Dear Members,

Thank you for opening up the Spring 2021 issue of the DSPN Newsletter. Although the AANS has been pushed to August, your Media team still wanted to get this out to you in the spring! There is great content within, including interviews with outgoing Section Chair Mike Steinmetz and the 2021 DSPN meritorious award recipients; a variety of committee updates; and superb educational pieces. We hope you are staying safe and look forward to seeing you in July in San Diego!

Sincerely,
Khoi D. Than, MD khoi.than@duke.edu

Interview with
Dr. Michael Steinmetz, Outgoing Spine Section Chair

What made you interested in spinal surgery? Were you influenced by any mentor or mentors?

Dr. Steinmetz: I have always been interested in construction and deconstruction, so to say. This interest carried into medical school and residency. I would say the most significant drive was meeting Dr. Benzel as a fourth-year student. He was (is) able to make you feel like the most significant person in the room. He is the reason I matched at the University of New Mexico and left with him to finish my training at the Cleveland Clinic. His focus and research in biomechanics made spine surgery intellectually challenging and fun. He was not only a mentor, but someone I wanted to emulate professionally.

What, in your opinion, makes a good mentor?

Dr. Steinmetz: Interest and availability. A good mentor takes the time and interest in their mentee. They should provide encouragement, support and advice. As neurosurgery is a tough job, they at times must also be a counselor. The mentor should also work to advance their mentee, encourage academic work, suggest them for publication, committee presentations, etc.

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Interview with Dr. Steinmetz

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As the Chairman of Neurological Surgery at the Cleveland Clinic, what is your vision for your department?

Dr. Steinmetz: We continue to grow programmatically. I have worked to continue to bolster our existing programs and expand into new areas. I am excited to announce we have recently recruited a peripheral nerve neurosurgeon. She will work with plastics and orthopedic surgery to create a world-class program. Further, I am hiring physician scientists. We have always had very strong research programs, but only a few were actually lead by neurosurgeons. Our most recent neurosurgeon recruits include physician scientists in cerebrovascular, peripheral nerve, oncology and epilepsy. All will perform translational science while maintaining a clinical practice in neurosurgery.

How do you balance the demanding responsibilities of being a chairman, your clinical practice, and being a leader in national organizations such as the Spine Section?

Dr. Steinmetz: This is something I have not mastered. Time is our most precious commodity and there is unfortunately not enough of it. Unfortunately, these activities erode into evenings and weekends. I try to include my family into travel when possible and always try to minimize meetings during “family time.” Some barriers need to be set and I always try to never violate them. I am always trying to be a better manager of my time. I look to my mentor, Ed Benzel. He empties his inbox every day. I have tried to live this way as well, however, I fail most days.

How did the Covid-19 pandemic impact clinical and non-clinical operations at your department and what adjustments did you pursue?

Dr. Steinmetz: We were already conducting a large number of virtual visits. We were able to pivot to all virtually very efficiently. We were already using the platform and all providers were used to the process. Cleveland Clinic Foundation shut down surgical services outside of emergencies. We had to triage our cases and most neurosurgery was able to move forward. We performed some spine surgery, but really cut back. During those days, we were really worried about waste of personal protective equipment. We kept our residents at home and out of the hospital. As regulations lightened up, we returned to essentially near normal. We, at first, only operated on those with severe pain and/or disability.

What, in your opinion, were the major advancements in spinal surgery over the past decade and what is the future of spinal surgery?

Dr. Steinmetz: I think the oblique lateral interbody fusion (OLIF) has been an advance over the direct lateral approach for interbody fusion. As this procedure is merged with navigation, the procedure appears to be safer and more efficient in my hands. The use of image guidance is now significantly expanded especially with the use of intraoperative image acquisition. Many of our tools are now navigated and can totally eliminate the need for x-ray or fluoroscopy. Robotics are an exciting technology expanding in spine surgery. I think this will continue to expand. The robots will allow us to perform surgery safer and more efficiently. Lastly, exoscopes and augmented reality will allow us improved ergonomics and accuracy.

What advice do you have for residents interested in pursuing a career in spinal surgery?

Dr. Steinmetz: Associate with a high quality mentor. I would pursue spine research early, publish frequently. Present at as many meetings as you are able. I am still a strong advocate for a post-graduate spine fellowship. Enfolded fellowships are available, but I would only pursue as a PGY-7. Lastly, don’t focus only on surgery. The proper indications for spine surgery can only be learned in the outpatient setting.

Do you pursue any hobbies? What are they?

Dr. Steinmetz: I am an avid fly fisherman. I have fished throughout the United States and now in many countries.

