

THE **SPINE HEALTH** JOURNAL

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NECK PROBLEMS: UNDERSTANDING THE CONDITIONS AND TREATMENT OPTIONS

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The National Spine Health Foundation is a 501(c)(3) nonprofit organization dedicated to improving spinal health care through patient education, patient advocacy and clinical outcomes research. We educate patients and the public about the treatment and prevention of neck and back disorders with unbiased, expert-driven educational resources, supporting patients through peer-to-peer connection on their journey to spinal health. This publication is a service of NSHF that aims to provide a deeper understanding of the science of spine care technology and techniques, serving as a bridge toward knowledge and hope for anyone suffering from spine problems.

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■ IN THIS ISSUE

■ Introduction

6

Letter from the Guest Editor: Shedding Light on Common Neck Conditions

Tom Mroz, MD

8

President's Note: Motion Beats Fusion for Patient Happiness

Thomas C. Schuler, MD

■ Section 1: Neck Function

11

Taking Care of Your Neck: The Importance of Motion and Alignment

*Glenn Gonzalez, MD | John V. Wainwright, MD | Sara Thalheimer, BA
James S. Harrop, MD, MSHQS*

14

'Look Up' Campaign to Tackle Tech Neck

■ Section 2: Neck Symptoms and Disorders

16

Neck pain: Causes, Treatments, and Myths

Kevin Moylan, DO | Russell DeMicco, DO

18

Cervical Radiculopathy Summarized

Dylan C. Dean, MD | Jeffrey C. Wang, MD

20

Cervical Myelopathy Explained

Michael Steinmetz, MD

■ Section 3: Surgical Treatments

24

Understanding Surgical Options: Front-to-Back Basics

Tarek Yamout, MD | Colin Haines, MD

26

Failed Neck Surgery Syndrome

Ian D. Connolly, MD, MS | John H. Shin, MD

■ Section 4: Around the Foundation

29

New Coalition Brings Spine Health Patient Awareness and Education to the Forefront of Public Healthcare

Dave W. Poley

30

Coalition Member Spotlight: Cervical Spine Research Society

31

Medical and Scientific Board Members

Introduction

A close-up photograph of a person with long, dark, wavy hair. A hand is gently massaging the back of their neck. The person's face is partially visible in profile, looking towards the left. The background is softly blurred, showing a laptop keyboard and a small potted plant. The entire image has a blue color overlay.

LETTER FROM THE GUEST EDITOR



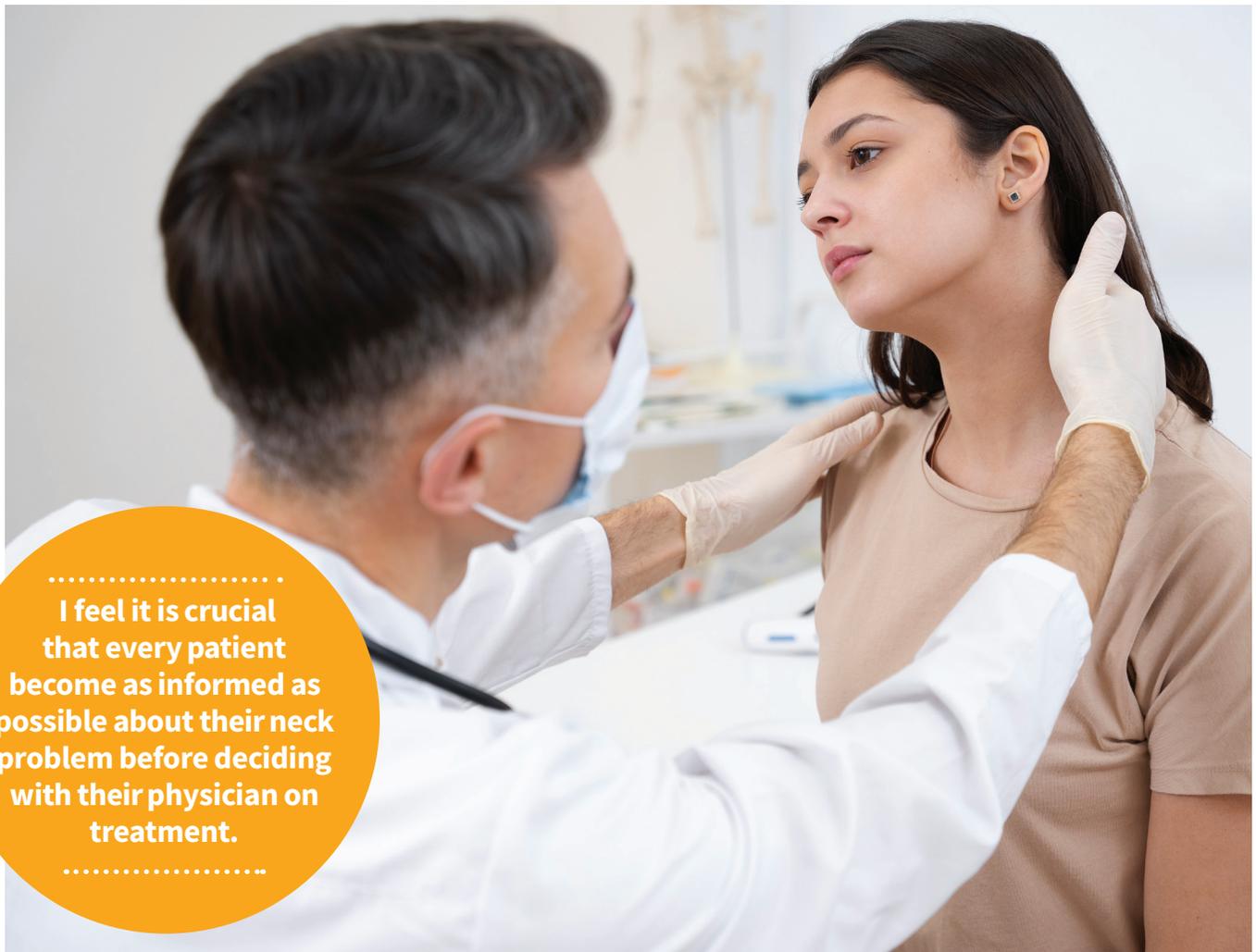
Tom Mroz, MD
Guest Editor-in-Chief

Shedding Light on Common Neck Conditions

Various clinical syndromes related to the neck can arise at any time during one's life. Fortunately, episodes of neck pain or arm pain, weakness, and/or numbness (i.e. a cervical radiculopathy or "pinched nerve") usually resolve quickly and without surgery. Cervical spine problems can cause, however, a fair amount of pain and disability for a *minority* of patients, and this can result in a consultation with a spine specialist. It is often difficult for patients to navigate the variety of spine specialists that include pain specialists, physiatrists, orthopaedic spine surgeons, and neurosurgeons. Similarly, patients can be confused by the differing treatment opinions that can be rendered for a single problem.

The purpose of the current **Neck Problems** edition is to shed light on the common conditions that patients face, and to provide a framework necessary to understand those conditions and treatment options. In this edition, we are fortunate to learn from world-subject-matter authorities.

