patient access coordinator)

Glenn Kolluri, MD
Neurologist
AdventHealth Neuroscience Institute

Taking a Proactive Lifestyle Approach to Promoting Brain Health: The Quest for Achieving Neurogenesis and Synaptogenesis

It was once believed that the nervous system was fixed and incapable of regeneration after embryonic development. However, over the last two decades, the concepts of ongoing neurogenisis (growing new neurons) and synpatogenesis (the formation of synapses between neurons in the nervous system) throughout life have emerged as critical developments in the field of neurology.

Too often, we are treating patients in rescue mode after they are already experiencing a neurological crisis such as stroke. Our focus as neurologists is on reducing the brain from further injury with medication and other interventions. Once the rescue is over and the patient is recovering, we focus on repair. In this phase, we use a variety of therapeutics, including medication or surgery, to help restore the patient's quality of life. We hope to generate neurogenisis and/or synaptogeneis, but we are rarely ever able to truly cure the neurological disease. This leaves us with a focus on disease management and limiting the amount of neurological damage.

In contrast to this pattern of rescue and repair, many within the field of neurology are starting to focus more on prevention and steps that can be taken to proactively promote brain health and avert neurological crisis events. Building a better brain begins with building a better biology. However, before we can build a better biology, we must first remove the insults to our patients' biology. There are a number of lifestyle modifications that healthcare professionals can proactively promote to patients that will improve overall and neurological health. Intertwining this education into the care that we provide as clinicians is part of keeping our patient at the center of everything we do. Creating a high-quality, connected neurology network is the first step in ensuring that patients leave the hospital with timely and appropriate follow-up care in the outpatient setting. This is not always easy, and we need to arm patients with the education on why this is important.

At the AdventHealth Neuroscience Institute, we are continually modifying processes and ways in which patients can best be connected and navigated across the neurological continuum. We remain committed to not only providing groundbreaking treatments and customized care for patients in neurological crisis, but also to proactively promoting neurological health, education, and disease prevention.

Roland Torres, MD
Neurosurgeon
AdventHealth Neuroscience Institute

Coagulopathy and Bleeding Progression After Isolated Blunt Head Injury

Traumatic Brain Injury (TBI) is a major cause of morbidity and mortality. It is responsible for more than half of the approximately 100,000 trauma-related deaths a year in the United States. The incidence of coagulopathy in TBI is considered high but varies significantly between studies, from 10% to 97.2%, depending on study designs and definitions for coagulopathy used. Coagulopathy is independently associated with in-hospital mortality in patients with severe TBI. The association between the presence of coagulopathy and progression of traumatic hemorrhagic brain lesions after the initial injury has been described by many authors, but the severity of coagulopathy that is clinically significant has not been specified.

The goal of this study is to describe the frequency and severity of coagulation disorders in patients with isolated, moderate-to-critical traumatic blunt brain injury treated in a Level I trauma center, determine the severity of coagulopathy that has clinical significance, and assess management of the modifiable factors associated with coagulopathy. This will also help us to understand how to improve the natural history of ongoing bleeding and progressive neurological deterioration.

Methods

This is a retrospective review of data collected prospectively in a hospital trauma registry. We reviewed the records of 153 consecutive, admitted patients, who had isolated, moderate-to-severe blunt head injuries (Glasgow coma score [GCS] ≤ 12, who had an abbreviated injury score [AIS] ≥2, and who had an extracranial AIS sum ≤ 2) but had no preexisting coagulopathies or a history of anticoagulant therapy. Coagulopathy was defined as an elevated International Normalized Ratio [INR] ≥1.3 or partial tromboplastin time [PTT] >35 seconds. The degree of coagulopathy was considered mild if INR or PTT was over upper laboratory norm [ULN] to 1.5 ULN, moderate when INR or PTT was from 1.5 ULN to 2 ULN, and severe if INR or PTT was over 2 ULN.