Nominating Committee Update

Zoher Ghogawala, MD

The following slate of candidates was approved by unanimous consensus:

- Chair, 2021-2022 – Dom Coric
- Chair-Elect, 2021-2022 – Adam Kanter
- Secretary, 2021-2023 – Luis Tumialan
- Treasurer, 2021-2024 – Juan Uribe
An Interview with
Nicholas Theodore, MD
the 2021 Spine Section Meritorious Awardee

Ali A. Baaj, MD

Who were your mentors and role models that steered you towards a career in spinal neurosurgery?

Dr. Theodore: Volker Sonntag was my mentor in spinal surgery. He taught me about honesty and integrity, especially when dealing with complications. He was always thinking and receptive to trying new things. He was a great role model of the surgeon educator. He also taught me the importance of work-life balance. Ed Oldfield was also a mentor and taught me how to think critically about surgical problems and to “think before you cut.” Mark Hadley introduced me to better understanding and harnessing the medical literature as well as guiding me to my passion for spinal cord pathophysiology.

What are the major hurdles facing spinal neurosurgeons in the next 10-20 years?

Dr. Theodore: Spinal surgery is constantly being redefined. When I started residency, very few neurosurgeons were actually placing spinal instrumentation. Now, the most commonly performed procedures by neurosurgeons are spinal. With advancements in diagnosis, conservative interventions and surgical techniques, we need to focus on outcomes and demonstrating value for the care provided not just to the patient but to health systems and populations. The major hurdles for the next generation of spinal surgeons will be to better measure and improve our outcomes, personalize interventions for a given patient and further refine the technical aspect of the surgical encounter.

You’re a pioneer in spinal robotic technology. What is the one, unequivocal value in this technology and do you think it will become the standard of care?

Dr. Theodore: I was fortunate to train during a time when technology transformed the field of neurosurgery. The introduction and subsequent adoption of image-guided intracranial surgery forever transformed our field. While the adoption of this technology in spine has been slow, the advent of robotics and more user-friendly computer-assisted spinal surgery has created a groundswell and offers an opportunity to improve our outcomes by potentially making surgeries faster, safer and more accurate. While the adoption of any new technology in medicine always takes time, the unstoppable freight train of innovation will not go backwards. Image guidance and robotic surgery will become the standard of care in spinal surgery.

Do you think there should be a separate and distinct spinal surgery specialty with its own residency?

Dr. Theodore: The knowledge base in spinal surgery continues to expand rapidly and it seems inevitable that the field will one day become its own specialty. With work hour restrictions and the burgeoning of our knowledge in the fields of oncology, endovascular and functional neurosurgery as well as cerebrovascular diseases, it is naïve to think that any one person can become a jack of all trades. Despite the political ramifications and turf battles surrounding spinal care, I believe that future care in this field will be delivered by a specialist in spinal disorders.

How do you manage life-work balance and what tips do you have for junior colleagues?

Dr. Theodore: Work-life balance is a life-long process of learning. My family is the most important part of my life. As a spinal surgeon and academician, I love my profession but tend to work long hours and travel frequently to meetings. Spending as much time as you can with your family is the healthiest of outlets for a stressful life. Both of my sons are Eagle Scouts, and the time spent camping and trekking across the wilderness of Arizona over the years are some of the best bonding experiences ever. Going to games, coaching sports, and in our case traveling to rowing regattas has all been time happily spent as a family. Living for vacations has also been a way to carve out protected quality time. Planning for family getaways builds lasting memories that we never forget. Whether it’s a trip to Disney World or visiting grandparents, it is never too early to start traveling. We have been fortunate to rack up some amazing adventures which include everything from salmon fishing in Canada to camping in the Serengeti, and from snorkeling in the Galapagos to sailing the Greek islands. Each and every trip allows for a disconnected time to enjoy our family!
**Q&A with 2021 DSPN Neurosurgery Meritorious Awardee Greg Trost, MD**

**John H. Shin, MD**

Dr. Gregory R. Trost is Professor and Vice Chairman of Neurosurgery at the University of Wisconsin, Madison. Dr. Trost will be honored this year in San Diego as the Neurosurgery Meritorious Awardee for his contributions to spine surgery. Dr. Trost is internationally renowned for his engagement in spine surgery training and education.

What does receiving the meritorious award from the section mean to you?

Dr. Trost: There is no greater honor than to be recognized for your accomplishments and career by your peers, friends, and colleagues. There are many individuals more deserving of this honor than myself. It is somewhat humbling to reach an age where these kinds of things happen.

What are some of the challenges you think spine surgeons will face in the next 5 years?

Dr. Trost: I think we will continue to struggle in deciding what the best and appropriate surgery is to do. The surgical armamentarium has become so powerful we can accomplish nearly anything we technically want to. We need to figure out the proper use of evolving technologies and the right surgery for patients. Bigger is not always better.

What advice would you give to surgeons coming out of residency and fellowship?