- **Dr. Russ DeMicco**, Medical Spine Director at Cleveland Clinic, is an expert clinician specializing in the nonoperative treatment of all degenerative spine conditions. In this edition he presents a tremendous summary of the common facets of neck pain, which are almost always treated successfully without surgery.
 - **Dr. Jeffrey C. Wang**, an internationally acclaimed leader on cervical spine surgery presents a concise summary of cervical radiculopathy. Dr. Wang has over thirty years of surgical expertise, and he is the Spine Center Director and Professor of Orthopaedic Surgery and Neurosurgery at the University of Southern California.
 - **Dr. Michael P. Steinmetz** is the Chair of Neurosurgery and Director of the Center for Spine Health at Cleveland Clinic. He provides a wonderful overview of cervical myelopathy, which is a constellation of signs and symptoms from spinal cord dysfunction due to spinal cord compression.
 - **Dr. James Harrop**, a national and international authority of spine surgery, is the Director of the Division of Spine and Peripheral Nerve Surgery at Thomas Jefferson University Hospital and the Past President of the Cervical Spine Research Society (CSRS). His article on the importance of neck motion and alignment has essential information for both younger and older readers.
 - **Dr. Colin Haines** is the Director of Research at The Virginia Spine Institute. He simplifies an otherwise complex topic of surgical options for the cervical spine, which can prepare the spine patient for a surgical discussion with their provider.
 - Last but certainly not least, **Dr. John Shin** is Professor of Neurosurgery at the Harvard Medical School, Chief of Spine Surgery at Massachusetts General Hospital, and Director of Spine Oncology & Spinal Deformity Surgery and of the Neurosurgery Spine Network. Dr. Shin provides a thorough, patient-centric review of failed neck surgery. The latter is perhaps the most frustrating and troubling condition for patients and surgeons alike. A careful attention to detail, goals and options by all stakeholders is critical when faced with revision cervical spine surgery.
- As you will learn in this edition, there exist several common neck conditions and there are many medical and surgical treatment options for each condition. There



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**I feel it is crucial
 that every patient
 become as informed as
 possible about their neck
 problem before deciding
 with their physician on
 treatment.**

are several key points to consider when faced with a cervical spine problem. I feel it is crucial that every patient become as informed as possible about their neck problem before deciding with their physician on treatment. Surgery should always be used as a last resort for all patients and for all conditions. However, there are instances when surgery is the correct option; thankfully, it most often will render an improved, durable outcome for the patient. It is incumbent on medical spine specialists and surgeons alike to ensure a transparent and exhaustive appreciation of the condition with every patient. Finally,

it is imperative for the patient to feel comfortable with the surgeon and to understand the treatment plan. If either of these two conditions are not met, I strongly recommend a second opinion with another provider. In fact, I will often offer another opinion to patients; there are times when it is a healthy option.

I hope this edition provides all readers with foundational knowledge of the common spine problems and their treatments.

PRESIDENT'S NOTE



Thomas C. Schuler, MD
President

Motion Beats Fusion For Patient Happiness

The phrase “*you need a spine surgery*” scares most people. Fortunately, through the development of modern techniques and technologies, today’s spine surgeons can vastly improve their patient’s quality of life with surgery. The artificial disc is one of these technologies benefiting patients suffering from debilitating neck or back problems by allowing them to regain their full and active lives after surgery. Historically, if someone suffered from disabling neck or back pain related to severe disc degeneration, the best treatment available was to remove the bad disc and fuse one bone (vertebra) to the next one. Over the past several decades we have developed better fusion techniques, but most exciting has been the development of the disc replacement (non-fusion) option. Fast forward to today and the use of artificial discs in the spine has vastly improved results for so many patients. Spine surgeons can remove a painful, degenerative, and/or herniated disc and replace it (disc replacement) with a new motion preserving device that keeps one functioning without debilitating pain.

Let’s review the anatomy of the spine to understand the application of disc replacement surgery:

- The spine is composed of a column of bones (**vertebrae**) which are connected to each other via discs.
- The **disc** is a strong ligamentous structure allowing for distraction, compression, flexion, extension, side bending, and rotational movements. The discs can function properly when these motions are preserved.
- There are two small joints (**facet joints**) in the back of the spine at each disc level.
- Together, the large disc in the front and facet joints in the back make up a 3-joint complex known as a **motion segment**.

When we perform an artificial disc replacement, we remove the damaged disc in the front and put a synthetic device in its place, which allows the motion of that 3-joint complex to be restored. This concept is very similar to a hip replacement surgery; however, in the spine we must consider the health of the facet joints. Think of a spinal motion segment as a tricycle. We can replace the big wheel in the front (the disc) but rely on the two small wheels (facet joints) in the back to be functioning. If the facet joints are reasonably healthy, then replacing the big disc in the front with an artificial disc allows us to preserve motion, restore function, and eliminate pain. Patient happiness often follows.

Artificial discs have been used very successfully over the past two decades and are now a standard of care. Despite this, insurance companies have been slow to accept this newer technology, even though the benefits have been well-proven in clinical trials as well as in practice. Ultimately, for patients to have access to new technology such as disc replacements, insurance companies must agree to pay for it. Unfortunately, many insurance companies

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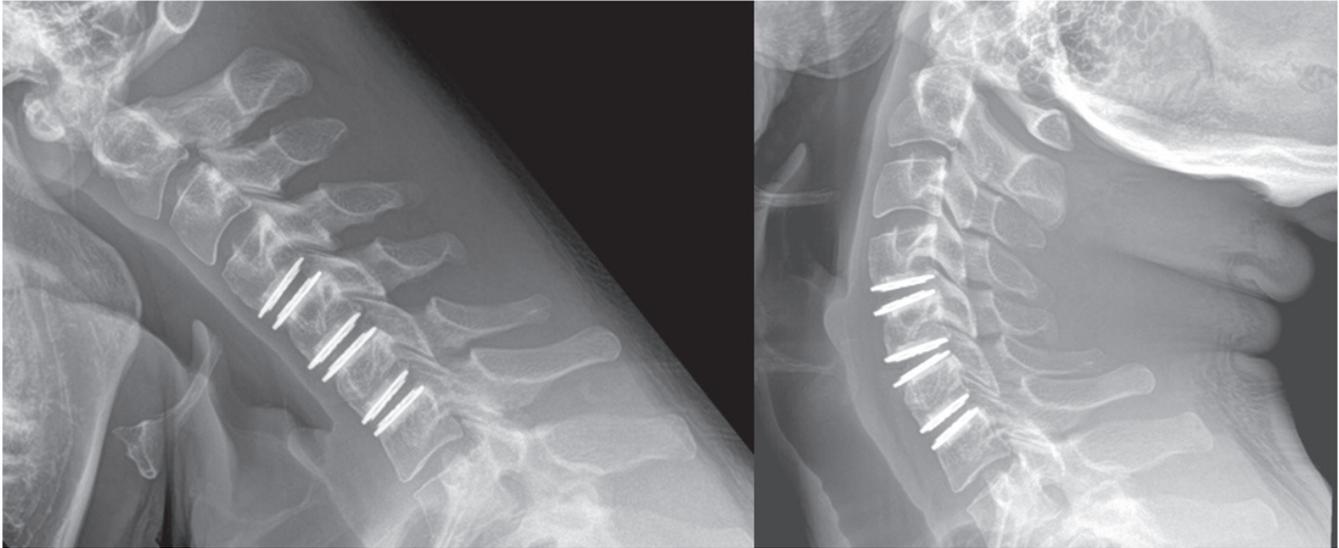