Results

We found that 21 of 153 patients (14%) had coagulopathy on admission, and 48 of 153 (31.4%) had it by day three of hospitalization. Among them, 35 (22.9%) developed a mild coagulopathy, and 13 (8.5%) had a moderate or severe coagulopathy. Hematocrit values were used as an indirect indicator of hemodilution. Among patients with increased INR, PT or PTT, median hematocrit at admission was significantly lower than in patients who did not have coagulopathy (31.3 s., interquartile range [IQR] 25.8-36.8 vs. 41.3 s., IQR 38.1-44.5). Hematocrit was the factor that most strongly associated with INR increase. In addition, there was a moderate correlation of INR with severity of injury (ISS and AIS). Tables 1 and 2 show the relationship between the presence of coagulopathy and outcome, analyzed as dichotomized variable with GOS scores of 4 to 5 representing "good" neurological outcome, and scores of 1 to 3 representing "poor" outcome.

Table 1. Outcome in patients with intracranial bleeding who had coagulopathy at arrival

Outcome	INR < 1.3	1.3 ≤ INR ≤ 1.5	INR > 1.5	Total
Poor	22.6% (14)	60.0% (6)	80.0% (4)	31.2% (24)
Good	77.4% (48)	40.0% (4)	20.0% (1*)	68.8% (53)

*This patient had INR reduced to 1.4 within 10 hours after admission.N=77, coagulation tests for 2 other patients had not been performed at arrival. Kruskal-Wallis test p=0.0001

Table 2. Outcome in patients with intracranial bleeding who had coagulopathy during the first 3 days of hospitalization

Outcome	INR < 1.3	1.3 ≤ INR ≤ 1.5	INR > 1.5	Total
Poor	15.0% (6)	33.3% (9)	83.3% (10)	31.6% (25)
Good	87.2% (34)	66.7% (18)	16.7% (2)	69.2% (54)

N= 79, Kruskal-Wallis test p=0.0001

Finally, we examined other factors possibly associated with clinical outcome and found that the median time from emergency department (ED) arrival to start of plasma transfusion in the patients who had coagulopathy on admission and survived was shorter than in those who died (95 min, IQR 70-120 vs. 150 min, IQR 110-210).

Discussion

Our data demonstrate that decreased hematocrit is the factor that most strongly correlates with severity of coagulopathy in patients with isolated blunt head injury. Hematocrit level in trauma settings reflects severity of blood loss and/or hemodilution. Our study also showed that timely replenishment of consumed and lost coagulation factors is of high importance in treatment of post-traumatic coagulopathy in patients with blunt head injuries. Our data, demonstrating the clinical significance of even a mild coagulopathy in patients with intracranial bleeding, is strong evidence for a more aggressive coagulation factor replacement strategy beginning immediately on arrival.

Conclusion

Overall, our study demonstrates that low hematocrit, reflecting amount of blood loss and hemodilution, correlates stronger than severity of injury with INR in patients with isolated blunt head injury, and even mild prolongation of coagulation tests results predicts the occurrence of delayed bleeding in the patients who already bleed. Earlier coagulopathy diagnostics and a more aggressive coagulation factors replacement strategy may lead to improved outcomes in patients with intracranial bleeding after trauma.

Bernadette Nazario-Lopez, MD
Headache Medicine Medical Director, AdventHealth Neuroscience Institute

Migraine Treatment Update: Four New Medications Approved by FDA

Founded in 2019 and led by a board-certified neurologist, who is also board-certified in headache medicine by the United Council of Neurologic Subspecialties, our Headache Clinic specializes in evaluating and treating a wide variety of headaches, including migraines, with a focus on both easing pain and symptoms as well as preventing recurrence. Migraines can be especially debilitating for patients, with some episodes lasting for hours or even days, and our team continuously stays on top of the latest science to identify new safe and effective treatment methods that will provide our patients improved relief and a better quality of life. We are excited to report that within the last year, four new migraine medications have been approved by the U.S. Food & Drug Administration (FDA):

