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The Truth About **Spinal Fusion**

 **SRF**
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About SRF

Established in 2002 and headquartered in Reston, VA, the Spinal Research Foundation is a patient focused 501(c)(3) nonprofit dedicated to improving spinal health through research, education, and patient advocacy. We empower patients with knowledge and hope! We help patients get their lives back!

RESEARCH

In our first decade alone, SRF has dedicated over 50,000 hours to research for the purpose of driving innovation and proving the effectiveness of surgical and non-surgical treatments. We've built a national network of distinguished partners, consisting of the nation's leading spine clinics and research practices. Through our research, we are proving what works – opening the door for patients to receive the most effective treatments and achieve the best possible outcomes.

EDUCATION

SRF brings together patient experiences, medical expertise, and research findings to offer much needed knowledge to patients as they embark on their spinal health journey. We use our expertise to provide meaningful, accessible information to help patients achieve improved spinal health, strengthen provider-patient relationships, and reduce uncertainty and anxiety.

ADVOCACY

The journey to spinal health is not one that can be made alone. The Spinal Research Foundation brings together patients and the nation's leading spine experts to drive unique patient support initiatives. Our efforts empower patients to take an active role in their health care, help them become self-advocates, and provide cutting-edge research and information they can use to make informed decisions and communicate effectively with their health care team.

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FROM THE EDITOR:**Brian R. Subach, M.D., F.A.C.S.****Balancing Cost and Efficacy**

In spinal health care, we constantly push the envelope. Going forward we must be mindful of the specific forces at work behind the expansion of our knowledge base and our surgical efforts. Corporate America has not been blind to the technical advances made in spinal surgery. Both corporate events and government reports acknowledge the number and types of spinal surgeries being performed as well as the surgeons performing them. We need to be cautious of the device oriented marketplace so often embraced by the surgical community. Although the newest developments often give surgeons a choice in their battle against traumatic and degenerative disease, the increasing number of new devices places a significant burden on this country's regulatory agencies. Many surgeons have become frustrated, wondering why the federal Food and Drug Administration is so difficult to deal with regarding these regulatory issues.

Without a doubt, careful research and retrospective review of devices will give us the ability to move forward. We do need to have a firmer grasp on the surgical outcomes that we are achieving at present. We need to carefully evaluate internal fixation devices used to stabilize the spine and correct spinal deformity, but more importantly we need to consider cost. With the skyrocketing costs of health care and the declining reimbursements, who is going to pay the bill? Will it be the patient? Will it be the health care insurer? The government? Or will it be the health care provider? I anticipate that with declining reimbursements and more complicated surgical procedures, it will be the surgeons bearing the brunt of both the financial and surgical workload.



As we move deeper into a debate on health care costs, a critical analysis must be made of new emerging fields of minimally invasive surgery, stem cells, and artificial disc technology to determine the way to gain optimal and cost effective outcomes.

I am curious if cost restraints will ultimately determine failure of a conservative management strategy making surgery actually more appealing. Does it make sense to actually shy away from more sophisticated conservative treatments because of cost and opt for a more definitive and curative surgical procedure? Will the gold standard for surgical intervention remain spinal fusion or will it be a minimally invasive and potentially regenerative approach?

In our new health care environment, obviously quality and efficacy matter, but these must be balanced with cost. If a certain procedure will add six months of quality life at a six figure cost, is that worthwhile? I am clearly in favor of careful evaluation of new technology with respect to both cost and efficacy. I would caution surgeons to do the same in adopting something that seems to be the next big trend in spine.



PRESIDENT'S NOTE:

Thomas C. Schuler, M.D., F.A.C.S.

Creativity and Research Drive Innovation in Spinal Surgery

Spinal fusion: two words that strike fear into the hearts of many people. I've actually had patients faint when they first heard they needed a spinal fusion. Much of this fear stems from horror stories of decades old surgical treatments and failed surgeries.

Thankfully, with imagination, creativity, research, and hard work, this field of medicine has evolved into one that now offers patients the best chance at a full recovery with very little down time.

The first spinal fusion dates back to 1911. As of the 1950s and 1960s, a patient recovering from a spinal fusion was required to lie in bed for at least three months and sometimes up to one year. Body casts and bed rest were all that surgeons of that era had available to immobilize the spine in the hopes of obtaining a fusion. In the 1970s and 1980s, advancements in spine surgery came more rapidly than in previous years. Segmental fixation was developed—a method which secures each vertebra individually to obtain a more rigid spinal construct. Studies showed that segmental fixation greatly improved fusion success rates. During the 1980s, we relocated the fusion site from the back of the spine to the intervertebral or disc space area. Common sense was backed by research to confirm that the large surface area between the vertebral bodies was the most favorable site for a successful fusion. These novel techniques evolved in the 1990s with dramatic improvement in technology, surgical options, and, most importantly, in surgeons' skills.

Modern day spinal surgery is leaps and bounds beyond where it was at the end of the century. The incision and the instrumentation are much smaller. We have state-of-the-art spinal instrumentation which enables surgeons to immobilize just one spinal segment. The ability to limit surgery to one motion-level allows for greater success in fusing the painful segment, eliminating the patient's deformity and pain while preserving the properly functioning segments.

Another great advancement which has gained momentum over the past decade is the use of minimally invasive spine surgery (MISS). Properly performed, MISS enables a surgeon to precisely eliminate the source of the pain with minimal disruption of normal tissues. Smaller operations with much less tissue disruption and appropriate stabilization lead to spinal surgery success: a happier, more rapidly recovering patient and, ultimately, a better quality of life for that patient.

In addition, we are utilizing artificial discs for patients who have painful discs but whose pathology doesn't require a fusion. These artificial discs allow surgeons to eliminate painful intervertebral discs while preserving normal motion and avoiding adjacent segmental breakdown.

Innovation and research have allowed these technologies to evolve. Regardless of which technique is used, patients can obtain outstanding success for their particular condition. It requires the combination of a well trained spinal surgeon utilizing contemporary instrumentation with modern surgical techniques, on the correct patient, with the correct diagnosis.

Advancing spinal health care is much more difficult now than it was in the 1990s and early 2000s when physicians were given flexibility by third party payers and the government to create and use modern and novel techniques. The great struggle that exists today is that the government and insurance companies are severely restricting the physician's ability to offer patients these life-changing therapies. Techniques and procedures that have proven to be successful in eliminating patients' pain and suffering and restoring people back to their lives are now routinely deemed "experimental" and are denied by third party payers. The insurance companies unilaterally select, for their own financial benefit, what they consider to be experimental versus proven. Their opinions are based upon a refusal to accept any research which has received substantial funding by corporations who manufacture and sell these

modern technologies. Physicians have been unable to financially fund research to prove the effectiveness of these established techniques which, again, have already been proven extremely effective through the corporate sponsored research.

The great advancements that we enjoy today are the result of much research and investment in spinal technology and novel surgical procedures. The year 2016 should be an exciting time to be a spinal surgeon with the enormous technologies that we have available to best treat each unique patient. A patient's care should be customized depending upon his or her specific symptoms, pathology, and life situation. Unfortunately, the government does not want us to individualize each patient's treatment. The government and third party payers believe one size fits all, preferring to look at all spine problems as identical and all people as identical. This cannot be further from the truth. All one needs to do is look at the groundbreaking research that is being done in cancer therapies to specifically target a patient and his or her cancer's specific DNA in order to optimize the patient's outcome. The same is true in spinal surgery. Each individual, his or her occupation, symptoms, and pathology must be considered and analyzed to determine the best treatment for his or her specific situation. Insurance companies, which are being forced to insure many more patients because of the new health care laws, are seeking ways to limit patient access to treatments, especially expensive ones. As a result of insurance companies attempting to cut costs, spinal surgery has acquired a bulls-eye mark. Ultimately, the insurance premium paying patients are unable to get appropriate care to resolve their specific conditions, leaving them to live with disabling pain and limitation.

Low back and neck pain are the leading causes of disability worldwide. The only way to reverse these painful, debilitating conditions is with modern technology, the best techniques, properly trained surgeons, and the ability of patients to receive this care. Brilliant minds create new methods and techniques. Research proves to the government and insurance companies the effectiveness of these innovations.

The Spinal Research Foundation (SRF) continues to stress the need for better research documenting outcomes to support modern techniques and the continued evolution of spinal health care. SRF is uniquely situated to produce valuable data funded by patient and public donations: non-corporate funded research that insurance companies and the government will not ignore or disallow. At SRF, we believe it is imperative that we continue to drive our research efforts and request public financial support so that we may continue the pursuit of our mission to improve spinal health through research, education, and patient advocacy. With your help and support, we can achieve this and continue to return millions of patients back to their lives.

Spine Tales

DAVID HOLLINGSWORTH

“Every day is an anniversary of the recovery.”

July 9, 2004 – A normal day, or so it seemed. It was a sunny Friday. The kids were watching TV, the babysitter had the afternoon off and had gone off to a concert. I was casually practicing riding my motorcycle in the elementary school parking lot. I didn't have my license yet, but I was trying to get some time in before going off to my Motorcycle Safety Foundation (MSF) beginning rider course.

This wasn't a very big or powerful bike. It wasn't a Harley, it was a Honda. Rebel 250. Born to be Mild. According to other riders, it was a good starter bike that everyone assured me I'd outgrow in a few months. It seemed easy enough to handle and not that difficult to ride around the neighborhood. I also made sure that I wore safety gear – full-face helmet, armored riding jacket, heavy jeans, boots, and motorcycle gloves. I was taking just about every precaution I could.

After a few passes up and down the parking lot, I began practicing hard stops. That entailed accelerating for several yards, then getting on the clutch and brake to get comfortable with stopping suddenly because you never knew when that would happen in real life. On the third pass, I must have hit a patch of sand or something, because I started to lose balance. When that happens, your first instinct is to grab onto the closest hand-hold. In my case, my hands were already on the handlebars, but my hand was also on the throttle. When I gripped it hard, I over-revved the bike, launching me into a curb at the end of the parking lot. If I had hit just a few inches to the left, I would have bounced up and over the curb, likely landing in the



grass after catapulting over the handlebars. Where I DID hit the curb, it was tall enough that the bike stopped suddenly, launching ME into the air. I came down right on the curb, and hit hard.

As soon as I landed, I knew it was bad. I was in intense pain and had at least enough presence of mind to not immediately try to move. I tried wiggling my toes. While my left leg was good, I couldn't feel anything in my right leg. A person walking by saw the accident, and called 911.

After I was transported to the hospital, they immobilized me for two full days prior to surgery. Right before putting me under, I was told,

“I don't know if you're going to walk again.”

Surgery took six full hours, and I was in critical care for another nine days before transferring to a rehab facility, where I spent six weeks learning to stand and walk all over again. Wearing a full-torso Thoracic-Lumbar-Sacral Orthosis (TLSO), it took a couple nurses to help me roll over, get in a wheelchair, and even go to the bathroom. I was about as helpless as I could be without being completely bedridden.

When I was in the hospital, it took small steps to go from being immobile to rolling over in bed. One day,

I was able to sit up by myself which made watching television from the hospital bed a lot easier. Because I needed assistance to transfer to the wheelchair, getting to the bathroom was a major production which required advance planning. After several days, I was able to transfer myself, which was a major boost in my confidence (and privacy). From there, I was able to stand with a walker... then take a step... then another.

After I was discharged, I nearly exhausted myself walking 60 feet to the neighbor's mailbox. But each day, I'd build a bit more, to the point where I would be walking as many as seven miles in one day.

That doesn't mean it's been all successes. Eight years after the accident, I was significantly overweight, and not exercising much at all. I certainly wasn't pushing myself.

I came to the realization that nothing would change if I didn't.

Knowing that I had failed a number of times in the past, I decided to do this effort a bit differently, making small changes, but measuring my progress along the way. To paraphrase Covert Bailey, my goal was to 'start so slowly, people would make fun of me.' Day one, I started out walking. Once I got up to 30 minutes after about a week, I decided to see if I could run (slow jog, actually). I jogged 60 yards. Then walked. I built up to 60 on/60 off, and each week I'd add a bit, eventually building up to running a full mile.

During the spring, I built up from my first 5K, then a 5-miler, then a 10K, and then a 10-miler. Eventually I ran the Indy Monumental Half- Marathon with my sister and her husband. Building up wasn't easy, but I did it in such small increments that it didn't feel like more work.



Today, if I didn't tell you I went through that, you probably wouldn't know.

I walk, run, and ride regularly to stay active, and I compete (if you can call it that) in local athletic events. I love cycling, swimming, running, and participate in triathlons. I have to take my time and be careful about training, but it's less because of the accident and more because of my age. Some days I'm a little sore from overdoing it, but everyday is an anniversary of the recovery, and I plan to be celebrating again. Just not on a motorcycle.