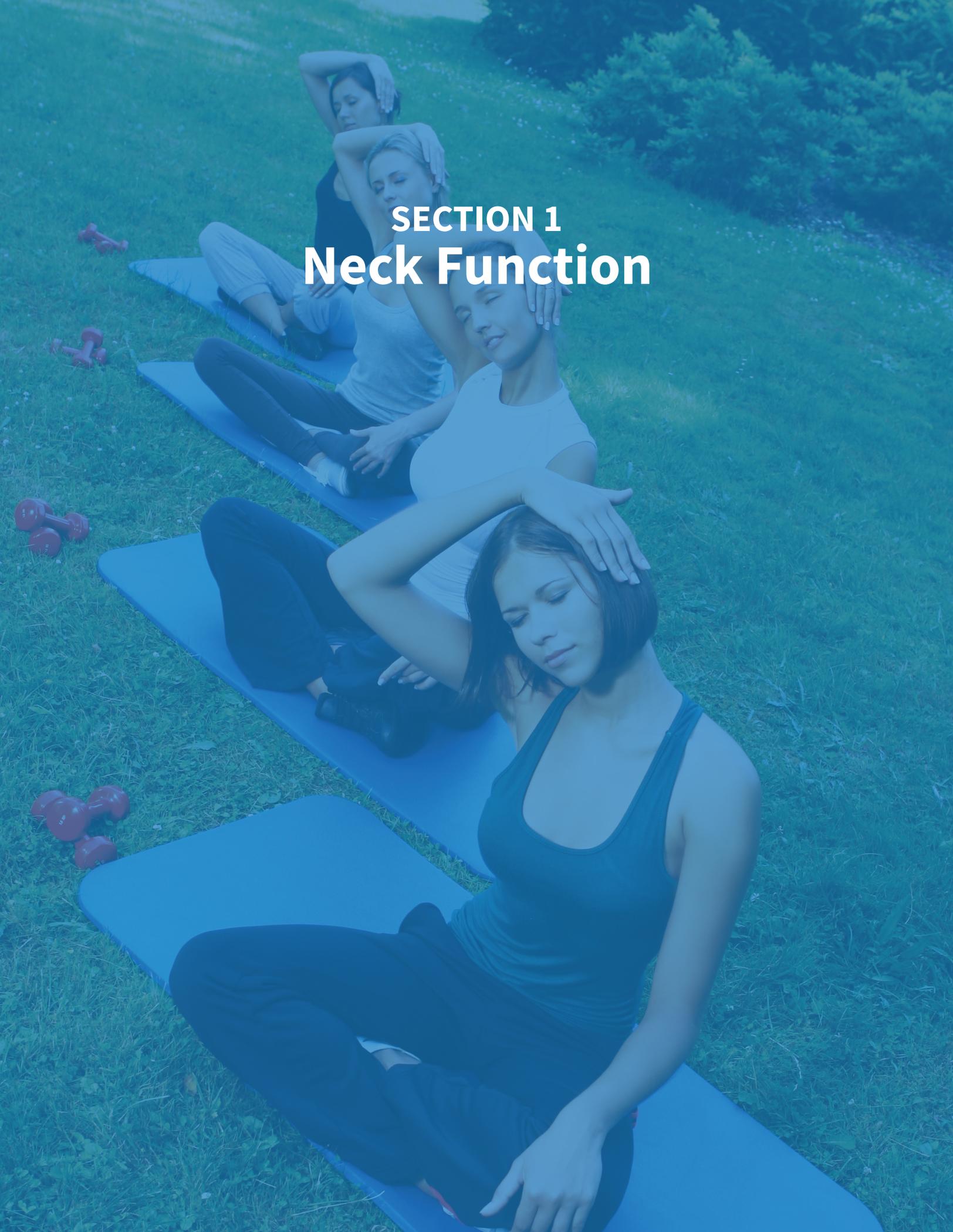
Figure 1: Motion seen bending the neck forward (left) and backward (right) after a 3-level disc replacement surgery.

often claim something is “experimental” even though it is not. This enables them to deny care and prevent access to these life-improving technologies. Furthermore, it is critical to understand that when a company develops a new product, FDA clearance must be obtained to distribute it in the US market. Many insurance companies further limit access to these implants by claiming that any scenario of use outside of the clinically narrow FDA trial is also “experimental.” As clinicians, we know that there are many clinical scenarios that would also benefit from these new technologies, but were not included in the FDA trial. Thankfully, FDA indications do not prevent surgeons from expanding the use of technologies beyond those initial limits, which ultimately allows surgeons to help more of their patients.

For example, postural problems such as forward flexed spines (kyphosis) were not included in the FDA trials of disc replacement implants. As a result, there is belief that artificial discs are contraindicated in cases of kyphosis. Just because certain indications were not tested in the original FDA studies does not mean other indications won’t work as well. Those of us proficient in artificial disc replacement have been successfully expanding the use of these implants by using our scientific knowledge and intuition to best benefit our patients. This means that the patients who undergo surgery for these expanded indications often have much better results than their traditionally fused counterparts. Cervical kyphosis is not an absolute contraindication to disc replacement technology, despite what some insurance companies say.

The long-term follow-up of the initial disc replacement clinical trials showed that while patients with fusions did well, those with disc replacements did better. None of the original trials looked at three- and four-level disc replacement cases, but it just stands to reason that in appropriately selected patients, a three- or four-level disc replacement procedure would produce even better results than a three- or four-level fusion. The logic is simple: if fusing the spine causes loss of motion through the fused levels thereby increasing stress at the adjacent levels, then preserving motion at as many levels as possible will produce a superior result, as the original trial demonstrated (*figure 1*).

The essential take away point is that when we **can** preserve motion, we **should** be doing that. When stabilization is required, then fusion is still a good operation. Sometimes we even combine these technologies, where we fuse the most unstable or degenerative level and then perform replacements at the other levels, still producing excellent clinical results compared to a fusion-only procedure. The great news is that through modern technological evolution, enhanced surgical techniques, and improved physician knowledge, we are better at restoring our patients to full and active lifestyles with the least short- and long-term problems. Patients do not need to fear modern spinal surgery performed by their trusted spine surgeons. In 2023, we should embrace all the amazing medical miracles that we have to restore and improve lives with spine surgery.

A photograph of four women sitting on blue exercise mats on a grassy lawn, performing neck exercises. They are arranged in a diagonal line from the bottom left to the top right. Each woman has one hand resting on the back of her head. The scene is overlaid with a semi-transparent blue filter. In the background, there are green bushes and trees. To the left of the mats, there are several pairs of red dumbbells scattered on the grass.

SECTION 1 Neck Function

ACCORDING TO THE NATIONAL SPINE HEALTH FOUNDATION'S 2022 CERVICAL SPINE SURVEY, THE

#1 FUNCTION
OF THE NECK PEOPLE ARE MOST
INTERESTED IN LEARNING MORE ABOUT IS
NECK MOVEMENT



38%
Neck Movement

■ TAKING CARE OF YOUR NECK: THE IMPORTANCE OF MOTION AND ALIGNMENT



Glenn Gonzalez, MD
Thomas Jefferson University



John V. Wainwright, MD
Thomas Jefferson University

Sara Thalheimer, BA
Thomas Jefferson University



James S. Harrop, MD, MSHQS
Thomas Jefferson University

■ OVERVIEW

The motion and alignment of the neck are crucial for overall spinal health. The neck, also known as the cervical spine, consists of seven vertebrae and associated discs that support the head and allow it to move freely. The neck also allows for changes in head position and permits vertical and horizontal gaze (looking in all directions). Proper motion and alignment of the neck are necessary for optimal functioning of the spine, maximizing the line of sight, as well as for overall physical and mental well-being.

■ PROPER ALIGNMENT

When the neck is properly aligned, the head is centered over the shoulders while the shoulders remain level, and the remainder of the spine is in a neutral position (*Figure 1*). This creates a load pattern where the muscles in the back of the neck are relaxed and not subjected to many forces. After birth, the cervical spine develops a natural curvature (cervical

lordosis) as we begin to hold our heads up to eat and interact with our environment.¹ This curvature (lordosis), provides for the proper distribution of weight and balances the pressures exerted on the spine, which helps to prevent injury and pain.

When properly aligned, the curvature of the cervical spine and the complimentary curves in the remainder of the spine allow the weight of the head and trunk to be passed through the vertebrae in the front of the spine, to the pelvis, and lastly through the legs to the ground. Proper alignment of the neck minimizes the forces and stress on the vertebrae, discs, joints, and muscles in the neck. This may reduce the development of degenerative conditions of the neck including arthritis, degenerative disc disease, disc herniations, spinal stenosis, and neck pain. Additionally, proper alignment of the neck protects the spinal cord from compression (unnatural pressure).

■ PROPER MOTION

The cervical spine is designed to move in several directions:

- Bending forward (flexion)
- Bending backward (extension)
- Turning the head (rotation)
- Bending the head to the side (lateral bending)

Proper motion is essential for normal function and spine health. These movements allow one to perform a wide range of actions, such as looking up and down, turning the head to look in different directions, and nodding and shaking the head.

■ IMPROPER ALIGNMENT AND MOTION

Injury, poor posture, and degenerative conditions of the neck can alter this normal motion and create stress on the various structures of the neck. This can lead to degenerative disc disease, disc herniations, and arthritis of the neck which can result in pain from pinched nerves or pressure on the spinal cord. One common biomechanical situation we see in the clinic is the development of a forward position of the neck (kyphosis) which can start from simple poor posture (see graphic on page 14).