VYEPTI™

Vyepti™ (eptinezumab) is the first IV treatment approved for the preventive treatment of episodic and chronic migraine in adults. It is part of a newer class of drugs called CGRP (calcitonin gene-related peptide) monoclonal antibody (mAbs) treatments. During a migraine attack, the cerebral nerves and blood vessels release substances, including CGRP which is a neuropeptide. Eptinezumab is a humanized monoclonal antibody that binds to CGRP ligand and blocks its binding to the receptor. Patients receive the medication through a 30-minute IV infusion every 3 months either at a 100 mg or 300 mg dose. Eptinezumab was evaluated through two Phase III clinical trials. These studies found that more people were migraine-free for 7 days after their first IV infusion with eptinezumab compared to placebo. The main distinguishing characteristic of eptinezumab is that we can observe clinical results from day one. In the PROMISE-2 trial, 50.3% of patients on the 100 mg dose experienced a reduction in migraines in comparison to 27.1% of patients on placebo. In addition, 57.6% of people with chronic migraine treated with eptinezumab 100 mg had ≥ 50% reduction in their migraine days, compared to 39.3% with placebo. This drug provides migraine patients, especially those with chronic migraine, a new treatment option, particularly if they are unable to tolerate some of the other injectable preventive medications that are available. Eptinezumab is well tolerated with nasopharyngitis as the most common side effect.

UBRELVY®

Ubrelvy® (ubrogepant) is an oral, non-narcotic medication, available in 50 mg and 100 mg tablet form, for the acute treatment of migraine with or without aura in adults. It is the first drug in the class of oral CGRP antagonists called gepants, which work to block CGRP from attaching to its receptor and initiating pain signals. Gepants are small molecule CGRP receptor antagonists, whereas preventive CGRP monoclonal antibodies, like eptinezumab, are large molecules. For more than 20 years prior to the approval of ubrogepant, triptans were the primary medications used to treat acute migraine, but they come with limitations, including cardiovascular contraindications. In addition, some patients taking triptans experience reduced effectiveness over time. Gepants are not contraindicated in patients with history of cardiovascular disease. Ubrogepant's effectiveness for the acute treatment of migraine was demonstrated in two randomized, double-blind, placebo-controlled trials. In the ACHIEVE II trial, which included 1,686 participants, rates of pain freedom at 2 hours were significantly greater with ubrogepant 50 mg dose (21.8% responders) in comparison to placebo (14.3% responders). A similar pattern was observed in pain relief at 2 hours: ubrogepant 50 mg (62.7% responders) versus placebo (48.2% responders). Ubrogepant is also well tolerated with a low side-effect profile. The most common adverse reactions are mild nausea, dry mouth, and somnolence. Ubrogepant is contraindicated with co-administration of strong CYP3A4 inhibitors, and it is metabolized via the liver so appropriate considerations and dosage adjustments must be made.

NURTEC ODT™

NURTEC ODT™ (rimegepant) is the second gepant recently approved by the FDA for treatment of acute migraine with or without aura in adults. It is a 75 mg, orally-dissolving tablet that blocks CGRP receptors. The safety and efficacy of this drug was evaluated in one clinical trial of 1,351 patients with migraine headache. Its benefit was determined based on both the percentage of patients who became pain-free within 2 hours compared to placebo as well as elimination of patients' most bothersome migraine symptom within 2 hours of taking the drug. The results of this trial were similar to those obtained with ubrogepant. In comparison to placebo, 21.2% of the participants on rimegepant were pain free at 2 hours versus 10.9% on placebo. Rimegepant should be taken immediately when a migraine starts but can also be effective if taken up to 4 hours later. The most common reported side effect is nausea. Like ubrogepant, it is metabolized by CYP3A4. It is contraindicated with co-administration of strong CYP3A4 inhibitors.