VINICIO VANICOLA

The Case for Becoming Your Own Health Advocate

The beginning and end of my story is no different from many of those I've read in "Spine Tales." Degenerative disc disease of my lumbar spine had progressed to the point where surgical intervention was necessary, and I now live a full life completely free of back pain. What I want to convey in this story is the importance of educating yourself about your condition and possible treatments, the importance of appreciating the advances in surgical technology and expertise that are available, and the importance of being grateful for the possibility of living your life fully again.

Lower back pain flared up occasionally throughout all of my adult life, typically following some type of activity that strained my lower back. My first nasty back pain came at age 19 after simply chopping wood in my parents' backyard. Episodes like this continued intermittently for the next 30 years, usually every six months. For treatment, I would rest, take ibuprofen and acetaminophen, and the pain would go away in a couple of weeks. Looking back, I vividly remember my dad dealing with back pain, and I remember stories of my grandfather's back pain being so bad that he was occasionally hospitalized.

In the summer of 2011, my spine health began to decline with a progression of new and more severe symptoms. With agonizing and constant pain in my hip, I made a visit to an orthopedic surgeon who ordered an MRI of my hip, which showed nothing amiss. A subsequent MRI of the lumbar spine showed a herniated L4-L5 disc, and a prevalent bulge of the L5-S1 disc. Physical therapy was prescribed, which I diligently completed. By September of 2011, I was relatively pain free.

Fortunately, we live at a time when diagnostic imaging studies are conducted at specialty facilities, and patients are the custodians of their own study media. We take MRIs with us to our office visits, but we can also load the imagery onto our own computers and view the same images our surgeons examine while they diagnose our problem. As I was recovering from



my disc herniation, I poured over my MRIs and did an initial bit of internet research in an attempt to learn what was wrong with my spine and why I kept having recurring back pain incidents. It was easy to find very informative videos, spine condition descriptions, and treatments at a number of highly reputable web sources. Given the extent of information available, I was able to become appreciably informed about my condition and options.

In February of 2012, I was catching curve balls from my daughter (a committed NCAA Division I softball pitcher) when all of the pain came back immediately, with additional excruciating pain located just above my sacroiliac joint. I was miserable and went to see the orthopedic surgeon again. After another MRI of my lumbar spine, it appeared that the L4-L5 disc had emitted more material, and my orthopedic surgeon recommended a microdiscectomy of the L4-L5 disc. I underwent the procedure, and immediately felt complete relief. Unfortunately, this feeling only lasted for three months.

Pain returned for no apparent reason in May 2012, and worsened daily. At the time, I was thinking that I would need an additional microdiscectomy, and I made another visit to the orthopedic surgeon's office. From August 2012 through February 2013, I was given several sets of steroid injections, four facet joint rhizotomies, a lumbar CT scan (from which I was able to generate a 3D model of my spine), a nuclear bone scan, an EMG, an MRI of my thoracic spine, and an additional MRI of my lumbar spine. Also from September through December, the pain reached a level that was nearly impossible to bear. I was using

two canes because I couldn't walk more than 20 feet on my own, I was taking maximum recommended doses of several opiates, I couldn't sleep, nerve pain constantly shot down my legs, and I had extensive trouble just staying upright. If I were a horse, they would have shot me.

During this time, I again focused my attention toward my imaging studies and internet research. In addition to reviewing my MRIs and CT scans, studying the radiologist reports, and searching for MRI images of lumbar spine problems, I did the hard homework. I conducted extensive internet research to gain a basic understanding of spinal health vocabulary, nerve anatomy, surgical interventions, surgical indications (and contraindications), and non-invasive treatment options. Through my diligence and desperation, I had learned more about the spine, spine disorder diagnosis, and surgical options than I ever thought possible.

More importantly, though, I became a well-informed advocate for my own health.

By February of 2013, it was clear to me that I needed fusion surgery... but it wasn't clear to the orthopedic surgeon I had been seeing. I began to research the various surgical options for lumbar fusion, and came to the conclusion I needed an Anterior Lumbar Interbody Fusion (ALIF). Now, I'm just a guy with an internet connection, and the capability to investigate and understand, but I was convinced that I had neural foraminal stenosis brought on by the collapse of my L4-L5 disc. That was my "official" self-diagnosis. While I would never be foolish enough to believe my self-diagnosis was medically acceptable, I did learn that my symptoms, pain locations, and imaging studies matched up perfectly with indications for ALIF surgery. Again, this was my thoroughly humble and non-professional opinion.

I spoke with the orthopedic surgeon's assistant about the ALIF procedure, and I remember her telling me, "We only use an anterior approach for the most severe of cases." I did not address it with her, but thought to myself that my case was rather severe. When I later spoke with the orthopedic surgeon (and showed him the 3D renderings of my spine that I had created from my CT scans – which he thought were pretty



slick), I asked him how a posterior approach could be used to restore my disc space. He told me that the fusion surgery he had in mind wouldn't restore disc space—the goal of the procedure would be to stabilize the spine. Armed with the knowledge I had gained, I couldn't understand how the nerve pain would subside if the foramen wasn't expanded. Being thoroughly respectful, I didn't say what I was thinking, which was simply, "I don't get it." The reason "I didn't get it" was because the surgical treatment he recommended didn't align well with what I had learned, not because I didn't understand what I was being told. At this point I decided to look for another surgeon.

I made appointments with two surgeons. One was a rising star out of Johns Hopkins Hospital who came highly recommended by a friend in the medical profession. The other was Dr. Subach of the Virginia Spine Institute, whom I had seen seven years earlier. I saw the Johns Hopkins surgeon first, and after his examination and review of my MRIs said to me, "You need an Anterior Lumbar Interbody Fusion", to which I smiled and thought to myself, "You're right." I truly had done my homework. Later that week, I went to the Virginia Spine Institute for my visit with Dr. Subach. While the Hopkins surgeon was indeed brilliant and personable, there was something extra special about the way that Dr. Subach approached my problem, poured over all of my data, and treated me as if I were an old friend. After reviewing everything, he recommended an ALIF, as well. At the visit, I decided that my ALIF would be performed by Dr. Subach. A week later, Dr. Subach performed a lumbar discography to confirm his diagnosis, and prescribed an ALIF of L4-L5 and L5-S1 with posterior instrumentation.

Of course, all this time I was in crippling pain.

Family and friends would ask me if I was nervous about what I was to endure with the surgeries. Plain and simple, I would answer, “No, I feel fortunate.”

I would continue and say that I was fortunate because I wasn't my grandfather. As I mentioned earlier, stories I had heard indicate that he suffered from severe degenerative disc disease, but his situation was different than mine. At 49 years of age, he had four kids at home and had to drag himself to his job at the steel mill regardless of how debilitating his back pain was on any particular day. If he didn't go to work because the pain was too much to bear, he would lose his wages, and someone was waiting to take his job. This wasn't lost on me, and it helped me to focus only on the positive aspect of eventually being able to live fully again. So I felt fortunate – very fortunate. Also, since I had learned about the history of spinal fusion technology through my research, I was grateful that my surgeries were going to take place in 2013 and not in 1939.

The surgeries went well. Of course, there was what I considered to be minor incision-related pain and the general pain of the fusion healing process, but that pain was altogether trivial compared to the pain of living with paper-thin discs that caused my vertebrae to rub together and gnaw on my spinal nerves. My recovery progressed quite well – better than I could have ever expected. After six months I was skiing, I now work out six days a week, I golf regularly, and my back hasn't felt this strong since age 18—never even the slightest stitch of pain. The best way to describe it all is this: it feels like there was never anything wrong with my back, and I never had surgery to fix it. Being able to make that statement gives me overwhelming joy, and I will forever be grateful for the care provided by Dr. Subach and the Virginia Spine Institute.

My advice: learn all you can about the spine, your symptoms, treatments, and maintain a positive outlook. Given the tremendous volumes of information at our fingertips on every topic under the sun, there's no reason why you can't be informed enough to be your own advocate. Appreciate how fortunate you are that you can take the time to be cured, and realize that you will benefit from decades upon decades of advances in surgical training and medical technology.

THE CLINICAL PERSPECTIVE

**FROM DR. BRIAN SUBACH
VIRGINIA SPINE INSTITUTE**

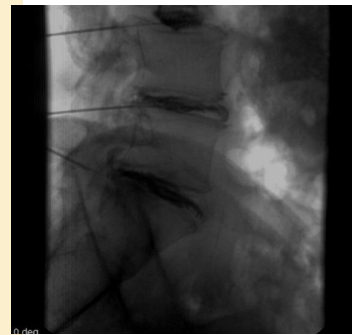
I had a chance to meet Vinicio Vannicola first in 2004. He came in with mild complaints of low back pain and tight hamstrings. He continued to deal with a home exercise regimen until he had surgery at an outside facility in 2012 for a ruptured disc. He then returned to me in February of 2013 complaining of low back pain. Despite the previous surgery, it had done nothing to resolve his low back pain and he had signs of obvious degeneration at the lowest two discs of the lumbar spine. He had an MRI scan, x-rays, and underwent lumbar discography. When I did the discography procedure I was able to press a small amount of dye into each of the discs. At the L3/L4 disc he had no pain; however, at the L4/L5 and L5/S1 discs it reproduced relatively severe pain in his usual pain distribution. I knew at that point that we had a reason for his back pain. I offered him a surgical procedure to address the disc component of his pain and stabilize his lumbar spine with a combined anterior/posterior or a front/back operation. On Monday, April 15, 2013, he underwent anterior lumbar interbody fusion at L4/L5 and L5/S1. Two days later I revised his scar and revised his decompression, performing a posterolateral fusion with screws.

After the initial postoperative period where Mr. Vannicola was fairly sore, he started doing physical therapy, strengthening his core, and improving his flexibility. He felt that he had been given a new lease on life. Mr. Vannicola has shown tremendous courage in the face of adversity in dealing with his low back pain. No one likes the idea of having surgery, but the last time I asked Mr. Vannicola if he made the right choice, he responded, "Absolutely."

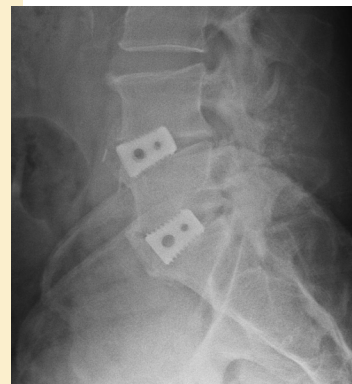
The last time I saw Mr. Vannicola in the office on December 19, 2013, he was two weeks out from removing the screws in his low back, which were no longer necessary. His pain level was a zero out of ten, and he was quite happy.

To go through the process of identifying the pain generator, seeking a surgical opinion to repair that problem, and then to do as well as Mr. Vannicola did with physical therapy is remarkable. He is quite simply an ideal patient.

Thank you for your efforts Vini!



Fluoroscopy image during the diagnostic discography



Lateral view x-ray after the anterior lumbar interbody fusion at L4/L5 and L5/S1 showing the implants between the vertebrae



Lateral view x-ray after the posterolateral fusion at L4/L5 and L5/S1 showing the implants between the vertebrae and the posterior instrumentation

KATIE CASSIDY

"I wish someone had told me much sooner that I didn't have to live in pain."

I was 15 when I was taken to the ER. It was after a high school volleyball game, and I found out I had fractured my lumbar spine. That was the beginning of many painful years for me.

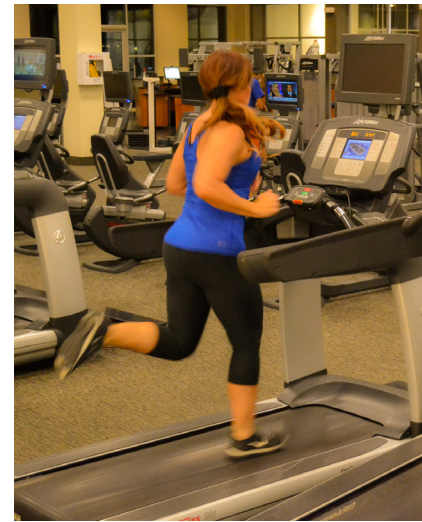
In my early 20s, I tried to stay as active as possible. I continued to weight train with hopes of competing in fitness, but the pain in my lower back stopped me every time. Even with the pain, I continued to work out and stay active. But there were times the pain was so bad, I would find myself stuck in bed for weeks. The only times I would get up was for physical therapy or chiropractic care. Once the pain was manageable, I would start the vicious cycle again of working out only until the pain became unbearable once again.