Prolonged poor posture can occur with everyday activities, such as:

- Sitting at a desk looking down and leaning the neck forward to view a computer screen that is poorly aligned with one's natural line of sight over extended periods of time
- Prolonged cell phone use with leaning the head forward and/or to the side repeatedly through the day

Prolonged poor posture can result in:

- Muscle strain in the neck and shoulders and pressure on the joints of the neck resulting in pain and even headaches
- Premature degeneration of the cervical spine over time
- Stress on the discs in the neck which can lead to disc herniations and pinched nerves
- Permanent structural changes to the neck — the loss of the normal cervical curve (lordosis) and the neck leaning forward into kyphosis
- The development of a kyphotic deformity, which is exacerbated and worsened by the forces of gravity heavily weighing down on the posterior portion of the neck

■ NECK ESSENTIALS

It is very important to maintain proper neck alignment and motion before permanent problems occur. One technique to prevent these issues is to practice correct posture and ergonomics. This includes sitting and standing with the shoulders back and the head level, looking straight and avoiding prolonged periods of inactivity.^{2,3,4} Additionally, taking regular breaks when seated or watching a screen for extended periods is important. Stretching and strengthening exercises for the neck and upper back can also help to maintain proper alignment and motion.

It is also essential to be mindful of any neck pain or discomfort and seek medical attention if necessary. Underlying conditions that may cause neck pain, poor alignment, or abnormal motion can be diagnosed and

Figure 1: A lateral, full body, x-ray showing the natural spinal alignment with the center of gravity line passing through the hips and knees demonstrating a well aligned spine (Courtesy of J.V.W)



.....
Taking care of your neck today can help ensure that your spine remains healthy and functional properly in the future.



treated by a doctor or physical therapist. Specific stretches and exercises to help improve neck range of motion and alignment can be tailored to the individual.

In conclusion, the motion and alignment of the neck are important for overall spinal health. Proper motion and alignment are necessary for the spine to function normally

and can help prevent injury and pain. It is crucial to maintain appropriate neck alignment by practicing good posture and ergonomics and engaging in regular stretching and strengthening exercises. Taking care of your neck today can help ensure that your spine remains healthy and functioning properly in the future. As always, seek medical attention if necessary.

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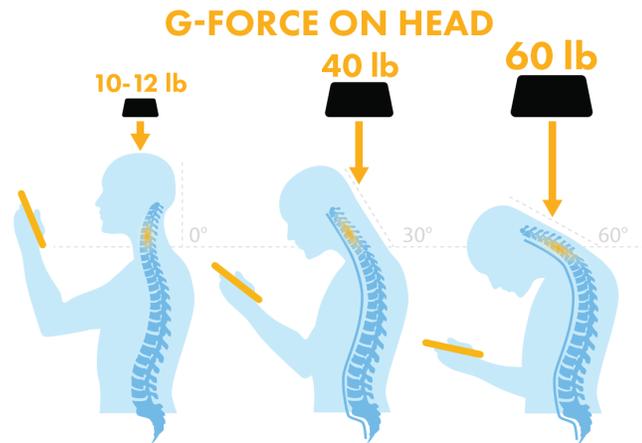
LOOK UP!

TACKLING TECH NECK

“Tech neck” is a catchy phrase to describe the act of stressing muscles while looking down at phones and screens. The head is held in a forward position when staring down at these screens, often for extended periods of time resulting in neck and shoulder pain, stiffness, and soreness. In the short term, you can take action to alleviate the muscle strain. But over time, without preventative measures, it can lead to permanent degenerative changes.

3 THINGS YOU NEED TO KNOW

- 1** The force of gravity (G-force) concentrates onto your head/neck as you look down.
- 2** G-Force effects worsen over time. Young people are especially at risk with poor posture-related activities, such as gaming or schoolwork on laptops.
- 3** Chronic poor posture can contribute to degenerative problems that lead to permanent spinal alignment issues into adulthood.



Don't let tech become a pain in your neck! Follow these guidelines:

RECOGNIZE SYMPTOMS



HEADACHES



NECK PAIN & STIFFNESS



SHOULDER PAIN

PREVENT SYMPTOMS



TIME IT

Look up from your device frequently and set timers to remind yourself to move regularly.



STACK IT

Keep your head stacked over your spine and hold your device at eye level.



LEAN IT

Relieve disc pressure by combining good lumbar support and leaning your seat back at a 25 angle.



WORK IT

Practice neck, back and core strengthening exercises regularly.

TREAT SYMPTOMS



TREATMENT OPTIONS

Start with non-operative treatment options like physical therapy, yoga or strengthening exercises.



SPINE SPECIALIST

You may need to see a spine specialist if you have persistent pain, weakness or numbness to guide a treatment plan.

For more information, visit spinehealth.org.



A photograph of a doctor in a white coat and stethoscope examining a patient's neck. The patient is a woman with dark curly hair, her eyes are closed, and she is wearing a denim shirt. The entire image is overlaid with a semi-transparent blue filter. The text is centered in the upper half of the image.

SECTION 2
Neck Symptoms and Disorders

ACCORDING TO THE NATIONAL SPINE HEALTH FOUNDATION'S 2022 CERVICAL SPINE SURVEY, THE

#1 NECK SYMPTOM

PEOPLE ARE MOST INTERESTED IN LEARNING MORE ABOUT IS

NECK PAIN



28%
Neck Pain

NECK PAIN: CAUSES, TREATMENTS, AND MYTHS



Kevin Moylan, DO
*Center for Spine Health
Cleveland Clinic*



Russell DeMicco, DO
*Center for Spine Health
Cleveland Clinic*

If you have not experienced neck pain, consider yourself lucky. Neck pain is incredibly common, as it is estimated that 10% of adults have neck pain at any one time. Fortunately, there are things to help if you do experience neck pain.

Neck pain can be caused by a number of things, and in many patients there are multiple factors playing a role. The most common causes of neck pain include muscle/ligament strains, facet joint osteoarthritis, cervical spondylosis (age related wear and tear), discogenic pain (painful discs), and cervical radiculopathy (nerve pain). The good news is, the vast majority of people get better with conservative treatment.

To guide a proper workup and treatment plan, neck pain can be broken down into categories based on chronicity (acute, subacute, chronic), as well as distribution (axial neck pain vs. radicular pain).

ACUTE NECK PAIN (< 6 WEEKS)

In most patients with acute, nontraumatic neck pain, imaging (X-ray/MRI/CT) is not indicated. Acute neck pain can be treated conservatively with over-the-counter (OTC) pain medications (acetaminophen or NSAIDs), ice, heat, home exercises, stretching, and short-term use of a muscle relaxant.

SUBACUTE NECK PAIN (6-12 WEEKS)

Patients with persistent or worsening neck pain > 6 weeks in duration should be re-evaluated by a physician. A referral to a spine specialist may be warranted. X-rays of the cervical spine will likely be obtained. Without the presence of red flag symptoms (see figure 1), advanced imaging with CT/MRI is generally not indicated prior to completion of conservative treatment. If experiencing radicular pain/numbness/tingling from the neck into the upper limb(s), a short course of oral steroids could be considered to reduce inflammation. Treatment will likely include exercises and a referral to physical therapy for direction on stretching, strengthening, range of motion exercise, and to develop a home program.

Other options that may be offered include massage, acupuncture, osteopathic manipulation, topical analgesics, and trigger point injections.

■ CHRONIC NECK PAIN (>12 WEEKS)

Patients with neck pain longer than 3 months are at an increased risk of disability and long term functional impairment. If a patient has persistent or worsening symptoms despite conservative treatment and OTC medications, a trial of non-opioid analgesics may be indicated (prescription NSAIDs, tricyclic antidepressants, membrane stabilizers). MRI of the cervical spine may be ordered for diagnostic/interventional planning purposes. Based on MRI findings correlated with symptoms, image-guided injections could be an option. If a majority of your pain is axial (pain that stays in the neck), intra-articular facet joint injections with steroids may be considered as well as diagnostic injections, called medial branch blocks. If you are experiencing neck and radicular arm pain, a cervical epidural steroid injection may be offered.

■ NON-SPINAL CAUSES OF NECK PAIN:

Neck pain can also be caused by non-spinal pathology such as shoulder disorders (rotator cuff tears and impingement syndromes), myofascial pain syndromes (fibromyalgia), and autoimmune disorders (polymyalgia rheumatica). More serious causes of neck pain (fracture/cancer/infection) are rare, but may be considered in the presence of red flags.