REYVOW®

The FDA also approved Reyvow® (lasmiditan) within the last year, and it is the first migraine treatment in the class called ditans. This class of drugs are serotonin (5-HT) 1F receptor agonists. Available in 50 mg, 100 mg and 200 mg tablets, lasmiditan works similar to a triptan, but is not contraindicated in cardiovascular conditions. Its efficacy for the acute treatment of migraine was demonstrated in 2 randomized, double-blind, placebo-controlled, single-attack trials of 4,439 patients who took 50-mg, 100-mg, or 200-mg doses of lasmiditan or placebo. Researchers found that it could relieve pain and other migraine symptoms within 2 hours. In the SPARTAN trial, responder rate for pain relief in 2 hours was significantly higher in the lasmiditan groups vs placebo: 56% (50 mg dose), 61% (100 mg dose), 61% (200 mg dose), and 45% (placebo group). Treatment emergent adverse events were generally mild to moderate, and the most frequent included dizziness, fatigue, paresthesia, sedation, nausea and/or vomiting, and muscle weakness. It is important to mention that lasmiditan can cause significant driving impairment. Patients who use lasmiditan are advised not to drive or engage in potentially hazardous activities for at least 8 hours after taking it. Lasmiditan is a non-opioid/non-narcotic, Schedule V medication that has low abuse potential and no evidence of physical dependence.

The AdventHealth Neuroscience Institute Headache Clinic remains dedicated to continually identifying and implementing new effective treatment options that will improve the care provided to our patients. While our most recent efforts have focused on outpatient care, we are also currently working on the development of both ER and inpatient clinical protocols for the treatment of headaches.

Ravi Gandhi, MD
Neurovascular Medical Director AdventHealth Neuroscience Institute

Endovascular Neurosurgery Update: Management of Chronic Subdermal Hematoma Through Endovascular Therapy

Endovascular neurosurgery (interventional neuroradiology) is a field that began in the 1960s as practitioners searched for better, less invasive solutions for existing problems. The desire to improve care for neurosurgical patients has led to many innovations. Now, we present a scenario to apply this technology to an age-old problem.

Chronic subdural hematoma (cSDH) is a disease process that is increasing in prevalence every year with the aging population and increasing use of anticoagulation and antiplatelet medications. It is estimated that by 2030, there will be 60,000 new cases of cSDH per year. The patients have varying presentations and outcomes after traditional treatment. Common symptoms include cognitive decline, headache, focal weakness, gait difficulties, and seizures. The one-year mortality rates are estimated at 30%.

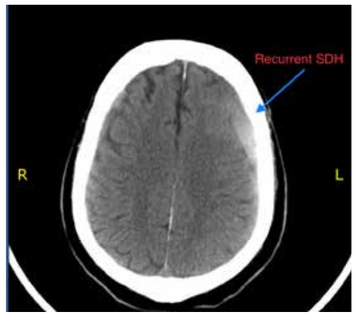
The conventional management of cSDH range from conservative management to open craniotomy for surgical evacuation. The management strategy is dependent on patient-specific factors such as the symptoms, medical co-morbidities, and size and location of the hematoma. Patients with larger cSDH and debilitating symptoms are best suited for surgical evacuation.

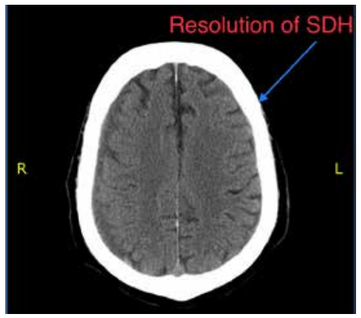
Surgical outcomes tend to be favorable. However, a current obstacle is the tendency for recurrence. The quoted rates of recurrence fall between 10-20%, with a smaller percentage resulting in symptoms. Surgeons have tried various methods to decrease recurrence such as removal of chronic membranes, aggressive irrigation, and many other anecdotal solutions. None of these have been proven consistently successful. This disease process includes a cascade of inflammation that leads to angiogenesis and leaking blood vessels. This feedback loop leads to accumulation and mass effect that results in the symptoms.