When I would have these flare ups of excruciating pain, I was given muscle relaxers and pain medications which put me right to sleep. I run my own company, and the medication side effects were too strong. So I tried other treatments, such as massage, acupuncture, physical therapy, and chiropractic care. I also had to give up the active lifestyle I loved.

Over the course of the next 15 years, I would often find myself thinking about how quickly the pain was taking over my life. It was stopping me from living. Eighteen months prior to having surgery, I stopped weight lifting. I planned my days and activities with my kids around how long I could sit or stand. Life was "best" if I could be in bed by 4 or 5 p.m. in the afternoon. And that's pretty much what I did.

My once very active life wasn't so active anymore; yet I was young. It was embarrassing.

In the summer of 2014, I found myself in excruciating pain. Whether I was standing, sitting, or lying down, it was unbearable. I went to the ER. The pain lasted four days, and again, I was on medications. Again, the medications made me drowsy. It was hard to work



let alone stay awake. However, I had my company to run and kids to take care of.

Thanksgiving of 2014 was my turning point. I decided I was no longer going to let the pain control me. I was 43 years old, embarrassed to tell people how badly I hurt, and more embarrassed that the pain was so intense that holiday. I couldn't lift the turkey out of the oven and could barely stand to finish dinner for my family. Simple things in life quickly were becoming harder and harder. That's when I began researching spine care physicians.

In April 2015, I contacted Desert Institute for Spine Care (DISC). The pain was horrible that day. I dialed the number and assumed it would be months before I could get an appointment. To my surprise the young lady that answered the phone made me an appointment for the following day.

My appointment was with Dr. Field. When Dr. Field explained to me that I needed an anterior/posterior lumbar fusion to correct my lower back, I was scared. Back surgery was not the answer I wanted to hear, but he took the time to explain everything so that I understood. I felt confident in my treatment plan when I left his office that afternoon.

Once I arrived home I started researching the procedure, the outcomes, and how it impacted the quality of life of patients from other clinics. That was a mistake. My online research frightened me, and I found myself questioning my decision to have

surgery. I've also never known anyone to have back surgery and be pain free, like Dr. Field said I would be. The only way to calm my fears was to see him again. The office gladly scheduled another appointment for me and Dr. Field answered all of my questions. He didn't rush me or make me feel as if I was being silly with my list of questions. He calmed me. I left there feeling confident again in my choice to have the anterior/posterior lumbar fusion.

Surgery was scheduled for April 28, 2015. Two days prior, my insurance still had not approved my surgery. Fortunately, the team at DISC worked hard to get the insurance approval in order before my surgery date, and I went through with the surgery as planned. When I woke up after the procedure, I instantly felt the difference. It was the first time I could ever remember my hips feeling like they were connected to my body. It was the best feeling ever. I stayed in the hospital for three days. During that time, I tried to get up and walk as much as possible. The post-surgery pain was minimal and tolerable.

Once I returned home, I continued to walk daily no matter how uncomfortable it was. I was off all pain medicine by the end of the first week. Within two weeks, I was able to take class at Orange Theory Fitness. I might have walked on the treadmill, but I enjoyed the class environment and getting out of the house. The fitness staff helped me to modify the entire class and I only added exercises my body was ready for, with Dr. Field's approval of course. At eight weeks, I was fully participating and doing sprints without pain.

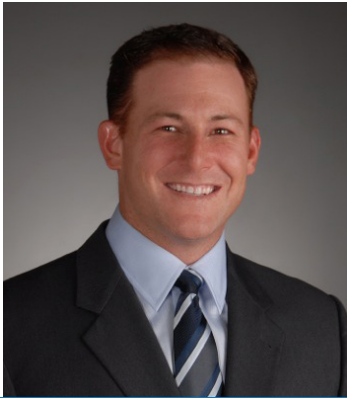
Every time I'm there, I tear up during class because I think back to how painful exercising was for me prior to this procedure.

The fact that I am doing everything people said I would never do again after back surgery, in only eight weeks, is mind blowing! I can do all the things I love to do with no pain. All the years of suffering my body still braces for pain out of habit, but now it never comes.



Dr. Field gave me my life back. I now enjoy long days with no need to lay down; I can enjoy my kids; I can cook all day; do my own laundry; stand all day; work out; anything! And I do it all pain free. There isn't a day that goes by that I am not grateful for Dr. Field and his ability to make me so comfortable with such an uncomfortable option. He was right; I am running again, and I am living an active life even soon after surgery.

My experience at DISC was phenomenal. The entire team is professional, compassionate and they take great pride in taking care of their patients. I would recommend Dr. Field and his team to anyone experiencing spinal problems. I wish someone had told me much sooner that I didn't have to live in pain.



THE CLINICAL PERSPECTIVE FROM DR. JUSTIN FIELD DESERT INSTITUTE FOR SPINE CARE

I first met Katie Cassidy in March 2015. Katie is a 45-year-old female who was able to balance a very active lifestyle of athletics, being a mom, and also an entrepreneur in business. Unfortunately, she continued to suffer with ten years of back pain, which had gotten progressively worse over the last year. She presented to me with severe low back pain with radiating pain all the way down her leg to her toes. She had tried extensive conservative treatment for quite a long time, and the pain became debilitating.

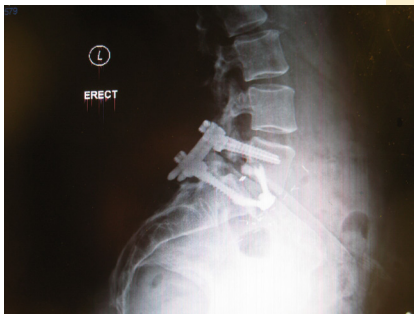
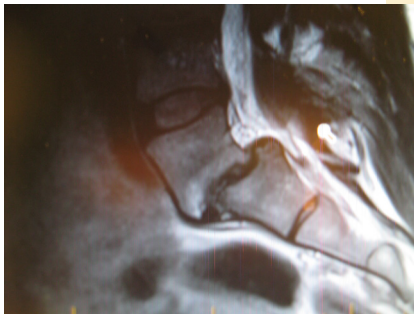
On physical examination, it was difficult for her to stand in an extended position, and she found it more comfortable to be slightly flexed forward. She had tenderness to palpation all along the lumbosacral region, as well as the gluteal area with decreased sensation down her right leg in the L5 nerve distribution. She also had some weakness in her ability to dorsiflex her ankles and toes on the right side.

I reviewed her x-rays and MRI, which showed a grade 2 spondylolisthesis at L5-S1 with bilateral pars defects and severe neuroforaminal stenosis. The instability that she had at L5-S1 along with her severe stenosis that was impinging on the nerve roots certainly explain her debilitating back pain and lower extremity radiculopathy.

Katie and I talked extensively over several visits of what would be appropriate surgical care for her condition. I felt that it was very important to not only treat her back pain, but her leg pain as well. We felt that the best surgical treatment for her was to perform an anterior lumbar interbody fusion at L5-S1 to be able to restore her sagittal balance, as well as restore disc space height at the L5-S1 region. This would also give her the relief in her leg pain by reducing the L5-S1 spondylolisthesis and restoring foraminal height as well. In addition, I felt that she needed posterior instrumentation and fusion done through a more minimally invasive percutaneous fashion to stabilize the L5-S1 area because of the grade 2 spondylolisthesis.

After surgery, Katie did extremely well. Within one week of surgery, she was able to walk and do normal household activities without any back pain at all. Her right lower extremity pain, weakness, and numbness completely disappeared as well.

It has been six months since her surgery and she had been quite active in athletic activities and her quality of life has been drastically improved. Katie Cassidy is a spinal champion because she is truly an inspiration to her family, friends, and anyone who suffers from chronic pain. She has been enthusiastic and dedicated to her postoperative recovery, as well, which has enhanced her overall improvement from surgery.



CHUCK LOFTON

Smiling Pain Free

CAN I SEE ANOTHER'S WOE,
AND NOT BE IN SORROW TOO?
CAN I SEE ANOTHER'S GRIEF,
AND NOT SEEK FOR KIND RELIEF?
—WILLIAM BLAKE

For 30 years I have been the morning meteorologist at WTHR-TV in Indianapolis, Indiana. For more than 12 of those years, I have suffered periods of severe neck and back pain. Part of my job at the NBC affiliate in Indy is to give people the forecast and the hour by hour look at changing weather, but to also, hopefully, put a smile on their faces as they head out the door.

Putting a smile on my own face was sometimes very difficult, because I was smiling through pain that shot down my back, neck, and even legs.

My story began more than a decade ago. At a doctor visit, for an unrelated ailment, I found it difficult to hop on the table for my exam. Through gritted teeth and beads of sweat on my forehead, I managed to half crawl my way on top of the table. The doctor, a former physician for the Indiana Pacers NBA franchise and a former college athlete, immediately ordered up a set of x-rays. After analyzing them, he sent me to Dr. Rick Sasso of the Indiana Spine Group, a renowned physician and a Spinal Research Foundation Spinal Hero.

Not wanting an operation if unnecessary, I spent the next few years with various treatments, from medication to physical therapy. All of these approaches brought some form of relief, but sadly the relief wasn't long lasting. The pain would eventually return, with my forced smiles on television presenting the weather becoming more common.

Eventually the pain episodes came closer and closer together. Sitting in a car driving home from work meant adjusting and readjusting my seat trying to find a position that would provide some form of relief. Eventually, the day came when a serious decision had to be made.



In January of 2014, Dr. Sasso saw me and diagnosed an L5 lumbar radiculopathy. We quickly scheduled a surgery and not soon after, he performed a laminectomy at L4/L5.

The healing and pain relief wasn't immediate, but it was gradual and it was...real!

Since the healing took place I've been able to work out, ride my bike, and do my job without the wincing pain that had so often been part of my life the past decade.

The words "kind relief" are an important part of William Blake's prose at the beginning of my story. Those words also describe Dr. Sasso and his talented staff. From treatment to surgery to recovery to follow up, kind relief was shown to me by Dr. Sasso and the folks who work with him. Their genuine concern for my problem and the professional attitude they have displayed down this long road have been real, personal, and so appreciated.

I have a better quality of life. The constant pain is gone. I am a spinal champion, but it's because of the folks at the Indiana Spine Group who God has blessed with the ability to show "kind relief."



THE CLINICAL PERSPECTIVE FROM DR. RICK SASSO INDIANA SPINE GROUP

I first saw Mr. Lofton in August of 2006. Of course I knew who he was because he is the meteorologist on the local news station and a favorite local celebrity. He had an eight month history of low back pain that did not radiate. AP and lateral x-rays demonstrated decreased disc space height at L5/S1. The lumbar MRI noted advanced degeneration at that same level. Based on this, I recommended six weeks of NSAIDS and physical therapy. He presented again in December of 2007 with the same symptoms. He had experienced excellent relief of pain with the NSAIDS and physical therapy, but was now presenting with new onset back pain along with radiating pain in posterior thighs. Repeat MRI demonstrated no new changes, and he was restarted on NSAIDS and resumed physical therapy. We did not see him again until January of 2014 at which time he had worsening back pain radiating to his right buttock. He was started on a Medrol dose pack with instructions that if he did not note significant relief, we would like to repeat his lumbar MRI. The physical exam noted a positive and contralateral right straight leg raise. He returned to the office one week later. He had not noted any relief from the Medrol dose pack and had proceeded with a new MRI. He rated his pain as a seven out of ten and was having a difficult time bending. This pain was making it very difficult for him to maintain a professional demeanor on air.

The physical exam again demonstrated a positive right straight leg raise. In addition he has decreased sensation to his right foot and 4/5 right EHL strength. MRI scan demonstrated a large disc herniation at L4/L5.

Based on his physical exam, pattern of symptoms, and imaging studies, I recommended a lumbar microdiscectomy at L4/L5 on the right. This was performed as an outpatient procedure. During surgery he had a huge sequestered disc herniation L4/L5 with dorsal displacement of the L5 nerve. Excellent decompression was achieved.

He was thrilled with his postoperative progress. Two weeks post surgery his radicular symptoms had resolved. He quickly returned to his on air job and left for a trip to Florida shortly after his surgery. Mr. Lofton is a Spinal Champion due to his strong desire to return to work and all of his normal activities. In addition, both before and after surgery, his on air persona never reflected the significant lumbar issues he was experiencing.

CHRISTIAN ROSS

A Surgeon's Perspective

Christopher R. Good, M.D., F.A.C.S.

Virginia Spine Institute

It is truly a privilege to share Christian's story with you. It is a story of inner strength, devotion, family support, and team work.

Christian was diagnosed with a small scoliosis when he was eight years old. Scoliosis is a medical condition where the spine develops a curvature as it grows. Scoliosis is a relatively common condition affecting about 2% of teenagers. Luckily, only about 1/1000 teenagers have the type of curvature that progresses to the point where surgery is required. Scoliosis curves are usually observed on x-rays where the amount of curvature of the spine is measured using geometry.