■ NECK PAIN MYTHS:

- #1** Severe neck pain with or without radiating arm pain does not necessarily mean you need surgery. In reality, less than 5% of people will require neck surgery. Severe symptoms should be watched closely during your treatments.
- #2** Regardless of severity, acute episodes of neck pain without trauma/red flag symptoms often do not need imaging. Remember that your spine ages with you. There is not a direct correlation between findings on imaging and severity of symptoms. It is possible to have severe neck pain with normal findings on imaging, and little to no pain despite significant pathology seen on imaging. XR/MRI/CT do not show pain.
- #3** Despite what you may read online, there is no such thing as a perfect pillow for neck pain. The best pillow is the one that feels most comfortable to you while providing proper neck support.
- #4** Neck braces may be helpful to some people in certain circumstances (wearing a soft collar at night to improve sleep quality), but for the most part, braces/collars should be avoided for routine and long term use as they may weaken neck muscles and delay recovery.
- #5** Neck “popping” or “clicking” may be alarming (and even audible), but it does not point to a more sinister problem.
- #6** Lastly, it is important to understand the difference between hurt and harm. Everyday activities, home exercises, and hobbies might hurt, but they do not cause any irreparable damage or harm.

■ CONCLUSION

In conclusion, neck pain is common and most often is caused by the various structures in the neck. Short-lived symptoms can be simply treated, however there are many treatment options available for more persistent symptoms, both non-surgical and surgical. Spine specialists can guide you through your treatment journey.

Figure 1



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**Despite what
 you may read
 online, there is
 no such thing as a
 perfect pillow for
 neck pain.**

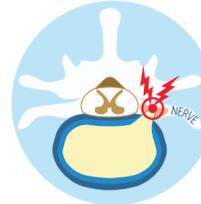
ACCORDING TO THE NATIONAL SPINE HEALTH FOUNDATION'S 2022 CERVICAL SPINE SURVEY, THE

#2 NECK SYMPTOM
PEOPLE ARE MOST INTERESTED IN LEARNING MORE ABOUT IS
RADIATING ARM PAIN



28%
Radiating Arm Pain

#2 NECK DISORDER
PEOPLE ARE MOST INTERESTED IN LEARNING MORE ABOUT IS
HERNIATION/PINCHED NERVE

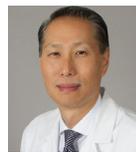


28%
Disc Herniation/
Pinched Nerves

CERVICAL RADICULOPATHY SUMMARIZED



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USC Spine Center

■ WHAT IS CERVICAL RADICULOPATHY?

Cervical radiculopathy occurs when a nerve root in the neck becomes pinched by something pressing on it, such as a herniated disc or arthritic bone spur. This can cause numbness, weakness, and pain that radiates from the neck to the shoulder or arms. Because these episodes usually resolve with time, surgery is reserved for refractory cases or for those with progressive symptoms. When conservative management fails, there are several highly successful surgeries that decompress the affected nerve root.

■ WHAT ARE THE CAUSES?

Nerves in the neck can become compressed or irritated in several different ways to cause cervical radiculopathy. In a disc herniation, the rubbery disc material protrudes out from between the cervical vertebrae and irritates the nerve. In degenerative arthritis, one of these cushioning discs can develop excessive wear, which leads to excessive motion and bone spurs that impinge upon the nerves. Other sources of compression include changes related to injury, tumors, and cysts.

■ WHAT ARE THE SYMPTOMS?

There are many different cervical pathologies that can become symptomatic, often with overlapping features. *Cervical radiculopathy* typically presents with pain, weakness, or changes in sensation down the arm(s). This differs from *axial neck pain*, where the pain is localized to the neck, and from *cervical myelopathy*, where the spinal cord itself is compressed causing imbalance and poor coordination. Symptoms, clinical features, neuroimaging, and electrodiagnostic testing help differentiate cervical radiculopathy from these other pathologies and help pinpoint the exact nerve root(s) affected.

■ MAKING THE DIAGNOSIS

X-rays are usually the imaging study obtained initially and are helpful in demonstrating degenerative changes, including bone spurs and decreased cervical disc height. Special flexion (forward bending) and extension (backward bending) x-rays can reveal instability as the patient bends their neck looking for movement between vertebrae as a source of compression. **MRI scans** show the soft tissues, including

herniated discs, cysts, tumors, and the nerve roots themselves and whether they are compressed. **CT scans** can highlight areas of bony compression with detail and are often obtained for preoperative planning.

Electrodiagnostic studies include nerve conduction studies (NCS) and needle electromyography (EMG) which measure the electrical activity of the nerves and muscles. They can help differentiate radiculopathy from other conditions such as carpal tunnel syndrome and diabetic neuropathy. In addition, they highlight which nerve roots are affected, and are therefore especially useful when patient symptoms and imaging alone do not pinpoint which nerves to decompress.

■ NON-OPERATIVE TREATMENTS

Non-operative treatment is successful in most patients, therefore surgical decompression is reserved for those with progressive deficits or who have failed conservative management. There are several non-surgical treatments available, but whether they improve recovery or simply provide symptomatic relief is unclear. Treatments include physical therapy, immobilization with a cervical collar, traction, medications, oral corticosteroids, and steroid injections. Selective nerve root blocks are helpful both diagnostically and therapeutically, as they can be injected around a single nerve root of interest. Thus, if effective, these injections can confirm the source of radiculopathy in cases of multilevel disease.

■ SURGICAL OPTIONS

Cervical disc arthroplasty (CDA) places an artificial disc into a decompressed disc space and is one of the preferred treatments due to its ability to preserve neck motion. It is often used in cases of single or two-level disease and should be avoided in those with symptomatic neck joint arthritis, as the preserved motion can worsen pain. In cases of cervical radiculopathy with significant arthritis or instability, fusion may be the better choice. In these surgeries, several vertebrae are fused with bone graft or implants to provide stability, which is especially important when large segments of bone must be removed for neural decompression. **Anterior cervical discectomy and fusion (ACDF)** remains the gold standard surgery with a high success rate. Advantages include low infection rates and wound complications. Potential disadvantages include failed fusion (pseudoarthrosis) as well as problems with speech and swallowing, which can happen with any anterior exposure. **Posterior foraminotomy** is another alternative to a fusion and has the major advantage of being done minimally invasively. It avoids the potential complications associated with entering through the front of the neck and may be preferred in those whose anatomy makes an anterior neck exposure contraindicated. Not everyone is a candidate however, and it should generally be avoided in patients with large central disc herniations or instability.

■ CONCLUSION

Cervical radiculopathy can be caused by several issues in the neck and can be treated both non-operatively and operatively. If symptoms of radiating arm pain, weakness, or numbness do not resolve quickly, seeking the opinion of a spine health specialist is warranted to guide the proper treatment.

.....
Non-operative treatment is successful in most patients and may include:



Physical Therapy



Cervical Collar



Steroid Injections



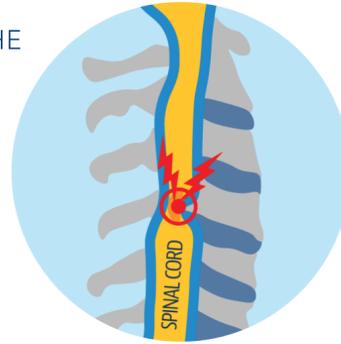
Medications

ACCORDING TO THE NATIONAL SPINE HEALTH FOUNDATION'S 2022 CERVICAL SPINE SURVEY, THE

#1 NECK DISORDER

PEOPLE ARE MOST INTERESTED IN LEARNING MORE ABOUT IS

CERVICAL MYELOPATHY



28%
Cervical
Myelopathy

CERVICAL MYELOPATHY EXPLAINED



Michael Steinmetz, MD
Cleveland Clinic

INTRODUCTION

Cervical myelopathy describes a neurological condition most often associated with cervical stenosis. Cervical spinal stenosis is a narrowing of the spinal canal which decreases the space available for the spinal cord in the neck. Cervical spinal stenosis is a common finding on imaging of the cervical spine, but does not always cause symptoms, which is a very important distinction to be understood. The diagnosis of cervical myelopathy is only made when the narrowing or “squeezing” of the spinal cord causes symptoms.