Dr. Trost: I would tell them to continue to educate themselves. Always strive to be better at everything you do. Patient care is a great responsibility and honor. Develop interests outside of surgery. Don’t neglect your family; time passes quickly, don’t miss the special moments.

What do you enjoy most about the section and the annual meeting?

Dr. Trost: The section meeting is always the best scientific meeting of the year. It always has been educational and relevant. Of course, having the ability to see old friends and make new acquaintances is also vital. We are all busy and this is sometimes the only opportunity to see people.

What are you most proud of in your neurosurgical career?

Dr. Trost: I think our program has produced a large number of great people and surgeons, both residents and fellows. They provide a tremendous legacy for the University of Wisconsin. I have had the opportunity to travel and teach extensively locally, nationally, and internationally. Teaching in areas with limited resources is an incredible experience. I think we have a greater impact in these places than anywhere else.

What do you do for fun outside the OR? How do you balance it all and keep your sanity?

Dr. Trost: I have a great number of interests outside of my career. Beth, my wife of 40 years, and I have a 5-year-old grandson that we see frequently. We love being involved in his life. All our children live within 1 hour of us, so the house can be busy. We have a home in Key West and try to spend significant time there. We enjoy fishing, kayaking, eating, and just relaxing. I also like to build stuff. My tandem kayak was the cover of World Neurosurgery in January. I plan on building several more wooden boats in the future. I had a career cooking before Neurosurgery. I still enjoy that. I am currently building a brick oven in my backyard.

Can you share your thoughts on mentorship and who influenced you as a spine surgeon?

Dr. Trost: I have had a great number of mentors in Neurosurgery. Mentorship is the key to success. My fellowship director was Iain Kalfas at the Cleveland Clinic. He opened my eyes regarding our field. He introduced me to Ed Benzel during my first year of practice at a week-long hands on spine course. Ed and I have become close friends and have taught together around the world. I was able to meet and learn from the great surgeons in our field: Reg Haid, Eric Woodard, Charlie Stillerman, and Russ Nockels to name just a few. All my partners at Wisconsin—Dan Resnick, Nathaniel Brooks, Amgad Hanna, and Darnell Josiah—have taught me a great deal and continue to challenge me on a daily basis. My orthopedic partners—Tom Zdeblick, Cliff Tribus, and Paul Anderson—have significantly contributed to my education.
In these unprecedented times, patient access to neurosurgical care has been threatened by a new wave of policy and coding updates aimed at reducing compensation for spine procedures. In response, the AANS/CNS Washington Committee reaffirmed its commitment to advocating for fair reimbursement for neurosurgical procedures and widespread access to affordable neurosurgical care in the latest 2021 Neurosurgeons Taking Action update. Policy priorities for 2021 include updating payments to account for inflation, revisiting discussions regarding the Medicare budget neutrality requirement, and working to decrease the substantial gap in payments between private insurers and Medicaid. The COVID-19 global pandemic has brought an unprecedented degree of attention to disparities in health care access and provision. More than ever, issues related to patients’ access to care, particularly in traditionally underserved communities of color, have come to the forefront of public attention and the national health policy debate. Efforts to reduce the payment gap between private insurers and Medicaid are a critical step in expanding access to neurosurgical care in low-income and underserved communities.

In the 2021 Proposed Medicare Physician Fee Schedule, increased compensation for outpatient and non-procedural services has resulted in a global decrease in reimbursement for spine procedures due to budget neutrality requirements. More specifically, the conversion factor for all CPT codes has been reduced from $36.09/RVU to $32.41/RVU, a change which is projected to decrease Medicare reimbursement for spinal procedures between 5% and 12% compared to 2020 rates. In addition, CMS has proposed the removal of 67 spine specific codes, including codes for the insertion or revision of cervical disc arthroplasty devices, from the inpatient-only list. These policy changes reflect increased interest from payers to migrate spine procedures to the outpatient setting where they can be performed at lower cost. As a result, neurosurgeons may begin to see denial of inpatient-related costs from payers for these procedures.

On a positive note, the COVID-19 pandemic has accelerated widespread adoption and implementation of telehealth technology across medical subspecialties. In our experience at Stanford, the introduction of telehealth video technology in our spine clinics has allowed us to provide screening new patient consultation and postoperative visits for unvaccinated patients that may otherwise defer neurosurgical care out of fear of exposure to COVID-19 in the healthcare setting. Given the wide geographic catchment area for many neurosurgical centers, we expect that increased integration of telehealth technologies into neurosurgical practice will significantly increase patient access to neurosurgical care by reducing the time and effort required by patients to seek care. Future policy efforts to enable and incentivize the use of telehealth technologies in neurosurgery should be prioritized.
Management of Common Subaxial Cervical Spinal Fractures

Nader S. Dahdaleh, MD

The goals of managing a subaxial spinal fracture (or any spinal fracture) are: avoidance of neurological injury (or deterioration of an existing neurological deficit), early mobilization, and prevention of delayed malalignment or kyphosis. Key in achieving these goals is an urgent assessment of spinal stability. A popular yet controversial definition of clinical instability was described by White and Panjabi around 1978 as the loss of the ability of the spine to maintain its patterns of displacement under physiologic loads without initial or additional neurological deficit, major deformity, and incapacitating pain. In general, a total score of 4 or more deems the fracture as “unstable” requiring surgical stabilization through internal fixation or fusion.