Endovascular therapy has been applied via embolization of the middle meningeal artery (MMA). This artery runs along the dura, outside of the brain parenchyma. Through a small puncture in the femoral artery, a catheter is guided into the MMA, and polyvinyl alcohol (PVA) particles or Onyx liquid embolic is used to occlude the artery. The occlusion of this vascular supply is safe and effectively stops the inflammatory-to-angiogenesis-to-leaky-vessels cycle.

Endovascular therapy for chronic subdural hematoma has been applied as a primary therapy or as an adjunct to surgery. There have been published case series and one report with historical controls. Ban et al. reported 98.6% success in embolization patients compared to 72.5% in the control arm. There is an ongoing randomized clinical trial comparing traditional surgical and conservative treatment versus middle meningeal embolization. The obvious benefits of MMA embolization in this patient population include the ability to reinstitute anticoagulation and antiplatelet medications.

Our experience at AdventHealth has mimicked that published in the literature. Middle meningeal artery embolization is a valuable asset in the armamentarium of management for this large patient population.





George Simon, MD, Named Executive Director of Moffitt Cancer Center-AdventHealth Joint Clinical Research Unit

George Simon, MD, joins Moffitt Cancer Center and AdventHealth as executive medical director of the joint Moffit Cancer Center-AdventHealth clinical research unit in Celebration. This new facility provides access to the latest in cancer treatments through cutting-edge research as well as access to investigational early phase clinical trials for Central Florida patients. It is part of a larger partnership between Moffitt and AdventHealth focused on enhancing both institutions' ability to deliver the highest quality cancer care to patients.

Dr. Simon brings more than 20 years of clinical oncology translational research experience to this new role. Most recently, he served as section chief of translational research in the Department of Thoracic/Head and Neck Medical Oncology at MD Anderson Cancer Center in Houston. Additionally, he served as medical director of the MD Anderson Cancer Network. He has also held director level positions at Hollings Cancer Center in Charleston, South Carolina, and Fox Chase Cancer Center in Philadelphia. Prior to that, Dr. Simon was a faculty member at Moffitt from 2000 to 2008 as director of mesothelioma research and a member of the Department of Thoracic Oncology.

Cory Hartman, MD
Neurosurgeon
AdventHealth
Neuroscience Institute

Preoperative Optimization for Patients Undergoing Elective Lumbar Spinal Fusion

As the cost of health care continues to climb, it is imperative that physicians lead the campaign to improve patient outcomes while providing high-quality, cost-effective care. For the first time, the AdventHealth Spine Governance Committee brought together physicians from multiple specialties to address pre-operative optimization criteria for patients undergoing elective lumbar fusion surgery. This included physicians from neurosurgery, orthopedic spine surgery, and pain management as well as our colleagues in the rehabilitation field.

First, a thorough literature review on patient risk factors and complication rates in elective lumbar fusion surgery was conducted. Then the committee voted to create a worksheet containing five criteria that a patient must meet prior to undergoing elective lumbar fusion. Those criteria include levels of obesity, malnutrition, diabetes, anemia and smoking status (Figure 1).

Obesity: It has been shown that obese patients report worse outcomes with higher complication rates and patient-reported outcomes. Longer operative times in obese patients also lead to higher risks for the patient. Weight loss programs not only help to curb the complication rates, they also can help patients with other obese-related medical conditions such as hypertension and diabetes.

Malnutrition: Poor nutritional status may lead to higher surgical site infections and other wound-related complications. Studies have shown low pre-albumin levels increase the rate of complications following lumbar surgery. Nutrition programs and protein supplementation are low-cost interventions that can lead to reduced complications.