In general, small curves which measure between 10-25 degrees in size are just observed as time passes to make sure that they do not get any bigger. If a scoliosis curve is getting bigger as a child grows, then a brace may be recommended. In general, wearing a brace is recommended for scoliosis curves between 30-45 degrees. A scoliosis brace is a custom-molded plastic brace that is worn to hold the spine and encourage growth in a straighter position. When a brace is used, wearing the brace full time (night and day) is the most effective treatment. The more hours per day the patient wears a brace, the better it works to prevent the curve from getting worse. If a curve becomes greater than 45 degrees, then surgery is usually recommended because that is the size at which the curve can be expected to continue to get bigger throughout a patient's life and lead to more serious medical issues.

Initially, the orthopedic surgeon that Christian saw recommended observation of his curve with regular x-rays, but unfortunately as Christian grew it became obvious that his curve was getting worse. Eventually, the doctor recommended that Christian begin to wear a brace at night. Unfortunately, Christian's spine continued to curve even faster. It quickly got to the point where his friends and family members could see his condition worsening both by looking at his

back and his x-rays. Christian and his family felt that they were in good hands and continued to work with their orthopedic surgeon who unfortunately continued to recommend that he wear his brace at nighttime even though his spine had curved well beyond the 45 degree mark where surgery is usually recommended.

In one year, Christian's scoliosis curvature progressed over 30 degrees to the point where the curvature in his thoracic spine measured 85 degrees. Christian's severe progressive scoliosis was mainly in his thoracic spine. As it worsened, his rib cage was twisted and distorted, and it began to compress his lungs. His severe scoliosis led to a condition known as restrictive lung disease where the stiffness and twisting of the rib cage prevents the lungs from inflating properly.

By this time, Christian was having difficulty keeping up with his normal activities. He had previously been playing as a goalie on his lacrosse team, but now started to notice increasing difficulties mainly due to trouble breathing as his condition worsened.

It was very hard for him to breathe, and as he noticed more and more trouble with his body, it began to also affect him mentally.

Christian was blessed to have a very supportive family and a great team of people around him. As he started having more troubles, his family began to rally around him, and his dedicated lacrosse coach, John, became a very important motivator for him. John encouraged him to "get as strong and as flexible as possible before surgery". They began a very dedicated exercise and rehabilitation routine to keep Christian as healthy as possible. Captain John convinced him to "FIGHT BACK!" and provided the motivation Christian needed and kept him from giving up.

Captain John was all too familiar with Christian's troubles because he had seen the trouble scoliosis can cause first-hand. Captain John's brother-in-law had died from pneumonia related to scoliosis. Everyone became totally dedicated to motivate and to help Christian fight through this time. John encouraged Christian to believe that he could be

cured and as they started working together, he became stronger mentally and physically.

Christian's family brought him to meet Dr. Christopher Good at the Virginia Spine Institute when he was 14 years old. Over the past year, the scoliosis had progressed over 30 degrees, and they were still being told that he should just continue wearing the brace at night. As soon as Christian met Dr. Good, his treatment moved forward quickly. Christian had a full evaluation of his breathing and his lungs and also a full evaluation of his spine. Within one month of meeting Dr. Good, Christian was prepared to undergo a spinal reconstruction surgery.

Christian's scoliosis now measured 85 degrees and he had a severe rotation of his spine and chest that was severely limiting his breathing. Unfortunately, pulmonary function testing confirmed that Christian had lost over 52% of his lung function because of scoliosis.

Christian's family brought him to see Dr. Good for a second opinion because he is a spinal surgeon who specializes in complex surgery and spinal deformity. Dr. Good proposed a scoliosis reconstruction surgery

correcting the curvature and rotation in Christian's spine with metal implants: screws and rods. Dr. Good also told them that because the spine had grown so stiff, it would also be necessary to make cuts through the various joints in the spine to give the spine enough flexibility to be corrected into an acceptable position. Unfortunately, because Christian's surgery was performed later than ideal, additional levels of the spine had to be included in the surgery, and the increasing size of the curve and stiffness increased the risk and complexity of the surgical procedure.

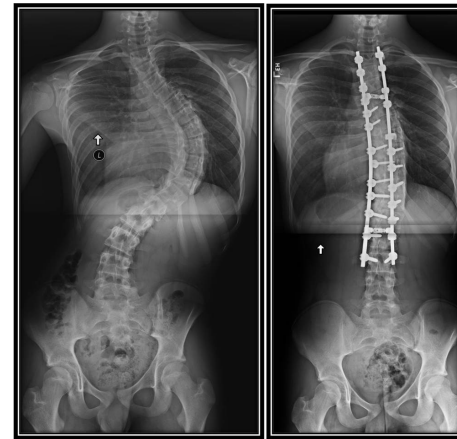
Christian underwent spinal reconstruction surgery from T2 to L3 (fourteen levels) later that month. Christian's procedure took all day to complete, and while he was in surgery, his family and John waited at the hospital in support. They were with him as soon as he awoke from surgery and went to the ICU. Christian's surgery was a long delicate surgery, but at the end of a long day, Christian's spine was successfully straightened and fused.

After surgery, all of Christian's hard work began to pay off big time! He recovered at record pace, and Dr. Good told his family that Christian was one of the toughest young men he had ever taken care of. Christian spent one night in the ICU, and went home just 4 days after a major spinal reconstructive surgery! All of the tremendous mental and physical work he, his family, and coach had put in before surgery began to truly pay off. Christian was astoundingly strong and resilient and was able to come off all pain medications within days after his surgery!

At home, Christian and his family began taking short walks and working to increase his body's strength and recover from surgery. Within two weeks after surgery, Christian was taking long walks outside with his dad.

Christian and his family were careful to give his spine time to heal, but he began working on strengthening his legs and calming down muscle spasm immediately after surgery and increased his physical activity once Dr. Good told him that it was safe. He began working with very light weights, lifting, and performing many repetitions to regain tone and flexibility, and as time went on, he was able to begin running and performing full exercises!

At three months out from his surgical procedure, Christian reported not having any residual pain in his back and began increasing his exercise routine with a goal of getting back to play as a goalie on his high school lacrosse team. Amazingly, Christian was able to get



X-ray of Christian's spine before and after spinal reconstruction surgery showing his severe scoliosis corrected from 85 degrees to 35 degrees and the resultant improvement in his ribs and lungs.



A photograph and X-ray of Christian's back showing his severe scoliosis and the twisting of his rib cage and compression of his lungs.



Christian's back before and after spinal reconstruction surgery showing the improvement in his posture and rib cage.



Christian's back before and after spinal reconstruction surgery showing the improvement in his posture and rib cage.

into such great shape that he was able to start as goalie for his high school junior varsity team, starting every single JV game. He is continuing to train and build his strength and it looks like he may be ready to start on the varsity team this coming year!



Christian started every single game as goalie on his high school JV team just 9 months after scoliosis reconstruction surgery!

Christian has returned to a normal life and function and recently returned from a six day trek hiking over 50 miles at high altitude with his Boy Scout troop at the Philmont Scout Ranch in New Mexico. Christian was able to carry his 45 pound pack on very grueling hike through rugged high mountain terrain. Dr. Good was very impressed that Christian was able to complete the arduous and demanding trek. Dr. Good knows first-hand how tough the terrain is a Philmont Scout Ranch because, as an Eagle Scout, Dr. Good also completed a trek at Philmont over 20 years ago!

Now, at one year out from surgery, Christian is focused on getting stronger every day and maintaining a healthy life.

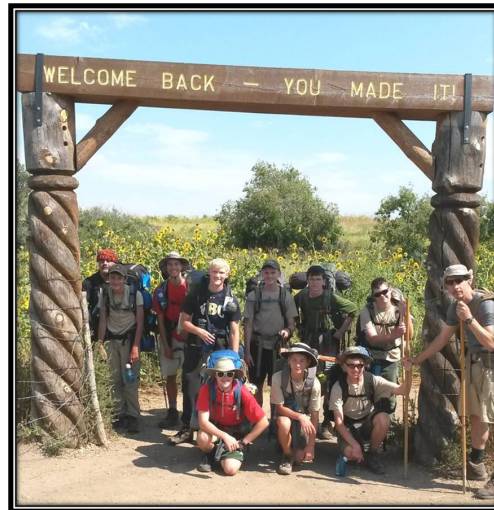
Like Coach John says, "Life is about endurance."

Christian and his family recently met with Dr. Good for his one year postoperative visit. His x-rays show a remarkable correction of his spinal curvature down from 85 degrees of scoliosis to only 35 remaining degrees of scoliosis. Christian's pulmonology doctor performed recent testing of his lungs, and we are ecstatic to tell you that Christian's lung function has already improved by 50% since his surgery!

At this point, the sky is the limit! This story is a true testament to Christian's individual strength and to the undying support of his family, friends, coaches, and doctors! Christian and his family have never wasted time looking back or second guessing what happened. They have always looked forward, remained positive, and in the end his belief that he could be cured has helped him to overcome what for some people can become a crippling spinal condition. We take our hats off to Christian! He and his family are an inspiration to all of those who have cared for him and to all other patients fighting spinal problems of their own!



Christian carrying his pack on the 50 mile trek.



The final picture at the end of Christian's 6 day long Trek seems to also signify an end to his battle with crippling scoliosis. Congratulations Christian, YOU MADE IT!!!

SPINAL RESEARCH FOUNDATION'S

WE'VE GOT YOUR BACK

RACE FOR SPINAL HEALTH

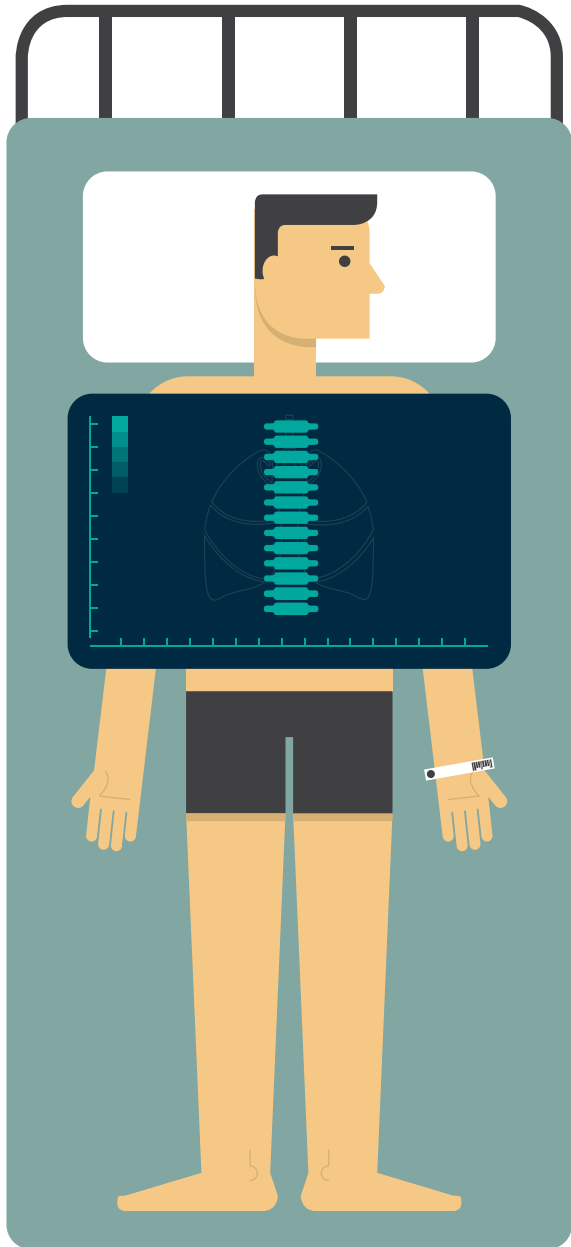


We want to celebrate more Spinal Champions in 2016! Visit WGYBrace.org to learn more about our races and be ready to run, walk, or cheer next year!



spi-nal cham-pi-on *noun* \ˈspi-nəl cham-pē-ən\

a person who has achieved an improved quality of life through treatment for back or neck pain.



Spine CHECKUP





LUMBAR FUSIONS 101 – AN INTRODUCTION TO TERMINOLOGY, IMPLANTS, AND INDICATIONS

Christopher H. Comey, M.D.
New England Neurosurgical Associates, LLC

The terms lumbar fusion and spinal fusion have received enormous amounts of negative press in the last ten years. Unfortunately, the impression given by the lay press is that these are procedures that are done too frequently and for no valid clinical reason.