The importance of the primary survey (Airway, Breathing, Circulation, and Disability) and its prioritization cannot be overemphasized. Once the patient is stable hemodynamically, a detailed neurological examination is pursued. Computed tomographic imaging is the gold standard to assess for fracture morphology and a magnetic resonance imaging is the modality of choice to assess for the integrity of the disks and ligaments. Vascular imaging is oftentimes pursued to rule out vertebral artery dissection.

The following is a summary of common subaxial spinal fractures that I hope will be a helpful for practitioners. To date, all the evidence is classified as level III and this is by no means a comprehensive review.

### Non-displaced unilateral facet fracture

These are relatively common fractures that are sometimes associated with radicular pain or minor deficits (for example, mild triceps weakness in cases of a C7 superior articular process fracture). By SLIC criteria, these fractures are oftentimes stable biomechanically and rigid collar bracing for 8-12 weeks is sufficient to achieve bony healing (Figure 1). In the presence of disco-ligamentous injury, the threshold for surgical stabilization is certainly lower. A systematic review suggested that surgical treatment is superior to non-surgical treatment; however, in the absence of significant disco-ligamentous injury, non-surgical treatment with rigid bracing can safely be attempted with close radiological follow-up.5

### Unilateral perched or locked facet

These fractures are oftentimes associated with subluxation of 25% or less on a lateral radiograph. They are also associated with disruption of the posterior ligamentous complex, increasing the severity score of these fractures. An associated neurological deficit is the exception, not the rule. To manage these fractures, a crown-halo

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**SLIC System**

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or Gardner-Wells tongs traction is pursued to reestablish alignment. This is followed by anterior or posterior stabilization (Figure 2).

**Fracture dislocation (bilateral locked or “jumped” facets)**

These are unstable injuries that are very often associated with spinal cord injury. True transection of the spinal cord is very rare, as the deficits are attributed to the dislocation and resultant compression. Common practice is an emergent attempt at a closed reduction through traction to establish appropriate alignment, followed by either circumferential fusion or posterior long segment fusion. In cases whereby reduction is not successful, posterior intraoperative reduction by resecting the superior articular processes to facilitate alignment is often pursued (Figure 3). There are also reports of intraoperative reduction through anterior approaches with intraoperative traction and distraction with Caspar pins.

**Figure 1:** 18-year-old male intoxicated with alcohol fell from a bunk bed. He presented with neck pain. He was neurologically normal. CT sagittal (A), left parasagittal (B), and axial (C) showed a left sided non-displaced fracture of the C6 facet. MRI STIR (D) showed increased attenuation involving the interspinous ligaments; however, the disk, ligamentum flavum and supraspinous ligaments were intact. The patient was managed with rigid collar bracing. A lateral x-ray (E) done after 8 weeks showed normal alignment and a CT (F) showed healing of the fracture.

**Figure 2:** 32-year-old male suffered a roll over car accident requiring extrication. He presented with neck pain. His neurological examination was normal. Total spine precautions were followed. A sagittal CT (A) showed grade 1 subluxation of C6/7 and the parasagittal and axial CT (B, C) showed a unilateral locked facet at C6/7. STIR MRI (D) showed increased signal within the disk as well as prevertebral hematoma. The patient was placed in crown halo traction with successful reduction (E). This was followed by an ACD at C6/7. Flexion/extension x-rays (F) were done showing healing and no instability.

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Burst or “tear-drop” fracture

Burst fractures of the subaxial spine, also known as tear-drop fractures, are unstable injuries that should not be missed and treated as trivial or stable injuries with neck collar bracing, especially in patients who are neurologically intact on presentation. The instability stems from involvement of the posterior elements and ligamentous complex resulting in total segmental disruption, or Denis three-column injuries. Total spinal precautions should be strictly pursued while evaluating these patients. Surgical management is usually with circumferential fusion through an anterior corpectomy and cage/graft placement followed by posterior fusion. Reestablishing anterior column support is necessary for load sharing purposes in an effort to avoid posterior hardware failure (Figure 4).