SYMPTOMS

The symptoms related to myelopathy are fairly typical. Classically, a patient would present with a complaint of decreased balance or feeling like they walk as if they are “drunk,” numbness and tingling in both hands, and a decreased ability to perform fine functions with their hands. They may describe difficulty with typing or handwriting, buttoning buttons, zipping zippers, etc. Neck pain may be present, but not always. Patients without neck pain are often surprised when they are told the issue is in their cervical spine.

PHYSICAL EXAM FINDINGS

There are classic findings on physical exam that confirm the diagnosis of myelopathy. As mentioned previously, not all patients with cervical stenosis have symptoms related to the imaging findings and the detection of symptoms is often difficult for patients, so a detailed physical exam by an expert is necessary to observe signs of myelopathy. Abnormal findings on physical exam include:

- The presence of hyperreflexia (overactive reflexes)
 - Increased deep tendon reflexes compared to normal or baseline
 - Hoffman’s sign (observed with a finger test)
 - Babinski sign (observed with a foot test)
- Clonus (involuntary muscle contractions, often seen in the ankle)
- A loss of balance, tested by assessing the gait

NATURAL HISTORY

The natural history of this condition is very important to understand. Most patients worsen slowly over time, which can make it difficult for patients to identify a change. The

worsening does not occur over days, but rather months. Some stay stable for a very long period of time. A very small percentage of patients may rapidly worsen, but this is rare. Myelopathic symptoms do not come and go, so if a decline occurs over a period of time, one is not expected to have spontaneous improvement in function.

■ TREATMENT

Surgery to relieve the pressure on the spinal canal (decompression) is the definitive treatment for progressive cervical myelopathy. Medications and other alternative treatments are not effective or based in science. Surgery, however, is not required in all patients. If symptoms are mild and not progressing, the patient can simply be followed with regular check-ups to assess signs and symptoms. Surgery is typically reserved for those who present with more severe symptoms or if there is a worsening of symptoms.

If surgery is planned, multiple options exist. Despite the many surgical approaches, the goal is always the same, to decompress the spinal cord by relieving the compression and giving it more room. Surgery can be done through the front of the neck (anterior), through the back (posterior), or even both. The approach is determined by the surgeon based on a number of factors: age of the patient, number of spinal levels causing compression, cervical spine alignment, and presence or absence of spinal deformity. Surgery through the front of the neck is called anterior cervical decompression and fusion (**ACDF**) and is commonly performed at 1 or 2 spinal levels (*Figure 1*). When multiple levels are involved, surgery is more common through the back of the neck. If normal spinal alignment is present, a **laminoplasty** may be performed

(*Figure 2*). If malalignment is present, **laminectomy** and fusion may be performed (*Figure 3*). A surgeon's preference and training will also guide treatment.

Controversy exists in treating *asymptomatic spinal stenosis*. An example of this would be a patient who had an MRI of the cervical spine for a non-neurologic reason, perhaps neck pain. The MRI demonstrates spinal stenosis, **BUT** the patient does not have any complaints of myelopathy (described above). A minority of physicians will urge surgery to be done urgently. The patient is often told that they are in imminent danger of being paralyzed and are frightened into having surgery.

At our center, we have had a number of patients emergently added to our clinic schedule or requesting consultation in the emergency room due to spinal stenosis and risk of paralysis. The reality is, we rarely operate in this scenario. We always stress to our patients and trainees that we only operate on patients with signs and symptoms of myelopathy and not on the imaging findings alone. It is interesting that when you consider the risk of paralysis in an asymptomatic patient, they have a greater chance of paralysis if they undergo immediate surgery versus walking out of the office and living a normal life. Patients are shocked but understand this explanation.

■ POSTOPERATIVE EXPECTATIONS

The overall goal of surgery is to stop the progression of the symptoms (worsening balance and coordination). A surgeon will often tell a patient that a successful surgery prevents symptoms from worsening, even if they do not improve.

Figure 1: Anterior cervical decompression and fusion (ACDF).



Figure 2: Cervical laminoplasty, a motion preserving procedure.



Figure 3: Laminectomy and Fusion.



In reality, most everyone improves, however the degree of improvement is variable and hard to define for a patient planning to undergo surgery. There are some factors which are known to negatively impact the chance of improvement. These include advancing age, long duration of symptoms, and severe symptoms at the time of surgery. Physical and occupational therapy will be utilized at some point during the recovery process to help regain function.

■ **SUMMARY**

Cervical spinal stenosis is the narrowing of the space for the spinal cord in the neck, is somewhat common, and can result in the neurologic condition known as cervical myelopathy.

The natural history is that of a slow progression over time with periods of stability. Surgery is offered if symptoms are present and progressing, or if they are severe at the time of presentation. Multiple surgical options exist based on a number of patient factors and surgeon experience. The overall goal of surgery is to relieve the compression on the spinal cord. A halt in the progression of the symptoms should be expected and most will even improve after surgery. The risks of surgery are small and outweigh the risks of the natural history of cervical stenosis causing progressive myelopathy.



SECTION 3
Surgical Options



ACCORDING TO THE NATIONAL SPINE HEALTH FOUNDATION'S 2022 CERVICAL SPINE SURVEY, THE

#1 NECK SURGERY
PEOPLE ARE MOST INTERESTED IN
LEARNING MORE ABOUT IS
HYBRID SURGERY
(BOTH DISC REPLACEMENT AND FUSION)



35%
Hybrid
Surgery

■ UNDERSTANDING SURGICAL OPTIONS: FRONT-TO-BACK BASICS



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Virginia Spine Institute

The collaboration between a patient and their surgeon during the surgical decision-making process is crucial to setting recovery expectations, which can enhance patient outcomes. Patient education on surgical options is an important part of this process. Although there are many surgical options to treat cervical spine (neck) pathologies, they can all be separated into two groups based on surgical approach: **anterior** (from the front of the neck, *Figure 1*) and **posterior** (from the back of the neck, *Figure 2*).



Figure 1: Anterior/front view of the cervical spine.



Figure 2: Posterior/back view of the cervical spine.

■ ANTERIOR APPROACH (FRONT)

Anterior Cervical Discectomy and Fusion (ACDF)

This literally means: entering the cervical spine from the front of the neck, removing the damaged disc(s), and fusing the bones above and below that disc together. Technically, the surgeon enters the neck through a small incision slightly off to one side, dissects down to the spine, removes the disc and any arthritic bone spurs in the problem area, then fills in that space with bone graft often held within a synthetic spacer to maintain height. The slow process of bone healing is what is referred to as the “fusion,” which allows for stabilization. Hardware like a plate with screws may also be placed to act as an internal cast, preventing motion while healing occurs.

Anterior Cervical Disc Replacement (ACDR) = Cervical Arthroplasty

This procedure begins exactly the same as the ACDF, but rather than fusing two bones together with spacers/bone graft/plates, the damaged disc is removed and replaced with an artificial disc made from synthetic materials. The main difference here is that motion is being restored rather than eliminated. There is no fusion, so the slow process of bone healing and stabilization are not needed for this procedure, allowing for a shorter recovery period.

Anterior Cervical Hybrid (ACH)

This procedure combines both the ACDF and ACDR when 2 or more levels of disc need to be removed. The approach is the same as described above. Discs can be damaged to varying degrees and the hybrid option enables surgeons to customize treatment on a per-level basis and utilize the benefits of both fusion (stabilization) and disc replacement (motion preservation).

Anterior Cervical Corpectomy and Fusion (ACCF)

Sounding similar to the ACDF, the ACCF is also surgically similar in the approach, but is much more extensive. In this procedure a corpectomy is performed, which involves removing most or all of a vertebral body along with the discs above and below it. A long spacer is filled with bone graft and placed in the open space to maintain height and allow for consolidation of the bone graft over time (a fusion). A plate with screws anchor into the bones above and below the treated area to act as an internal cast, limiting motion while healing occurs.