While the topic of overutilization of fusion lies beyond the scope of this article, it certainly bears mention. What gets lost in the often sensational stories chronicling a spine fusion epidemic is that in the right patient, done the right way, these operations can be life changing.

The concept of fusing two or more bones together in the spine goes back thousands of years. Archeological evidence of spine fusions done for infection or trauma is well documented. In the modern medical era, fusion of parts of the lumbar spine has become an invaluable tool for treating patients with incapacitating back and leg pain. These patients have often been through a variety of conservative treatments, including physical therapy, chiropractic care, spinal injections, massage therapy, acupuncture, and even simpler surgeries. The typical symptoms for these unfortunate patients involve mechanical back pain and mechanical leg pain. These terms refer to pain both in the back and legs that occur with standing, walking, or even sitting. This pain can limit the activities that an individual can perform, leading to difficulty with employment, chores, and leisure activities. Left untreated, this can lead to job loss, financial problems, depression, and marriage or family problems.

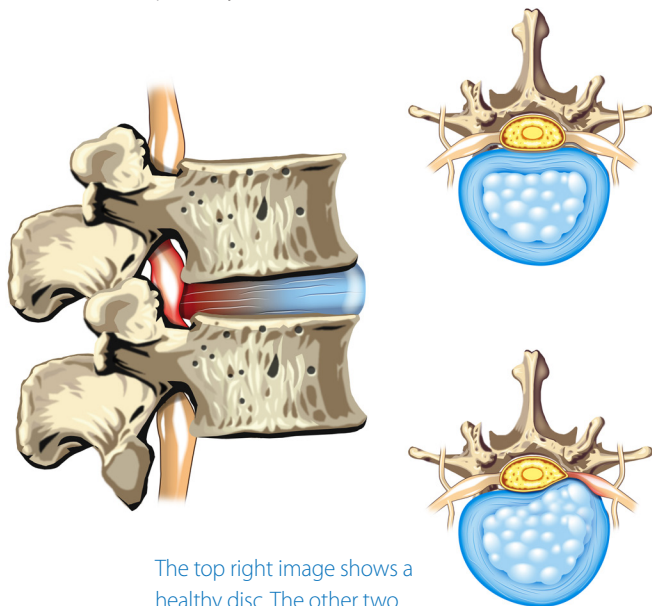
Most people experience an episode of back pain at some point in their adult life. This is usually a brief episode that gets better in days to weeks. Few people have experienced the unrelenting pain described above. This often leads to misunderstanding and lack of empathy as most people have come to believe that back pain is brief and always gets better. As a result, employers, spouses, and friends can't understand why the chronic back pain sufferer doesn't just "get over it." Could they be faking it, milking the system, looking for sympathy? This fundamental misunderstanding can lead to further isolation for the chronic back pain patient. **As I have said to my own patients, most people have had back pain; few people have had this back pain.**

Having said the above, it should be noted that not all chronic back pain patients are candidates for surgery. In reality, there are patients who simply have too much wrong with their lower backs to benefit from surgery. In addition, it is very important to emphasize that surgery for spinal pain should only be reserved for those individuals that have had longstanding pain that has not responded to the conservative treatments mentioned above, and their pain should be ruining their quality of life. Major surgery such as a lumbar fusion surgery should never be done for patients with mild or moderate pain unless they are experiencing another significant symptom, such as leg weakness. In the unfortunate individuals who have low back conditions that cannot be addressed with spinal fusion, the goal becomes one of symptom management.

This involves weight loss, a core strengthening exercise regimen, abstinence from nicotine in any form, chiropractic care, and even inversion table use.

Once a patient is deemed an appropriate candidate for a lumbar fusion, a meticulous search needs to take place in order to precisely identify the pain generator. This is the area of the spine that is found to be responsible for the patient's progressive and debilitating pain. Failure to understand the nature and origin of a patient's pain can lead to failure of that patient to benefit from lumbar fusion. Patients will sometimes become frustrated that more tests are ordered that seem only to delay their surgery. It is important to know that in most instances, these tests can pinpoint the source of their pain and directly contribute to the success of the surgery.

After the pain generator has been identified, the surgeon begins the planning process for the lumbar fusion. This process takes into account the patient's age, build, presence of spinal stenosis, and the presence of spinal deformity. There are a number of different ways to perform a spinal fusion. The method chosen by a surgeon seeks to address the patient factors listed above as well as the surgeon's comfort level with a given technique. The goals of a lumbar fusion are to un-pinch or decompress nerves as well as to intentionally eliminate one or more painful joints.



The top right image shows a healthy disc. The other two images show in red where a nerve is being compressed.

While a number of high tech spinal implants are utilized in fusion surgery, the operation is largely about bone healing. These implants function much as a cast does on a fracture. Elimination of motion is one of the keys to successful bone healing.

Anterior or front approaches to lumbar fusion have been used for many years. This technique involves carefully navigating around the abdominal contents until the spine is exposed. This requires careful attention to the intestines, the arteries and veins, and the elements of the urinary system. Once the spine is successfully exposed, one or more intervertebral disks are removed under fluoroscopic (x-ray) guidance. In the disc space(s), titanium or PEEK (a medical grade plastic) cages are placed to restore and maintain proper height. This restoration of height accomplishes an indirect decompression of the nerves. It is referred to as indirect because it allows an expansion and maintenance of the nerve canals without the surgeon having to directly see and manipulate the nerves. The cages are hollow, allowing the surgeon to fill them with bone graft material, bone from a cadaver (deceased human donor), or substances, such as Infuse, that promote bone growth. The surgeon may then choose to add additional stabilization devices to the front of the spine (such as plates), or to the back of the spine (pedicle screws) in order to create the best environment for bone healing.

Posterior or back approaches to lumbar fusion also have been used for many years. These techniques allow the surgeon to directly visualize and decompress nerves and perform a fusion with instrumentation all through the same incision(s). Bone graft is then harvested either from the spine itself or from the iliac crest, which is a part of the pelvis. Advances in image guidance systems (think GPS for the spine) and instrumentation now permit surgeons to perform posterior fusions through a series of small incisions with less disruption of tissues and less post-operative pain.

A third approach to fusion of the lumbar spine involves a lateral or side approach to the spine. Specially designed instruments allow a surgeon to access the disc and place a cage or cages as well as a plate from the side of the patient's body. Because the bones of the pelvis shield the lowest disc in the

lumbar spine (L5 –S1), this direct lateral technique is best used for the middle of the lumbar spine.

Regardless of the technique utilized, the goals are the same: (1) eliminate painful motion in an area of the spine, and (2) relieve pressure on the affected nerves.

By accomplishing these two important goals, a lumbar fusion surgery can improve a patient's back and leg pain, allowing them to resume their life with less daily pain.

The typical lumbar fusion can involve two to five hours of surgery and often results in a two to three day hospital stay. During that hospital stay, there is a gradual increase in activity and a gradual reduction in pain medication. Some patients undergo an evaluation by a physical therapist in order to determine if they can: (1) go straight home with no services, (2) go home with some in home physical therapy, or (3) go to short term rehabilitation after leaving the hospital and before heading home.

No discussion of a procedure would be complete without mentioning some of the relevant risks associated with the surgery. The most common short term risks can be divided into medical and surgical complications. Medical complications refer to things like pneumonia, heart attack, stroke, and blood clots in the legs. Surgical complications are related to actual procedure and vary a bit based on the actual approach used to carry out the fusion. Possible complications of all fusion surgeries include infection, bleeding, nerve injury, and spinal fluid leak. The risks specifically associated with an anterior or lateral approach also involve possible injury to the arteries and veins, the intestines, or the urinary system. While no medical procedure is without risk, the chance of complications for lumbar fusion surgery remains low.

In the longer term following lumbar fusion, the patient's body needs to complete bone healing across one or more joints. If the bone does not fully heal, the stabilizing hardware and cages can loosen or even break leading to the need for follow-up surgery to revise the fusion. Patients at risk for poor bone healing include smokers, patients with diabetes, and individuals with poor bone health. Even with successful fusion, it is possible for the

joint adjacent to a fused level to undergo premature degeneration. This adjacent segment degeneration is the result of the remaining joints of the spine having to do more mechanical work as a result of the elimination of one or more joints through fusion surgery. It is important for patients to understand that even successful fusion surgery does not mean that they will never have another difficulty with their lumbar spine.

An unforeseen barrier that both patients and surgeons sometimes encounter occurs when an insurance company denies a surgeon's request to perform a fusion procedure on his or her patient. This can be a very discouraging event that leads to anxiety and uncertainty for patients. The insurance companies will often selectively comb through the medical literature to find those studies that do not support lumbar fusion surgery. The companies then create rigid guidelines that cannot be altered even by those physicians who work for the insurance companies. Often the treating surgeon will advocate for his or her patient to no avail. Patients will also need to advocate on their behalf by pursuing appeals with the insurance company as well as reaching out to state insurance regulators. Few things in the practice of medicine are more frustrating than sitting with a patient who would likely benefit from fusion surgery and explaining that their insurance company does not feel that the recommended surgery is "medically necessary."

Lumbar fusion surgery is an option for patients who have failed all reasonable conservative measures and have debilitating pain that is destroying their quality of life. Once the surgeon correctly identifies the precise location of a patient's pain, a variety of surgical techniques can be used to fuse two or more bones together in order to improve both spinal pain and radiating leg pain. These surgeries use a number of different types of hardware, but the goal is to promote successful bone growth across a damaged joint or joints. While these procedures have some risks, it would not be accurate to call them risky. Successful identification and treatment of a patient's spinal pain can truly be life changing.

IMPOSSIBLE



WHAT DOCTORS WISH THEIR PATIENTS KNEW ABOUT FUSIONS

Christopher R. Good, M.D., F.A.C.S.
Virginia Spine Institute

“Oh no, I cannot believe it! My doctor just used the F word!?!?”

“I have got to get out of here, this guy must be crazy! Oh my God, this is the end of my life! I will never be able to do anything again...”

This reaction is an all too common and, in many cases, an unnecessary first reaction many patients have when speaking to their doctor about a spinal fusion. Let's face it, we all would like to live our lives without needing surgery and especially a spinal surgery. That being said, for some patients with spinal conditions, their lives can be much better after having a spinal fusion than they would have been without a spinal fusion.

There is a great deal of misinformation on the internet and in the media about spinal surgery and specifically spinal fusion. When contemplating a spinal surgery and deciding if a fusion is necessary, it is critical to consider multiple factors. First and foremost, the vast majority of patients with a spine problem can be successfully treated and live a good quality of life without ever undergoing a spinal surgery.

The vast majority of people with spine problems are successfully treated without surgery.

Many patients who I see who are coming in for a surgical opinion after having “failed non-operative treatment;” they actually are able to improve once a proper non-operative course is initiated and maintained. Modern spinal

health care can successfully treat most patients through a combination of exercise, therapy, spinal manipulation, medications, and non-operative procedures such as spinal injections or regenerative treatments like prolotherapy, PRP, or stem cells.

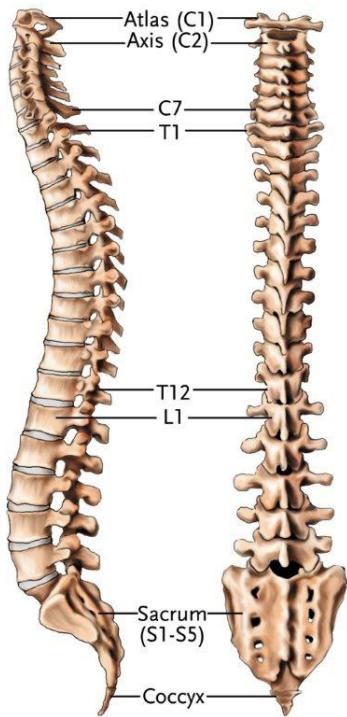
The decision to contemplate a spinal surgery depends not only on what kind of problem is happening in the spine, but more importantly what kind of pain and limitation it is causing the person in his or her life. The decision to consider surgery, especially a fusion, should be made mainly based on a patient's symptoms and quality of life rather than on pictures from an MRI scan or an x-ray.

For certain patients with specific structural problems in their spine that are causing severe pain or limitation in quality of life or danger for the future, spinal surgery offers an option that can lead to a much better quality of life than living with the current condition and symptom.

Not all spine surgeries require fusion.

There are certain problems that develop in the spine that can be treated surgically without requiring fusion and in those cases, that treatment option is preferable to fusion.