Extension distractive or dislocation injuries in patients with ankylosing spondylitis or diffuse idiopathic skeletal hyperostosis

These are three column injuries that are at times subtle and can be missed on lateral radiographs. Hence, a detailed review of a CT scan and an MRI is essential for an accurate and timely diagnosis. These fractures are universally treated with posterior long segment fusion with multiple points of fixation above and below the level of injury. These patients can be challenging to position and ventilate due to associated upper thoracic kyphosis, especially in the setting of ankylosing spondylitis (Figure 5).

In conclusion, early diagnosis and management of unstable injuries is important to avoid subsequent neurological deficits and cervical deformity. Moreover, in patients who suffered a spinal cord injury including those with ASIA A injuries, the most efficacious interventions to date are optimal spinal cord perfusion and emergent spinal decompression and stabilization.

References

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Figure 4: This middle-aged woman suffered a roll over car accident resulting in multiple orthopedic injuries. Her neurological examination was normal. A lateral radiograph (A) demonstrates a compression deformity of C5 and fractures of the posterior elements is also evident. CT (B) shows a burst fracture of C5 as well as fractures of the posterior elements indicating a three-column injury. MRI STIR sequence (C) demonstrates disruption of all the posterior ligamentous complex components (ligamentum flavum, interspinous and supraspinous). Circumferential fusion, with reconstruction of the anterior column and posterior fusion, was pursued for this unstable injury (D).

Figure 5: A 50-year-old man who is known to have ankylosing spondylitis fell off a roof. He presented with neck pain and luckily his neurological examination was normal. CT (A, B, and C) demonstrated an extension-type three column fracture at C7/T1. MRI STIR imaging (D) expectedly demonstrated an increase signal at the level of injury. Emergent posterior long segment fusion was pursued (E, F).
The Comprehensive Spine Center Model: Benefits, Challenges and Opportunities

Ali A. Baaj, MD

Spine care is complex, costly and often fragmented. Patients seeking treatment for certain spinal conditions have a daunting task of identifying the most suitable practitioner to help them. These can be pain management physicians, physiatrists, neurologists, or surgeons, just to name a few. Though the process is typically directed by a primary care physician, it can remain fragmented, time-consuming and costly, both to patients and the healthcare system.

To address these shortcomings, many medical centers and facilities have opted to build “comprehensive spine centers” or “spine centers of excellence.” The goal is to offer, under “one roof,” the myriad of services that a potential patient would need. These can include injections, musculoskeletal treatments, or surgical interventions, for example.

The infrastructure of such centers varies greatly, as it heavily relies on the institutional needs, resources and available personnel. Most would agree that, at minimum, there must be both non-surgical and surgical specialists. Physicians and advanced practice providers representing physical medicine and rehabilitation, pain anesthesia, neurology, neurosurgery, and orthopedic spine surgery should all have representation. Adjunct services crucial to spine including neuroradiology, endocrinology, oncology, rheumatology, physical therapy, and others, should be included. Designated personnel, whether triage or nurse navigator, are able to help patients navigate from one provider to another, cutting down on unnecessary referrals and travel. In some instances, patients can see multiple providers in the same visit.

Benefits

The primary benefit of a comprehensive spine center model is the delivery of integrated, coordinated spine care to the patient by an aligned team of practitioners. This coordinated care can potentially decrease travel and cost, and improve the overall experience for both patients and their referring physician. Another advantage is the opportunity for providers, both operative and non-operative, to quickly share information and provide consensus on treatment plans. A third advantage is marketability. A health system that is able to plan and execute a comprehensive spine center projects a clear vision and ability to treat all patients with spinal disorders. The intangible value to the patient, and referring physicians, can be enormous.

Challenges

Building a multispecialty, integrated spine center poses unique challenges to providers and health systems alike. Securing and coordinating the appropriate resources and personnel among various disciplines is no easy task. In addition to obtaining “buy-in” from various department leaders, agreement on structure and operations can be elusive. This is typically less problematic if physicians are under a system-employed model where there’s less separation of power and resources among various providers. A second challenge is insurance authorization for internal, same-day referrals. While the primary advantage of a spine center is the ability of one patient to see another specialist simultaneously, it can be problematic if prior insurance authorization is required. One way to mitigate against this is to have the patient at least meet the second provider briefly and then return

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Comprehensive Spine Center Model

for a formal visit once authorization is approved. This can enhance the patient experience as they’re directed to see other physicians. A final challenge relates to defining and measuring success and outcomes. Operational, financial and quality metrics must be implemented and analyzed to determine current and future directions of the center.

Opportunities

Despite major logistical hurdles, multidisciplinary spine center models are a key part of any major health system. They address some of the most common concerns of both patient and referring physicians. They facilitate and improve access to care. They build camaraderie among a group of physicians whose interests are aligned. They can potentially decrease costs to patients and the health system. They streamline the care process from referral to treatment. In spine, this is a complex endeavor with multiple providers involved. Excellent planning and execution of such entities not only reflects well on the health system but also provides an exceptionally important service to patients and their families.