■ POSTERIOR APPROACH (BACK)

Posterior Decompression

Decompression is a term meaning to remove pressure. The neural structures in the cervical spine are delicate and pressure can occur on the exiting nerves that travel to the arms and/or on the spinal canal which houses the spinal cord surrounded by spinal fluid. Pressure can be caused by a variety of offenders, including: disc herniations, bone spurs, ligament thickening, or can be a combination of these. There are several decompressive surgeries which describe where the decompression takes place in the posterior cervical spine and the extent of the decompression, including: **laminectomy, foraminotomy, laminotomy, and hemilaminotomy.**

Laminoplasty

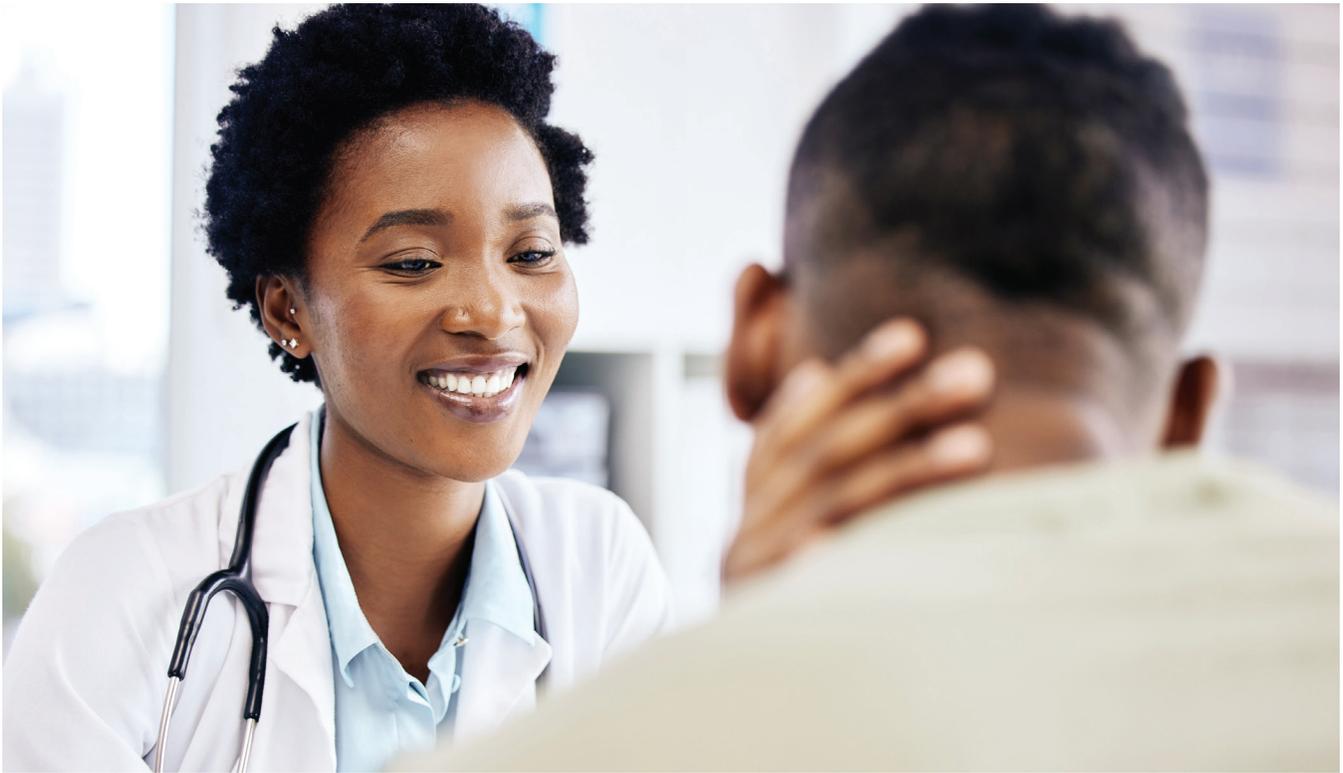
This procedure is designed to create more space around the spinal canal, which can become narrowed by degeneration of the surrounding structures such as bone and ligament. The extra space is created by making a small cut in the bone that surrounds the spinal canal (the lamina), which then allows for lengthening between the two ends of the cut lamina. Once adequate lengthening is achieved to increase the space around the spinal canal, a small plate and screws anchor into the ends of the cut lamina to maintain the new opened position. Laminoplasty is a non-fusion procedure.

Posterior Cervical Fusion

Similar to a posterior lumbar fusion, screws, rods, and bone graft can be placed to achieve fusion for stabilization of one or more levels in the cervical spine. This procedure can be performed by itself or in conjunction with one or more of the other procedures (i.e. laminectomy). Although many cervical fusions are done through the anterior approach (ACDF), there are times when the posterior fusion is needed instead of, or in addition to, the anterior approach.

■ CONCLUSION

You do not need a medical degree to understand the basics of cervical spine surgeries. Arrive prepared for a surgical discussion with your spine surgeon by understanding the 2 surgical approaches (**anterior/front** and **posterior/back**) to the spine. The surgical options presented will depend on the location and extent of the pathology at hand. Always ask questions if the details are unclear.



■ FAILED NECK SURGERY SYNDROME



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■ WHAT IS IT?

The field of spine surgery has seen tremendous advancements over the past few decades, benefitting a multitude of patients. As far as we've come, the fact remains that some patients do not get better. Failed neck surgery syndrome is a condition where a patient experiences persistent pain following one or more neck surgeries. It is closely related to a broader term known as failed back surgery syndrome which generally refers to recurrent pain after one or more surgeries on the lower back.

Neck and back pain are often multifactorial and very complex. There are a number of reasons why pain could persist following spine surgery. These reasons can be grouped into preoperative, operative, and postoperative factors. **Preoperative factors** could include psychological and social factors or improper patient selection for surgery (i.e. wrong indication for surgery). **Operative factors** could include inadequate decompression, instability of the spinal segments from excessive decompression (i.e. too

much structural bone removed), or even incorrect level surgery. **Postoperative factors** may involve recurrent disc herniations, adjacent segment disease where the level above a spinal fusion undergoes degeneration from newly introduced stress from the fusion and restricted movement, or new imbalance in sagittal spinal alignment. In some cases, epidural fibrosis or scarring can form which can put pressure on or even tether the spinal nerves.

■ HOW IS IT DIAGNOSED AND TREATED?

The evaluation of failed neck surgery begins with a detailed history and clinical examination. Basic labs may be ordered to rule out inflammation or infection. Postoperative imaging studies such as MRI, CT, or standing flexion and extension x-rays are typically obtained to rule out structural causes of persistent pain. If a structural cause is identified, **additional spine surgery** may be an option after a thorough workup that does not reveal any other causes. In general, the success rate of a repeat surgery in cases of failed neck surgery syndrome is lower than the initial surgery. The risks and

benefits should be carefully weighed since repeat surgery often has diminishing returns.

In the absence of compelling indications for reoperation, the management of failed neck surgery syndrome relies on an **interdisciplinary team-based approach** involving the spine surgeon, primary care physician, pain management team, and physical therapy team. Non-steroidal anti-inflammatory drugs (NSAIDs) possibly in conjunction with neuropathic pain medications such as gabapentin or pregabalin may be prescribed. The use of opioids remains controversial and is usually reserved as a short course generally in the postoperative period. Cervical epidural steroid injections may also provide pain relief by reducing swelling and inflammation around the nerves. Patients may also need to engage in physical therapy to improve flexibility and strengthen core muscles. Some studies have supported the use of cognitive behavioral therapy in improving chronic

neck pain scores. Another emerging treatment option in some cases of recurrent neuropathic pain from failed neck surgery syndrome is cervical spinal cord stimulator implantation. This option should be reserved after exhausting other conservative measures as data supporting its widespread use remains limited.

■ TAKE HOME MESSAGE

In summary, failed neck surgery syndrome remains a challenging clinical entity for both physicians and patients. Its underlying causes are numerous and approach to management requires a broad workup. Repeat surgery should be carefully considered in cases with a clear structural etiology that correlates with the location and type of pain being experienced. Patients benefit from a multidisciplinary approach to chronic pain management.



UNPARALLELED ACCESS TO WORLD-CLASS EXPERTS



Got Neck Pain?