If you think about the anatomy of the spine, it is a series of bones and discs stacked one on top of another. The purpose of the discs is to hold the bones apart, providing a cushioning effect. These bones and discs are attached by muscles and ligaments,



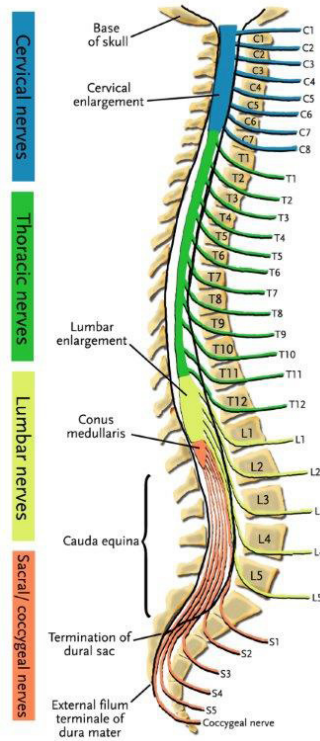
Anatomy diagram of the spine from the side showing the regions of the spine: cervical (neck), thoracic (mid-back) and lumbar (low back). The spine is a series of bones stacked on top of each other and the discs are the cushioning in between. *Image provided by Medtronic, Inc.*

and these structures all move together as a person is active throughout the course of his or her life. I sometimes use the example of cars on a roller coaster, all attached together but with movement between each level. The discs cushion the bones and prevent friction and also hold the bones apart, which maintain a space for the nerves, which run inside the spine. The spinal cord branches off of the brain and runs down into the neck. The spinal cord and the nerves of the spine run inside the bones of the spine much like a cable in a conduit pipe. At each disc level, nerves branch out. In the neck,

the nerves that branch out run down the arms; in the thoracic spine, the nerves run around the chest and abdomen; and in the lumbar spine, the nerves run out through the pelvis and down the legs. These nerves are essentially little electrical

cables and if someone develops a problem with the nerve in the spine, they can develop symptoms anywhere where that nerve runs, including pain, pins and needles, burning, numbness, or weakness.

For some conditions, when a nerve is pinched or a small amount of arthritis develops, minimally invasive surgeries to “unpinch a nerve” or “shave a bone spur away” may be effective at alleviating a patient’s symptoms without moving forward to a spinal fusion. These are especially good options for patient who have pain mainly related to a pinched nerve (arm or leg pain). These procedures can be performed through very small incisions using a microscope or fiber optics.



The spinal cord and nerves branch of the brain and run down inside the spine like a cable in a conduit pipe. Nerves branch out of the spine through small holes at each disc level and run to the body like little electrical cables. *Image provided by Medtronic, Inc.*

There are times when a spinal fusion offers a patient a much better chance of having a good life than simply living with the problem.

Spinal fusion involves using some form of implants (metal, plastic, bone) to hold two of the bones of the spine together and use bone graft to weld those two bones together. A good analogy is to think of placing cement or grout between the two bones, which ultimately hardens, much like a broken bone mending in a cast. Once this process occurs, those two bones are now welded into one solid piece (a fusion), and that level of the spine is never able to move again. This does take away the motion of the spine at that location.



A picture from surgery showing how a tube can be used to reach a disc herniation during a lumbar microdiscectomy surgery. This is a minimally invasive non-fusion surgery for a pinched nerve.

Obviously, when a fusion is performed, the tradeoff is that particular level of the spine is not able to move any more. For some patients, this is actually a good trade off because a fusion is a way to treat pathologic motion or instability in the back. For patients with spinal instability, if surgery is needed, a fusion is almost always the best option.

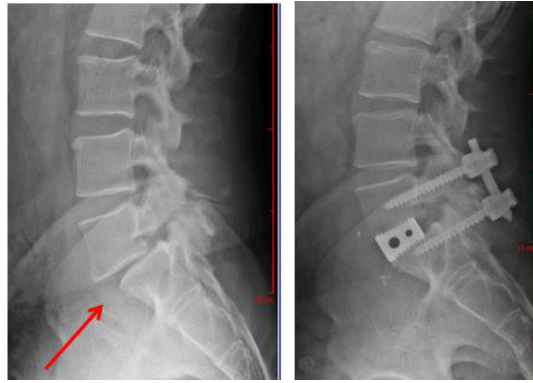
Many patients develop spondylolisthesis (an instability with slippage of one bone on top of another in the spine) or scoliosis. For patients with these problems, malalignment and instability between the bones of the spine is a large cause of the patient's pain and the only way to alleviate this instability with surgery is to realign and fuse the bones together. In a situation where a patient has a spinal deformity or instability, any surgical option that does not provide stability does not have a good chance of improving the pain and has a high likelihood that the condition will continue to worsen in the future. As of today, options to hold the spine bones without actually fusing them are not a good option because as time passes and the spine continues to move, those implants eventually work loose and cause even bigger problems.

Other conditions that commonly require spinal fusion include fractures or tumors where a tumor actually destroys a bone of the spine creating a spinal instability.

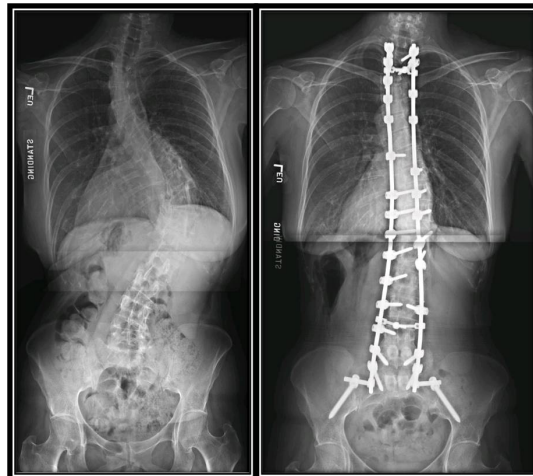
We cannot always compare patients who have had a fusion with each other.

I commonly hear stories from patients about a friend or a relative who has undergone a spinal fusion and how the surgery has helped or not helped them. I am always trying to help people understand that two different patients with two different fusions may have completely different problems and completely different rates of success.

For many spinal conditions, the type of problem that is causing the symptoms is a big predictor of how well the patient will do in the future with or without surgery. It makes sense if you think about it, the worse your problem is at the beginning, the harder it may be to deal with.



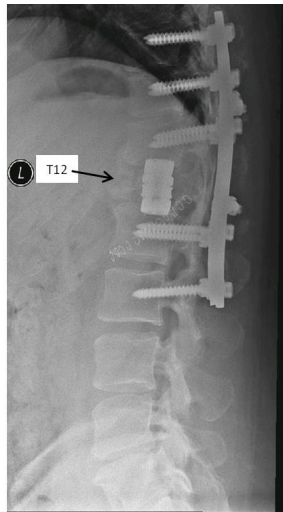
X-rays of a patient before and after minimally invasive fusion of spondylolisthesis of the lumbar spine. Progressive disc collapse and slippage of the bone (red arrow) has been corrected using minimally invasive techniques to stabilize and fuse the spine. In this case, the screws were placed in the back through an incision one inch in length using robotic guidance. The remaining discs are very healthy and this patient went back to full activities without limitation.



The x-ray on the left shows a patient with a severe scoliosis which is affecting heart and lung function. The x-ray on the right shows correction of the scoliosis with implants and spinal fusion. The patients breathing problems improved with surgery.



The x-ray on the left shows a patient a spinal tumor in the bone at T12. The x-ray in the middle shows that over time the tumor has eroded the bone away and the bone has collapsed (fractured). The MRI scan on the right shows that the broken bone is now pinching the spinal cord (red arrow) now requiring spinal fusion.



The x-ray on the left shows a patient with a spinal tumor in the bone at T12 and a fracture. The x-ray on the right taken after surgery shows that the collapsed T12 vertebra has been replaced with a metal cage and that screws and rods have been placed to hold the spine in place while fusion occurs. This patient's cancer was cured with surgery and chemotherapy and over five years after surgery, he has no back pain.

Patients who have healthy discs and bones all throughout their spine, with the exception of one injured disc, have a much different prognosis with or without surgery than patients who have degenerated or injured discs at every level in the spine. Again, the better off you are at the beginning, the better off you are likely to be at the end of treatment.

When we think about it, it seems very intuitive that a person undergoing a one level fusion would have a very different surgery and recovery than a patient undergoing a five level fusion. Obviously, if a person

needs surgery we would always prefer for them to need a very small and successful surgery, but we are forced to treat the type of problem that a specific patient has, and for patients with more severe spinal problem, this may require a more involved surgical treatment.

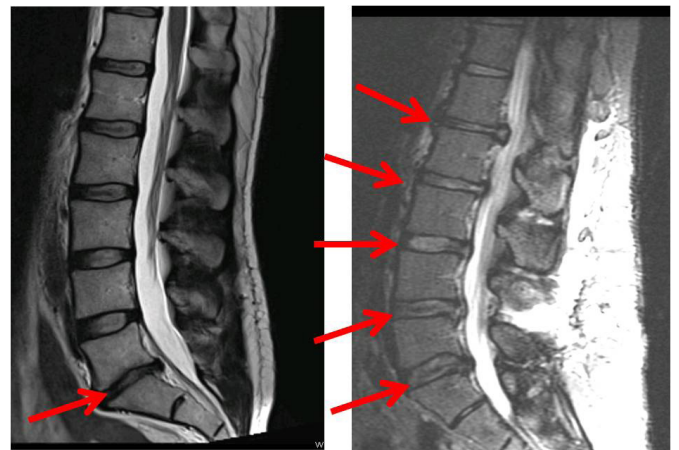
In some cases, "bigger spine surgeries" are actually the ones that can help a patient's life to improve the most because the condition they are starting with is so much more limiting and dangerous.

I have a very well connected patient who had a disc herniation in his back some years ago causing a pinched nerve. He had severe pain for over one year before deciding to have surgery, but eventually elected to undergo a lumbar microdiscectomy (a minimally invasive non-fusion surgery performed through a skin incision less than inch long). He has done phenomenally well and ultimately has referred many other patients to me. They always come to me and say they want the surgery that "Jim had." "Jim" has told them all about his surgery and how well he has done, and they are hoping to be as lucky as "Jim."

I then have to spend a good deal of time helping them to understand how the problem that is taking place in their back may or may not be similar to the one in "Jim's back." For me, it has been very important



X-ray on the left after 8 level fusion for scoliosis compared to x-ray on the right after 3 level fusion for spondylolisthesis. Both patients pain is much improved after surgery, but the patient on the left had a much bigger problem to start with and therefore a bigger surgery to fix his problem. The two patients both were treated with fusion, but we really cannot compare their results. It is like comparing an apple and a bowling ball!



On the left is "Jim's" MRI before surgery showing 1 bad disc in his back (red arrow) causing a pinched nerve. On the right is "Jim's friend's" MRI before surgery showing 5 bad discs (arrows) all combining to cause back pain and multiple pinched nerves.

for them to understand how their problem is different than “Jim’s,” and, therefore, why their treatment will also be different.

Another reason it is very difficult for patients to compare the success of their treatments is also because of how differently people may respond to surgical treatment. It is not just the type of spinal problem or the number of levels affected, things such as general health, level of physical fitness, pain tolerance, smoking, mental health, and motivation all play a critical role in determining how someone will recover from any surgical procedure and in helping to predict what their chances of success are after a surgical procedure.

For patients starting with a much more severe spinal problem, particularly patients who have many other medical problems and may be severely disabled because of them, how we define success or what type of activities or quality of life we may be able to get them back to may be different than someone who is younger and healthy with a simpler spinal problem.

Think of contracting with a building company to renovate your house. If you live on a nice piece of property and your old house is in relatively good shape, you have a good chance of coming through your renovation on time and on budget. On the other hand, if your land is contaminated with an oil leak and the entire house is falling down and the foundation is eroded, you are very likely to get into some unforeseen problems during the renovation that will cause your renovation to take much longer than expected and go way over budget.



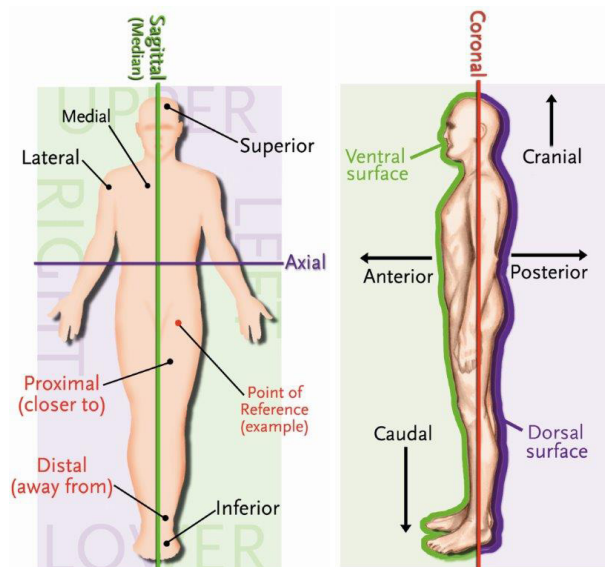
Two houses in need of renovation. The house on the left is in much better shape and as a result the renovation is much more likely to go smoothly and come in under budget.