References:

Interview with the Peripheral Nerve Meritorious Awardee: Dr. Eric Zager

Line Jacques, MD

You just received from the DSPN the meritorious award for your work in the field of peripheral nerve surgery. What did this honor mean to you?

Dr. Zager: This is certainly a great honor which I did not expect, and I’m not sure I deserve. I have been preceded by giants in this field, and it is humbling to be included in this distinguished group. I feel fortunate to be surrounded by friends in the field of nerve surgery who are constantly striving to improve the management of our patients with challenging nerve injuries, tumors and entrapments. I am indebted to the DSPN for the friendship and support that the nerve group has received over many years.

What is the direction that PN surgery will take in Neurosurgery?

Dr. Zager: I see a very bright future for nerve surgery in the years ahead, with more and more young neurosurgeons taking an interest in this rapidly developing field. There have been exciting recent advances in nerve transfers that provide much better functional results for patients who have suffered devastating nerve injuries. Spinal cord injuries are now being treated with new nerve transfers that have the potential for restoring hand and arm function in paralyzed limbs. Brief, early electrical stimulation has been shown to enhance nerve regeneration, and new nerve conduits, cellular therapy and growth factors will be applied to nerve injuries with long gaps that previously had little chance for recovery. Nerve imaging with ultrasound and MR neurography has markedly improved in recent years, and machine learning paradigms will help us to distinguish benign from malignant nerve sheath tumors.

Any comments for the young peripheral nerve clinician?

Dr. Zager: For residents who are interested in nerve surgery, I encourage them to read widely in the field, attend nerve courses (especially cadaver dissections when the pandemic allows these again), and consider a 6- to 12-month fellowship with a nerve surgeon mentor (these may be enfolded during senior residency). We have a very active and close peripheral nerve group that meets at every national neurosurgery conference including the DSPN where we have played an active role in encouraging academic development of young neurosurgeons. This is a dynamic area of Neurosurgery that will be challenging and intellectually stimulating throughout one’s career. We also have the unique opportunity to restore neurological function in many patients who have suffered grievous injuries – this is truly a gratifying subspecialty to pursue.
Interview with Dr. Sigurd Berven, Meritorious Award Recipient for Orthopaedic Surgery

Khoi D. Than, MD

Dr. Berven, congratulations on your selection as the 2021 DSPN Meritorious Award Recipient for Orthopaedic Surgery. Thank you for taking the time to be interviewed for the newsletter.

Please tell us about how you became interested in spine surgery. Who were your mentors?

Dr. Berven: As an orthopaedic trainee, I had a broad interest in subspecialties including arthroplasty, sports medicine, hand/upper extremity surgery and orthopaedic oncology. My interest in spine surgery began with my work in pediatric orthopaedics, and the variety of approaches to spinal deformity in the child. My mentors included John Hall and John Emans in pediatric spine. My experience with adult spine surgery was largely in spine fellowship and beyond. David Bradford and Serena Hu were important mentors in my development of an interest and commitment to adult spinal surgery.

What would you say has been your most impactful contribution to the field of spine surgery?

Dr. Berven: Through multicenter clinical research projects, I have had the opportunity to contribute to the development of important concepts in spine surgery. Development and validation of instruments to measure patient-reported health status in spinal deformity; defining the impact of spinal deformity on health status compared with other common medical conditions; and the magnitude of change that is clinically significant was an important part of my early experience with clinical research. Work with Steve Glassman and the Spinal Deformity Study Group led to recognition of the association of sagittal alignment and health status in adults with deformity. Subsequent work with Frank Schwab led to development of classifications for adult spinal deformity. More recently, work defining appropriate use criteria for spinal deformity, and modeling to predict expected risks and outcomes of surgery has been my major research emphasis. My goal of present research is to develop patient-specific tools to empower informed choice regarding operative and non-operative care.

From my time working with you at UCSF, I know that you have a great relationship with your neurosurgical colleagues. In a given operation, what would you say are the different skill sets brought to the patient by a neurosurgeon vs. an orthopaedic surgeon?

Dr. Berven: Interdisciplinary collaboration is critical to optimal patient care. Variability in the management of spinal disorders is a sign of the absence of an evidence-based approach. My approach to spinal disorders has been influenced significantly by interactions with colleagues in physiatry, pain management, radiology, and neurosurgery. I especially value the collaboration that we have between orthopaedic surgery and neurosurgery at UC San Francisco.
We discuss cases weekly in interdisciplinary conferences, and we have developed a more uniform approach to care by working together in all phases of the continuum of care, from preoperative planning and optimization protocols, to intraoperative standardization to post-operative accountability. Interdisciplinary evaluation of patients prior to surgery has led to recognition of pelvic alignment and pathology, and recognition of neural deficits including neurodegenerative disorders. Intraoperatively, an interdisciplinary approach has significantly influenced decisions regarding use of osteotomies versus drills, and use of anterior approaches to interbody reconstruction versus posterior approaches. Working together with neurosurgical colleagues has led to significant improvements in surgical techniques, and surgical safety for patients.