Diabetes: Hyperglycemia is an independent risk factor for increased complication rates following spinal surgery. Glycated hemoglobin (A1C) is a marker for blood glucose control over two to three months. Improving a patient's long-term blood glucose control will help decrease complication rates from surgery and other end-stage organ injury secondary to hyperglycemia.

Anemia: Perioperative morbidity and mortality are increased in patients with preoperative anemia. Treating pre-operative anemia can potentially avoid blood transfusion and its associated risks in the perioperative period.

Smoking: Smoking is another independent risk factor for increased perioperative complications. It prevents wound healing, spinal fusion, and the ability to fight infections. Providing patients with resources to help them quit smoking can decrease the deleterious effects of smoking and improve the healthcare system.

Looking Ahead

As we strive to improve the quality of care we provide, we will continue to review literature and add further criteria to our current list. This is our starting point to bring physicians from multiple groups and demographics together for a common goal: provide high-quality, cost-effective care for our patients.

Figure 1: Thoracolumbar Fusion: Surgical Optimization Form

Optimization Criteria	N/A	Optimized	Non - Optimized
Obesity	☐ BMI <30	☐ BMI 30 – 39.9 (weight loss recommended)	☐ BMI > 40
Malnutrition	☐ Pre-albumin > 20mg/dl	☐ Pre-albumin < 20mg/dl with nutrition enhancement Initiated	☐ Pre-albumin < 20mg/dl
Diabetes	☐ Non-diabetic	☐ HgbA1C < 7.5	☐ HgbA1C >= 7.5
Anemia	☐ Male: Hgb <13 gm/dl ☐ Female: Hgb < 12gm/dl	Chronic anemia medically treated and optimized ☐ Male: Hgb <13 gm/dl ☐ Female: Hgb < 12gm/dl	☐ Male: Hgb < 13 gm/dl ☐ Female: Hgb < 12gm/dl
Smoking	☐ Non-smoker	☐ Quit Smoking	☐ Continues to Smoke

Okorie Nduka Okorie, MD
Neurocritical Care Fellowship Director
AdventHealth
Neuroscience Institute

Inter-professional Education for Collaborative Practice

Approved by the United Council for Neurologic Subspecialties (UCNS) in 2019 and one of only four such programs in the state of Florida, AdventHealth's Neurocritical Care Fellowship welcomed its first group of fellows in July 2020. With a multi-disciplinary faculty of neurointensivists, vascular neurologists, epileptologists, neurosurgeons, and critical care physicians, the program is not only training its fellows to care for patients with a wide variety of life-threatening neurological and neurosurgical conditions, it is also fostering inter-professional collaboration, education, and development amongst the entire AdventHealth Neuroscience Institute (NSI) team.

The fellowship program's guiding philosophy is that inter-professional education is the foundation for competent collaborative care teams. Essentially, learning together, gaining new competencies together, and practicing together will enhance overall patient outcomes. Everyone on the team comes from different perspectives and can learn about and from each other, collectively growing the group's overall competence and strengthening the focus on patient- and family-centered neuroscience care.

The fellowship program features a series of interdisciplinary lectures attended by both faculty and fellows, and the use of Microsoft Teams technology has made these educational opportunities accessible to a wider audience of NSI physicians and nurses across the AdventHealth system. In addition, the fellowship program runs the Emergency Neurological Life Support (ENLS) course, a two-day, internationally accredited course designed to help healthcare professionals improve patient care and outcomes during the critical first hours of a patient's neurological emergency. The course covers interdisciplinary protocols, checklists, decision points and communication strategies.

Future plans for the Neurocritical Care Fellowship program include engaging the Fellows in patient care audits and additional quality improvement-oriented research.

For more information or to apply for the Neurocritical Care Fellowship, contact Fellowship Director Okorie Nduka Okorie, MD, at okorie.okorie.md@adventhealth.com.