Top Surgeons Answer Your Cervical Spine Questions

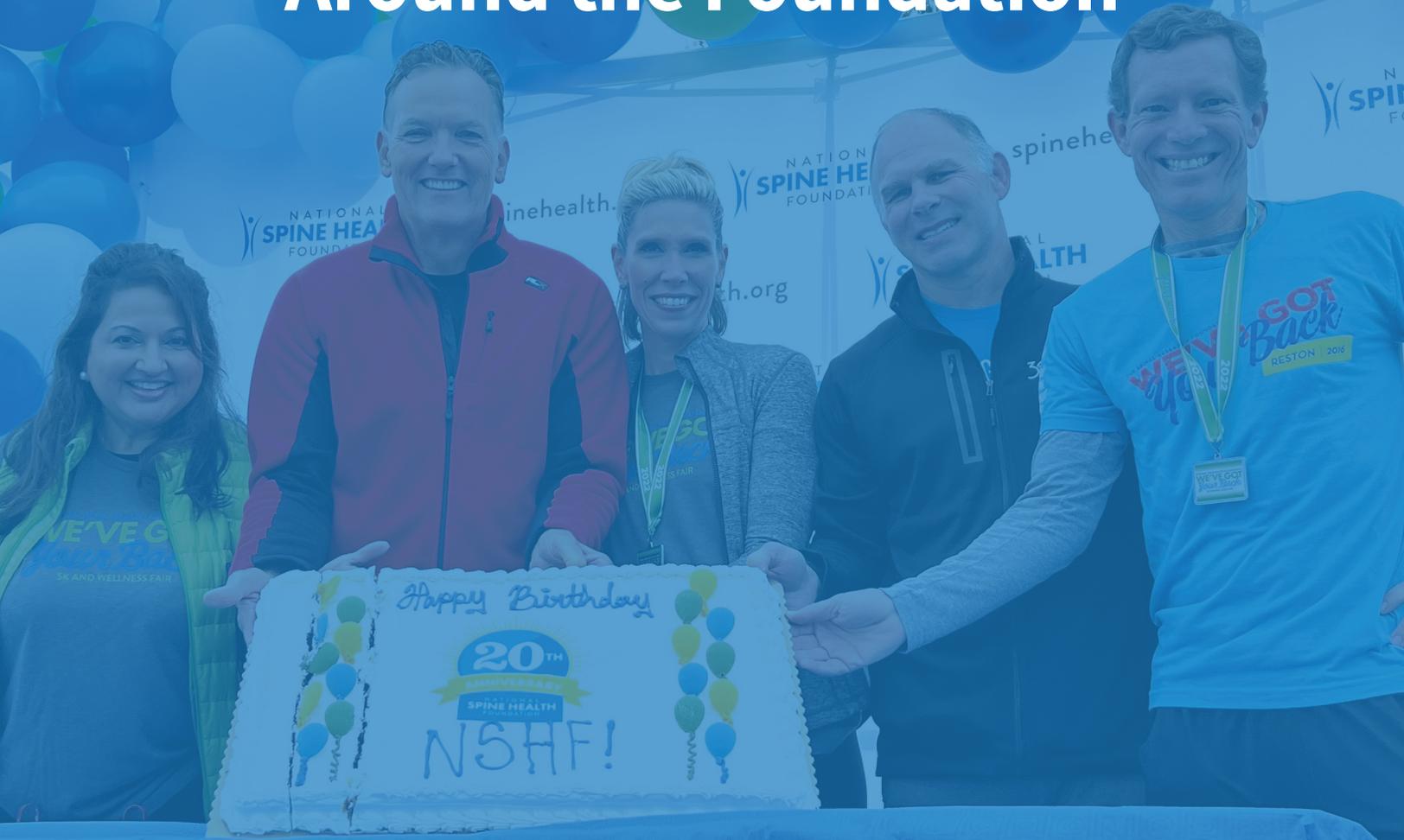
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SECTION 4

Around the Foundation





COALITION FOR
SPINE HEALTH

■ NEW COALITION BRINGS SPINE HEALTH PATIENT AWARENESS AND EDUCATION TO THE FOREFRONT OF PUBLIC HEALTHCARE



Dave W. Poley
Executive Director
National Spine Health Foundation

The National Spine Health Foundation (NSHF) has announced the creation of the Coalition for Spine Health, a first-of-its-kind collaborative initiative aimed at advancing public awareness and patient education. In its first phase, the Coalition brings together America's premiere professional spine societies and organizations to deliver best-in-class patient education. These include: the North American Spine Society (NASS), the Cervical Spine Research Society (CSRS), the Lumbar Spine Research Society (LSRS), the Setting Scoliosis Straight Foundation (SSSF) and the National Spine Health Foundation (NSHF) to deliver best-in-class patient education.

The Coalition's goal is to combine the collective expertise of the leaders in spinal health to improve the health outcomes of millions of Americans suffering from degenerative back

and neck pain, spinal deformity and other spinal disorders. By sharing research findings, advancing patient treatment methods, highlighting leaders in the field, developing novel educational programs, and advocating for access to quality care, the Coalition aims to advance patient knowledge and understanding of spinal conditions and treatment options, and amplify public awareness of the transformative advancements that have been achieved in spinal care and outcomes over the past two decades.

"We're thrilled that the Coalition for Spine Health will unify the top minds in spinal health to deliver best-in-class patient education," said Dr. Rita Roy, CEO of the National Spine Health Foundation. "By providing innovative learning opportunities for patients, the Coalition can improve the well-being of millions of Americans."

Dr. Larry Lenke, internationally recognized spine surgeon, Past President of the Scoliosis Research Society and Surgeon-in-Chief at The Ochs Spine Hospital, Columbia New York-Presbyterian, said, “I’ve seen first-hand how patient education can transform outcomes, especially when we consider the complex procedures and long recovery times that spine patients often face. It’s wonderful to see top spine organizations unite with a common goal of helping patients.”

The Coalition’s approach of bringing together leading organizations in spinal health is expected to drive progress and improve the quality of care for those with spine disorders. Pioneering new educational approaches for patients will equip them with the knowledge and resources to take an active role with their physicians in determining best treatment options, which can help contribute to better outcomes. The advocacy efforts of the Coalition will also help ensure that patients have access to quality care, which is essential for managing and treating spine disorders.

To learn more about this groundbreaking Coalition or to sign up for its newsletter, go to <https://spinehealth.org/coalition-for-spine-health/>.

COALITION MEMBER SPOTLIGHT: CERVICAL SPINE RESEARCH SOCIETY



As we introduce the Coalition for Spine Health, our aim is to feature a different member of the Coalition in each edition of the Spine Health Journal. As the current issue focuses on the cervical spine, it is fitting that we highlight the Cervical Spine Research Society (CSRS), an organization committed to evidence development, research and professional education in the cervical spine.

CSRS is an international organization composed of healthcare professionals committed to the advancement of knowledge and treatment of spinal disorders affecting the cervical spine. The organization was founded in 1973 with the primary objective of promoting research and education in the field of cervical spine surgery. Founded with the belief that the membership should encompass the diverse fields of interest related to the cervical spine, their membership composition includes a range of specialties and disciplines, such as biomechanical engineering, neurology, neurosurgery, radiology, orthopedic surgery, and more.

CSRS hosts annual scientific meetings, where members come together to share their research findings, discuss emerging trends in cervical spine surgery, and learn from experts in the field. CSRS provides funding for research studies and encourages collaboration among researchers in different disciplines.

The organization also publishes a scientific journal, *Clinical Spine Surgery*. This journal serves to educate spine surgeons on new clinical research and surgical techniques. The articles published in *Clinical Spine Surgery* are primarily based on original research studies, which typically fall into level 1, 2, or 3 categories. This ensures that the articles have the potential to impact a surgeon’s practice and are relevant enough to be both published and read.

CSRS has made itself the leading organization in cervical spine research. By partnering with the Coalition for Spine Health and the National Spine Health Foundation, CSRS is able to share their expertise and expand their capacity for patient education and advocacy. Illustrating the fruit of this collaborative Coalition with CSRS is the “Look Up! Tackling Tech Neck” campaign presented above on page 14 in this journal. Together, we will play a critical role in advancing knowledge and improving the treatment of cervical spine disorders, benefiting patients and healthcare professionals alike.



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