What have you enjoyed most about your collaborations with neurosurgeons?

**Dr. Berven:** Interdisciplinary collaboration has led to improvements in patient care, and improvements in quality of life for us as surgeons. There is nothing more lonely than struggling alone in a complex surgery, or a complication. At UCSF, our surgeons are never alone, and working together and supporting one another reduces stress on the surgeon by 90%. Supporting one another in decision making regarding a surgical approach, and intraopera-

What do you anticipate will be the biggest development in the field of spine surgery in the next 10 years?

**Dr. Berven:** Precision medicine applied to management of spinal disorders. There remains significant variation in the approach to spinal disorders, and the appropriate use of non-operative and operative care is largely dependent on patient-specific goals and risks. Predictive modeling will empower physicians and surgeons to develop treatment recommendations that are optimal for the individual patient.

What advice do you have for the new attending spine surgeons starting their careers in a couple of months?

**Dr. Berven:** Developing a network of collaborators for clinical care and for research is the most important advice I offer new attending surgeons. Learning and modifying practice approaches and techniques is a lifelong process. Seek opportunities to learn from your peers, to discuss cases in interdisciplinary conferences, and to operate together. Visit surgeons within your group, and beyond, including internationally. Surgery is a process of lifelong learning, and interdisciplinary collaboration is the key to ongoing improvement of care.

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**Membership Dues Update**

To our valued members,

We recognize that the COVID pandemic has had an impact on our lives and practices. On behalf of the AANS/CNS Spine Section, we would like to thank you for your support in these unprecedented times. As the nation recovers, we look forward to reconnecting during our upcoming in-person Joint Spine Section meeting in San Diego, July 28-31, 2021.

In recognition of the hardship we all have endured, we would like to show support for our members. If you are an active member who was unable to pay 2020 membership dues, the Section will waive your 2020 membership dues if you register for this year’s Annual Meeting at the member rate.

If you have already paid your 2020 membership dues, the Section will provide a $100 credit towards your already discounted members registration fee for this Annual Meeting.

The Spine Section continues to be the largest organization of spinal neurosurgeons thanks to your membership. See you in San Diego!

**Michael Steinmetz**
AANS Spine Section Chair

**Andrew Yew**
AANS Spine Section Membership Chair
The most common forms of benign peripheral nerve sheath tumors are schwannomas and neurofibromas. Schwannomas are more common as sporadic tumors and are associated with neurofibromatosis type 2 (NF2) and schwannomatosis, while neurofibromas are associated with NF1.

In most circumstances, resection of the tumor can be achieved effectively and safely. Several factors, including size, accessibility, nerve involved, and potentially histologic subtype determine the risk profile associated with resection. There are some surgeons who believe that neurofibromas are more difficult to resect than schwannomas, with some data to support this concept. Regardless of whether the tumor is a low- or high-risk tumor, the general approach to resection for extra-cranial, extra-spinal benign peripheral nerve sheath tumors (BPNSTs) is the same.

Successful, safe resection begins well before entering the operating room. Percutaneous and open biopsy of peripheral nerve tumors has been associated with neurologic worsening from the biopsy and also has been associated with increased risk during subsequent resection. Accordingly, biopsy should be reserved for suspicious lesions and should be avoided in convincingly benign peripheral nerve sheath tumors. Clinicoradiologic features that should raise suspicion for malignancy include maximal diameter >5 cm, perilesional edema, peripheral or irregular enhancement, intratumoral cystic components on imaging and rapid tumor growth, spontaneous pain, and neurologic deficits clinically.

In the operating room, anesthesia should be planned to allow for intraoperative nerve stimulation. Though there are no guidelines in this regard, many surgeons who perform a high volume of BPNSTs use some combination of visual mapping of the nerve fascicles, handheld nerve stimulation with visual observation for muscle activation, and/or formal intraoperative neuromonitoring (e.g., EMG, MEP, SSEP). The surgeon should consider how he or she will approach the tumor and what methods will be used to find a safe corridor and plan accordingly.

During dissection of the tumor, proximal and distal control should be obtained, when possible, by identifying the entering (proximal) and exiting (distal) nerve. The tumor and involved nerve should then be separated away from the surrounding soft tissue to allow manipulation of the nerve and tumor without undue tension. Next, the surface of the tumor is inspected and mapped, visually and/or electrically, in order to identify nerve fascicles along the surface of the tumor and a safe window between fascicles/fascicular groups. Within the window, the pseudocapsule is then opened and dissection is carried down through the layers of pseudocapsule to the true capsule of the tumor. Note that there are typically multiple layers of pseudocapsule.