Jose Garcia-Guerra, MD
Neurovascular Medical Neurologist
AdventHealth Medical Group Neurology at Palm Coast

Secondary Stroke Prevention in the Community

An estimated 795,000 Americans experience a new or recurrent stroke each year. From streamlined emergency room protocols, expedited diagnostics, and neurological care pathways to dedicated "tele-stroke" physicians who are readily available via telemedicine, the AdventHealth Neuroscience Institute (NSI) has worked hard to improve outcomes for stroke patients. To complement these efforts, our community neurologists are enhancing the continuity of care provided to these patients upon discharge to help address recurring issues and prevent secondary stroke.

Patients who suffer a stroke are often overwhelmed once they are discharged from the hospital. In addition to any new challenges they may have as a result of the stroke, most are also faced with chronic diseases such as hypertension, diabetes, obesity, or obstructive sleep apnea that require an ongoing, coordinated care plan. AdventHealth's community neurologists partner with post-stroke patients to identify how chronic conditions are impacting their health and to develop a customized care plan to improve it and prevent another stroke. These physicians serve as a primary point of contact for each patient, providing them not only medical care, but also hope, encouragement, and a second chance.

Our team of community neurologists stays current on the latest research and developments in stroke prevention and post-stroke care, incorporating these findings into individualized, evidence-based care plans. Specific services provided include the following:

- Perform additional diagnostics as needed as well as ongoing health monitoring
- Supervise medical care and use of drug therapies
- Educate patients to make necessary lifestyle interventions such as exercise, smoking cessation, and diet improvements
- Coordinate care with the patient's other medical providers such as primary care, cardiology, and endocrinology
- Help patients navigate the healthcare system, including follow-up appointments and access to community resources
- Empower patients with the knowledge and confidence to take charge of their health

After suffering a stroke, the risks for experiencing another stroke are significantly increased. The AdventHealth NSI believes preventing secondary stroke through a strong network of patient-focused, community-based neurological care is a critical piece of its comprehensive stroke program.

Federico Vinas, MD
Neurosurgeon
AdventHealth
Neuroscience Institute

Cervical Artificial Discs Provide Alternative to Cervical Spinal Fusion for Some Patients

For many years, cervical spinal fusion was the only option for patients undergoing a discectomy to address unresolved pain, muscle spasms, numbness, or inflammation due to cervical disc disease. While still considered a safe, effective option today, spinal fusion reduces range of motion and can also lead to adjacent level disease, resulting in degeneration in the discs immediately above and below the one that was removed and causing the need for additional surgery down the road. Performed in Europe for over 25 years, artificial cervical disc replacement has emerged as another surgical option for some patients. It provides the same pain relief as spinal fusion while protecting the patient's natural range of motion and helping to prevent disc degeneration in the adjacent discs.

Artificial cervical discs were developed to mimic the properties and biomechanical function of a healthy human disc. In 2007, the FDA approved the first artificial disc for use in the United States, and the implants have continued to evolve and improve over the past decade.

Who Can Benefit from Cervical Artificial Discs?

While a tremendous advancement, cervical artificial discs are not a valid surgical option for all patients. This approach primarily benefits younger patients (under age 60) with disc herniation without instability. Counter-indications for cervical artificial disc surgery include being over 60 years of age, osteoporosis, arthritis, bone spurs, deterioration in multiple discs, infection, and allergy to titanium.

Outcomes

Research has demonstrated that use of an artificial disc can improve radiculopathy or cervical pain as safely and effectively as cervical fusion while preserving spine mobility and range of motion. In addition, it does not require a bone graft, eliminating the risk of nonunion (the bone graft not fusing with the spine) and often resulting in a quicker recovery.

Care Navigation

Minimally Invasive Brain Surgery (MIBS)	407-303-7944	Parkinson's Outreach Center	407-303-5295
Spine Center	407-303-9102	Alzheimer's Disease & Dementia	407-392-9237
Epilepsy & MEG	407-303-7520	Normal Pressure Hydrocephalus	407-303-3282
Center for Sleep Disorders	407-303-1994		