In the end, the total improvement you can achieve is actually higher on the second property, but it takes a lot more work to get there.

All spinal fusions and spine surgeons are not created equal.

When it comes to spinal fusions, even for the same condition and for similar patients, it is critical to note that all spinal fusions are not created equal.

There are many ways to go about fusing a single level of the spine, mainly related to the direction that the surgeon uses to approach the spine and the amount of damage this may cause to the body on the way in. In general, a surgeon can reach a person’s spine through the back (posterior), the front (anterior), the side (lateral), or some combination of



Anatomical planes of the human body. Image provided by Medtronic, Inc.

these approaches. There are also many different types of implants and grafts used to achieve fusion and these can play a major role in determining success versus failure.

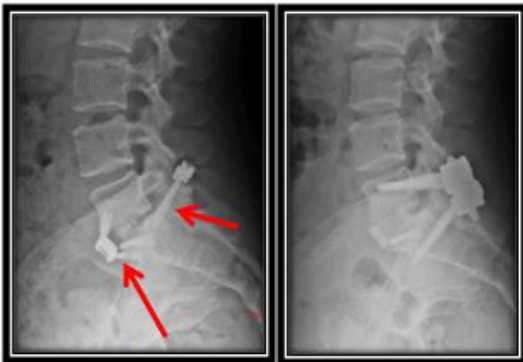
When performing surgery, our goal is get to the body part that is diseased while trying to avoid disrupting or damaging normal body tissues on the way in and the way out. Surgery in the back portion of the spine carries a different level of pain and disruption of normal tissues than does surgery in the side or the front. Ideally, the approach a surgeon uses to fix a problem should depend on the exact location of the problem for the patient, but in many

cases, the approach a surgeon uses may be based simply on their education, preference, convenience, or comfort level.

When contemplating a spinal fusion, I believe it is critical to work with a surgeon who is comfortable with every approach and can factor in the benefits and risks of each approach when making a recommendation. Surgeons who are not trained or do not commonly use each approach are very limited in what they can offer a patient. I remember the old adage, "if the only tool in your toolbox is a hammer, everything looks like a nail." If a surgeon only does surgery through an incision in the back of the spine, then that is the only type of surgery they will recommend.

Taking care of your fusion during the recovery period is as important as the surgery itself.

A final critical component to a successful spinal fusion is in the postoperative recovery period. Spinal fusions take time for the bones to weld together, just like a broken bone healing in a cast. During this critical time, moving, bending, twisting, and using those bones too aggressively can prevent the spinal fusion from healing, thereby decreasing the chances of success. When I see patients who have had failure after a spinal fusion, in many cases, it can be linked to



The x-ray on the left shows a healthy patient who had a failed spinal fusion causing years of pain. She was never told how to care for her spine while her fusion healed and she went back to weightlifting right away. Multiple surgeries trying to fuse the spine have failed and her screws are broken (red arrows)

indicating movement through the fusion. The x-ray on the right is nine months after successful revision fusion. The patient was appropriately counseled on how to take care of her spine, and stronger implants were used with more effective bone grafting. Her pain is greatly improved and she is back to full activity.

some problem that occurred during the early healing period. In some cases this is because the patient was not properly warned about the healing precautions and in some cases it is because the patient could not or would not follow the precautions. If you are going to go through a spinal fusion, it is critical to do everything in the recovery time to make sure that it has the highest chance of healing well. On average, spinal fusions in the low back take approximately three months to become strong enough for people to return to heavy physical activities.

Smoking (nicotine) kills your spine, causes you to feel more pain, and can cause your surgery to fail. It will also kill you.

Quite simply put, using nicotine is the worst thing you can do to your spine. Smoking kills the little blood vessels that deliver oxygen to your body causing you to age faster. Smoking kills your discs causing back pain. Smoking also increases the receptors in your brain that cause you to feel pain. **YES, SMOKING IS CAUSING YOUR BACK TO HURT YOU MORE.**

Finally, smoking prevents the body from healing and if people use nicotine around the time of surgery, they have much higher rates of wound infection, failure of fusion, medical complications, and chronic pain. If you are going to have a spine surgery, you need to do everything you can to make it a success. NOT using nicotine is absolutely the most important thing you can do to help you spine now and in the future.

Please, if you are going to do one thing after reading this article, consider quitting.

A spinal fusion is not the only factor that can cause issues in your spine down the road.

A very common interpretation in the public is that if a person has to have a spinal fusion, it will rapidly lead to the deterioration of the other levels in the back requiring more surgery. There is some truth to this concern but also a lot of misunderstanding. In the low back, there are six discs in the average patient, all sharing the load as the low back bends and lifts and twists throughout the course of life. All of us are sustaining a slow degeneration of our discs over time as part of the natural aging process. If a person loses a disc through arthritis or a surgical fusion and that level is no longer moving, then the remaining discs are all seeing a partial increase in stress as they pick up the slack. In this situation, the remaining disc may actually degenerate even faster than they already were going to. If a patient needs a surgery, the approach used to perform the fusion and the amount of disruption and damage to the remaining structures in the spine can also play a critical role in determining how long the remaining discs last before they go out.

Many studies looking at older surgical techniques showed very high rates of disc disease requiring fusion at levels above a spinal fusion. None of these studies ever commented on the health of the other discs before the initial surgery, and the chances are that many of the discs were going bad even before the initial fusion. In these studies, the most common surgical technique used was a very large incision on the back of the spine, which involved detaching all of the spinal muscles and ligaments, and it is understandable how this, coupled with the loss of motion at the fusion, could speed along disc problems at other levels. Using newer (and better) surgical techniques that are minimally invasive, less disruptive, and more protective to tissues, these rates of adjacent segment degeneration are much lower but are still an important consideration.

There is, however, another very important factor to consider that is rarely discussed. These days, if a person has to have a fusion, essentially everything else that happens in the spine after that is always blamed on the fusion. In reality, many of these

problems were likely already going to happen whether a fusion was performed or not. For many patients, disc problems come from a combination of genetics and the stress they may put on their discs throughout their life. Genetics play a very important role in determining how long your discs are going to last. This is why some people are able to play contact sports throughout their whole life without having any issues, whereas some people develop major disc problems with relatively low stress physical activities. It is true that the wear and tear plays an important role, but for many people, their disc disease is genetically programmed.

I commonly compare progressive degenerative disc disease with the process of developing gray hair or going bald. There is a genetic reason why one man will start to lose his hair in his twenties while another will have a full head of hair through his entire life. This is based on genetics and inherited through your genes. That is why baldness, grey hair, disc disease, and many other conditions tend to run in families.

If you think of a patient who has a genetic predisposition to degenerative disc disease, all of their discs are programmed to wear out at an earlier rate. In that patient, if one disc develops a severe problem requiring surgery, then surgery at that location will not do anything to prevent the patient from continuing to develop disc problems at their other degenerating levels. If that patient needs a fusion, then the fusion is later blamed on whatever may happen, when the reality is that even if the surgeon could replace that bad disc with a magic wand, the other discs will continue to degenerate as they have already started.

As a surgeon, I always try to avoid fusion when it is the right thing for a patient, but when I have to do a fusion, I try to help the patient understand this fact, and I try to perform the fusion in the safest possible way to protect the remainder of the back in the years down the road.

The patient and the surgeon need to understand each other to increase chances of success.

Nobody wants to have surgery. Trust me, I understand. That being said, for some patients with some conditions, spinal fusion allows a much better quality of life and level of activity than leaving the problem untreated. For patients who are lucky enough to be in very good shape and have one or two level spinal problems, many are able to return to a very high level of physical activity and a normal life. To decide if a fusion is right for you, I personally believe it is very important for your surgeon to understand you, your job, your family, your priorities and values, and your quality of life. The doctor understanding just your MRI is not enough to make the best recommendation for any given patient. One shoe does NOT fit all.

For patients with more severe spinal problems, such as, multilevel genetic spinal degeneration, severe spinal curvatures and instabilities, spinal surgery with fusion can provide a much better future than mother nature had in store for the patient, even though for someone in this scenario, the tradeoff of the spinal fusion may leave them with less motion than someone with a "normal back." For someone in this scenario, they are starting with a very abnormal back, and while the fusion can make them much better, it cannot restore a normal back to someone who did not have one to start with.

If you are contemplating a spinal surgery or a spinal fusion, it is critical to understand the type of problem that you have, the type of patient that you are, and how the particular surgery that could be used to help your problem may or may not allow you to do the things that you love. We all have to make choices in life and the majority of patients who correctly receive a spinal fusion can expect to have a much better quality of life than they would have had without surgery. If your spinal problem is limiting your quality of life in a way that is unacceptable to you and the surgery that could be used to fix it has a high chance of giving you a better level of function and quality of life, then a spinal fusion may be the right choice for you. If a fusion is going to be performed, it is critical to get it done right the first time and that it is performed in the least invasive fashion. It is equally important that you do everything needed in the recovery period to make sure that the fusion heals properly and then you have to keep your body as healthy and as strong as possible to protect the remaining portions of your spine in the future.

WE'VE GOT *YOUR BACK*

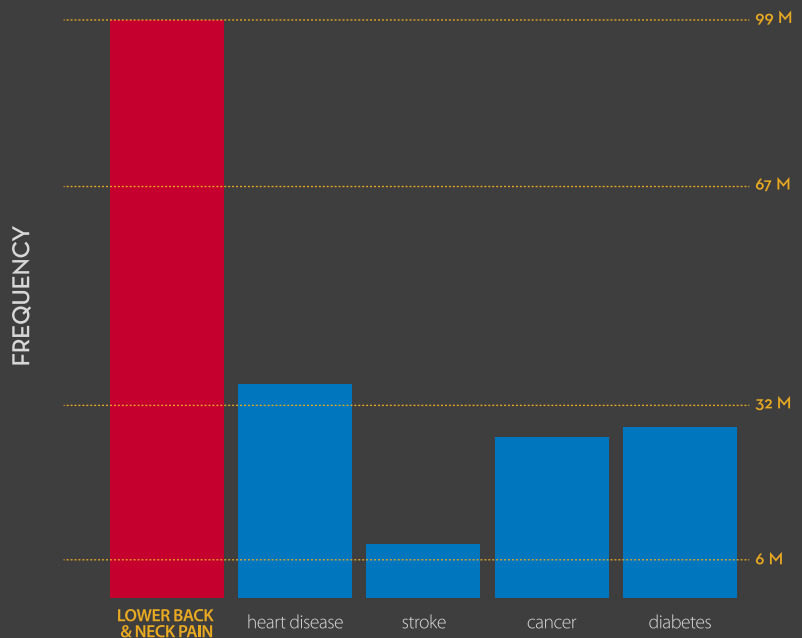
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99.3 M

adults in the U.S. suffer from low back and neck pain each year

U.S. ADULTS IN 2012



1 in 2.5
adults will experience low back or neck pain this year

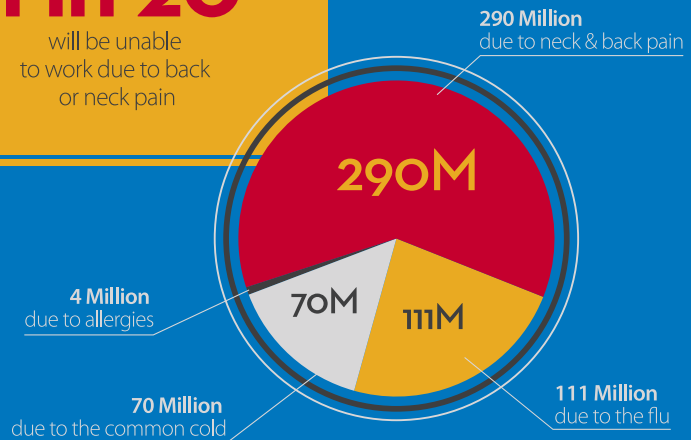


1 in 20
will be unable to work due to back or neck pain

Sources: Center for Disease Control, National Academy on an Aging Society/Asthma and Allergy Foundation of America, American Diabetes Association & American Academy of Orthopedic Surgeons



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Lost Workdays Per Year



SPINAL FUSION: THE RISKS AND HOW TO MINIMIZE THEM

Michael W. Hasz, M.D., F.A.C.S.
Virginia Spine Institute

Spinal fusion is a surgery in which two small bones or vertebrae in the spine are prepared to heal together. When two bones fuse together, they make that segment more stable. It is like welding two painful bones together so they can heal together to form a single solid bone.