Peripheral Nerve Learning Corner: Technical Pearls for Removal of Benign Peripheral Nerve Sheath Tumors

Thomas J. Wilson, MD, MPH and Robert J. Spinner, MD

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Throughout the dissection, cutting should be minimized and any cuts that are made should be parallel to the course of the fascicles, in order to avoid inadvertently transecting multiple fascicles with a perpendicular cut. Identifying the plane between the true capsule and pseudocapsule is the most difficult and most important part of the operation. The true capsule is typically slightly firmer than the pseudocapsule layers and the true capsule is also more yellow compared to the more white pseudocapsule. The plane between the capsule and pseudocapsule can then be developed towards both poles of the tumor and circumferentially around the tumor. If in the correct layer, the uninvolved fascicles of the nerve should elevate off the surface of the tumor, since they run within the layers of pseudocapsule. By developing this plane, the layers of pseudocapsule and uninvolved fascicles of the nerve can be rolled off the surface of the tumor. If dissection is initially carried out in the wrong plane, the plane should be revised by trying to define the plane between the capsule and pseudocapsule in a different location along the surface of the tumor. Especially for schwannomas (this may not be the case for neurofibromas), the goal is to be able to identify a single entering and exiting fascicle at the poles. If more than 1 fascicle is thought to be entering or exiting the tumor, additional attempts should be made to separate them away, since many times additional fascicles will be found to be en passage and uninvolved with the tumor. If at any point during the dissection, the fascicles are not elevating in the plane that is being developed, then it is likely that there are still layers of pseudocapsule adherent to the true capsule and the dissection should be deepened to try to find the correct plane. Once the entering and exiting fascicles are identified, cutting this fascicle proximally and distally will allow the tumor to be removed en bloc. Some surgeons prefer piecemeal resection, but this is our preferred technique, when feasible. If pursuing a piecemeal resection, all of the same principles apply. The pseudocapsule should not be resected, as the risk of nerve injury likely outweighs the risk of leaving any microscopic tumor residua. Finally, if the nerve has been manipulated and rotated during the tumor resection, care should be taken to return the nerve to its native configuration, in order to avoid any torsion of the nerve. While these techniques often allow for an en bloc gross total resection, due to the benign nature of these tumors, the goal should always be a function-sparing, maximal resection.

References:
Peripheral Nerve Updates for DSPN Members

Line Jacques, MD

1. The Peripheral Nerve Business Dinner during the AANS-Vancouver, Canada has been canceled and will be replaced at the Orlando, Florida AANS meeting Sunday, August 22, 2021. Details to come.

2. The 2021 Kline lecture will be presented by Dr. Mario G. Siqueira (University of Rio de Janeiro, Brazil) on Tuesday, August 24, 2021, during the AANS meeting in Orlando, Florida.

   The lecture title is: “Evolution of the treatment of the neonatal brachial plexus injuries.”

3. The Kline Research Award will be offered again this year to support either basic or clinical research related to peripheral nerves with funding in the amount of $10,000. The research award provides means of peer review for clinical projects, and therefore, to enhance competitiveness for potential National Institutes of Health (NIH) funding.

   Dr. Ilyas Eli (Dr. Mark Mahan, University of Utah) will present a talk entitled “Comparison of rapid-stretch injuries to conventional crush, transaction and repair” on Tuesday, August 24, 2021, during the AANS meeting in Orlando, Florida.

4. Winner of the 2019 Kline Research Award is Christopher F. Dibble from St. Louis, who will present a talk entitled “MO on Optimizing Nerve Regeneration” on Tuesday, August 24, 2021, during the AANS meeting in Orlando, Florida.

5. Winner of the 2020 Kline Research Award is Dr. Daniel Umansky (Dr. Rajiv Midha, University of Calgary). Use of focused ultrasound for reversible opening of the blood-nerve barrier.

6. Kline NREF “Honor Your Mentor” Fund is on the NREF website. If you would like to contribute to the fund, please visit the Kline NREF Fund website: http://www.nref.org/donate

   Note that the Peripheral Nerve Division leadership controls the use of the NREF PN funds (including the Kline fund) for research or education, within the guidelines of the NREF.

7. Upcoming meetings


   2. WFNS 5th theoretical & practical international course in peripheral nerve & brachial plexus surgery will be in Bogota, Colombia, August 29-September 3, 2021.


   4. ASPN annual meeting, January 14-16, 2022, Omni La Costa Hotel, Carlsbad, California http://www.peripheralnerve.org/meeting

   5. Narakas 2022 22nd international symposium on brachial plexus surgery, May 19-21, 2022, Berlin, Germany.

   6. The 7th annual Peripheral Nerve Dissection Course: “The Kline Legacy” in New Orleans, Louisiana, TBD.