For some patients, spinal fusion surgery is the best treatment option to alleviate their spinal problems. In the past ten to twenty years, there have been major advances in health care: minimally invasive surgical techniques, segmental spinal fixation, computer and robot-assisted surgery, improved optical visualization during surgery, as well as more modern surgical implants to aid in the surgery.

Fusion surgery can be very helpful in relieving symptoms related to many causes of back pain including:

- *Lumbar disc disease*
- *Spondylolisthesis*
- *Spinal stenosis*
- *Scoliosis*
- *Spinal instability*
- *Fractured or broken bones*
- *Infections*
- *Tumor*

Even with the advances in these modern surgical techniques for the spinal fusion, there are risk factors that increase the possibility of complications or poor healing after the surgery.

Some of the risk factors which have been identified to be associated with an increased association of postoperative complications include:

- *Older age*
- *Congestive heart failure or pulmonary disease*
- *History of myocardial infarction*
- *Preoperative neurological problems*
- *Chronic use of corticosteroids*
- *History of infection or sepsis*
- *Anesthesia rating of ASA 3 or higher*
- *A prolonged surgical time*
- *Insulin dependent diabetes*
- *History of smoking*
- *Obesity*

Age

Patients who are older have an increased risk of infection, as well as poor healing. This may not be particularly related to the patient's age itself, but might be related to diseases that can be associated with aging. While we cannot stop the aging process, we can take steps to improve our health to help decrease risk factors.

Congestive Heart Failure/Pulmonary Disease

Patients with congestive heart failure, pulmonary disease, and history of a heart attack, have an increased risk of postoperative complications. Smoking is a major cause of COPD and pulmonary disease, as well as vascular disease.

Smoking

Smokers definitely have an increased risk of complications, as well as an increased risk of poor healing, increased risk of nonunion, and an increased risk of continued pain after surgery, even if they heal well.

Chronic Use of Corticosteroids

Chronic use of corticosteroids, which is often used to treat pulmonary disease, autoimmune disease, asthma, arthritis, or other diseases, is associated with suppressing the immune system. Patients who are on steroids chronically often have thinner skin, a compromised immune system, and other complications. This can result in an increased risk of infection, poor healing, osteoporosis, and other postoperative complications.

Diabetes

Patients who are diabetic, particularly those who are insulin dependent, have a suppressed immune system. Also, many diabetics have microvascular disease, which could also decrease healing and have an increased risk of infection.

History of Infection

A history of an infection, even a remote infection, can increase the risk of postoperative complications. Having a tooth abscess, a bladder infection, or poor healing skin lesion can all lead toward increased complications after surgery.

Prolonged Surgery

Prolonged surgery times can also increase the risk of postoperative complications. Prolonged surgery times can often be associated with some increased blood loss or just exposure to the operating

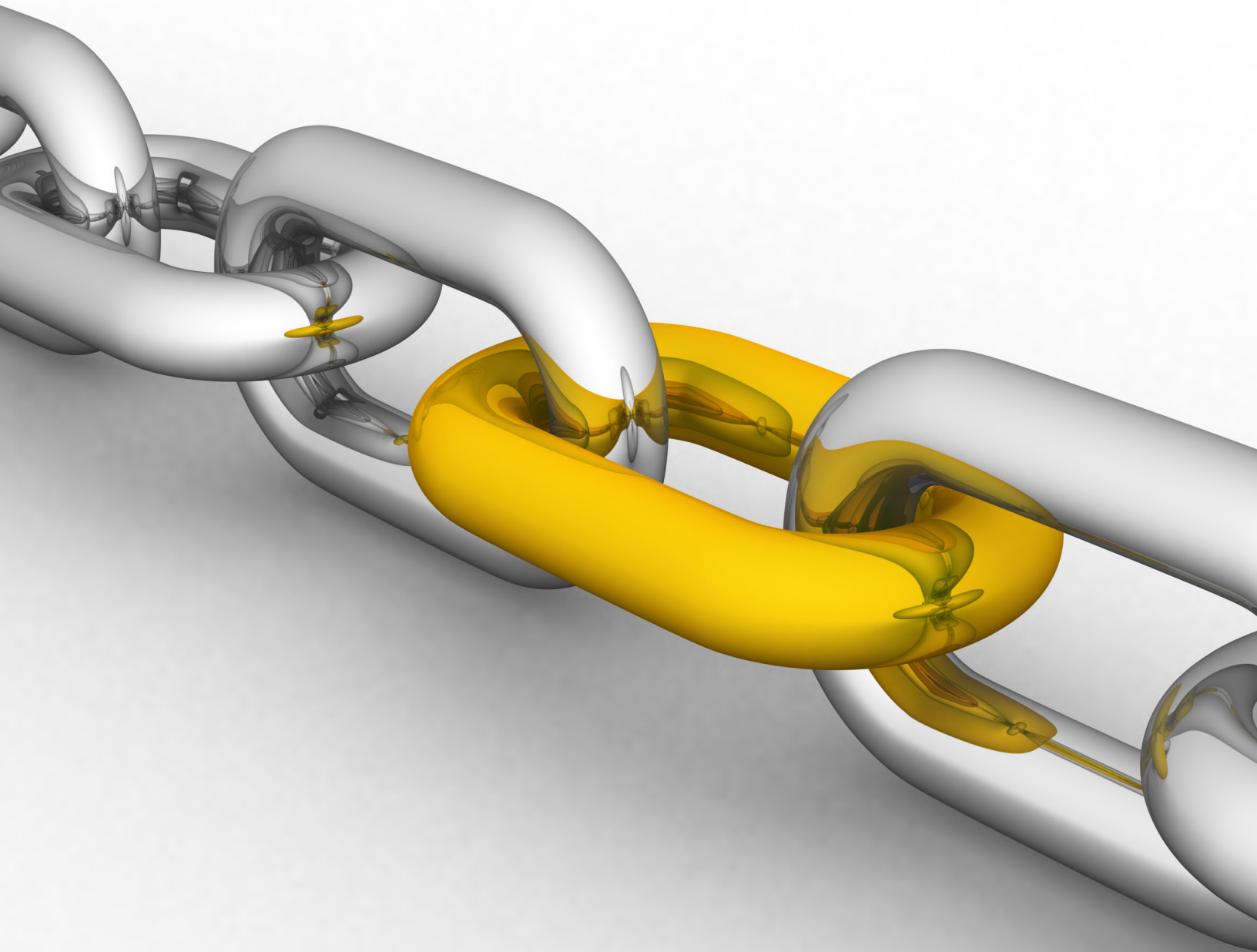
room air, which can potentially increase the risk of infection. To help decrease the operative time, often surgeries can be performed in smaller steps or separated in time to help decrease surgical risks.

High Anesthesia Rating

A classification of 3 or higher, according to the American Society of Anesthesiologist's physical status classification system, is also associated with an increased risk of complications. This classification system encompasses many of the items previously discussed here to include, pulmonary disease, heart disease, obesity, poor nutrition, and other such risk factors.

The Takeaway

By being aware of many of these risk factors for surgery, there are various things that can be done to help decrease these risk factors. Losing weight, quitting smoking, eating well, exercising, and making sure you are as healthy as you can be prior to surgery can give you a much better chance of doing well after surgery.





HOW TO KNOW WHEN A FUSION IS THE BEST OPTION FOR YOU

**Douglas G. Orndorff, M.D., Jim A. Youssef, M.D.,
and Sue Lynn Myhre, Ph.D.**
Spine Colorado

Deteriorate or Fight Back

At 71 years old, Richard Norton started to have low back and leg pain and tingling in the feet. He was able to continue his normal routine of daily living and vigorous exercise for awhile, but eventually he had to change and modify his lifestyle to accommodate the pain and symptoms. Mr. Norton was diagnosed with lumbar spinal stenosis and spondylosis. He underwent injections, physical therapy, and medications, but ultimately the conservative treatments did not withstand.

“It got to the point that the only time I was pain free was when I was sitting in my recliner with my legs up,” said Norton, “I realized that I needed to try something or slide into senility. I wanted to get back to my active lifestyle.”

In June of 2010, he underwent a spinal fusion procedure. Spinal fusion procedures are a very serious matter, and often patients are apprehensive to even hear the utterance of spine surgery. “My thought process was either I have complete faith in Dr. Orndorff or don’t do it. I didn’t worry or obsess about it, I had no concerns,” recalls Mr. Norton.

“In recommending surgery for Mr. Norton, I felt that he had exhausted all forms of conservative care. Even though he was on the older scale of patients we treat, he had long-term activity goals and wanted to

be able to achieve them and maintain a good quality of life. We discussed fusion versus decompression alone, and decided together that decompression with fusion was the best surgical option for him,” reflects Dr. Orndorff.

Mr. Norton goes on to express that the experience with Dr. Orndorff, the hospital, and all the staff was wonderful, and the staff was incredibly encouraging and helpful. “I was treated very well. Everyone was so attentive to me from check-in to discharge.” Mr. Norton confides that he was glad he decided to undergo surgery before his condition became really debilitating.

“I trained for surgery and prepared for discharge. I was told that I would have to be able to walk 1 mile before I was discharged. I didn’t give in to the pain; I pushed through and stayed active. I did my part. I was proactive,” he explains.

Mr. Norton was back at the gym six months later! “I was realistic; I knew I had two options: either deteriorate or fight back.” When it comes to spine surgery, there are no guarantees, but for many, such as Mr. Norton, there can be a world of difference before surgery compared to after surgery. He adds that in order to prepare, continue and maintain success, he made sure that he listened and followed all instructions that were given to him by Dr. Orndorff and the medical staff.

A Surgeon's View with Dr. Orndorff

Spine surgery, in general, should be considered a last resort, after failure of all forms of conservative options (medicines, physical therapy, injections, and neuro-psychological evaluation).

Fusion surgery is typically recommended to stabilize unstable vertebral body segments during surgical decompression around the nerves and thecal sac (protective membrane around spine). I recommend fusion surgery in the setting of instability and when I feel that decompression alone will not be adequate, or that I might increase a patient's stability.

Fusion surgery has changed dramatically even since I have finished my fellowship training. The technology of the implants we are using has increased the surface areas for fusion, which has increased the rates of fusion, and thus, improved a patient's outcome. The biologics (medicinal product that is created from a living organism) also continue to evolve and have dramatically increased our rates of fusion as well. Consequently, we do not have to harvest bone from a patient's hip as frequently.

My specialized training from my spine fellowship has been vital in treating spine pathologies. Whether spine surgery is performed by an orthopedic surgeon or a neurosurgeon, they should be fellowship trained. Fellowship status is the highest level of training and is a necessary step a surgeon should take in order to improve the chances of better outcomes for their patient.

In my training, I was fortunate to be taught several important principles:

- 1. Not everyone needs or can benefit from spine surgery.***
- 2. For a long time, spine surgery had a bad reputation because either the procedures performed were not the correct ones to treat the patient's pathology or we did not have the appropriate technology. Now that we have made tremendous strides with our technology, we have the technological support to perform the correct operation for the patient.***
- 3. It is fundamentally important to offer the right surgery that will address the patient's specific pathology, and in doing so, dramatically improve the patient's outcome.***

Common Questions Patients Ask Their Provider When Considering Undergoing a Spinal Fusion Procedure

Q: When do I need surgical intervention?

Surgery should be a last resort. The patient should have tried and exhausted non-operative treatments. Both clinical and health history factors need to be assessed, evaluated, and meet certain criteria. In the end, it is the patient's decision.

Q: What does "spinal fusion" mean?

Spinal fusion means to join or meld two vertebrae together. Fusion material or bone graft is planted between two vertebrae as an adjunct to fusion. The bone graft may be placed in the disc space and/or amid the transverse and spinous processes.

Q: What is the risk of fusing?

There are no guarantees. Not smoking and following the surgeon's instructions will greatly improve the chances of fusing. Many patients do successfully fuse.

Q: Once my fusion heals, what are the chances the arthritis will come back? Will I need additional surgery at other levels?

At the index or surgery level, there is no chance. However, adjacent segment pathology (ASP) is possible. ASP is any deterioration that occurs above or below the initial surgical level(s). The literature has reported a 4.4 – 7.4% chance of patients undergoing an adjacent level lumbar surgery within four years of the initial surgery.¹ For the cervical spine, the literature has demonstrated a 6.9% incidence of patients experiencing an adjacent level cervical surgery within two to five years of the primary surgery.²

Q: How risky is spine surgery? During spine surgery am I at risk for being paralyzed?

There are no guarantees. The patient should make sure they undergo surgery by an experienced and fellowship trained surgeon. Both cervical and thoracic surgeries happen near the region of the spinal cord. There is some risk of permanent spinal cord injury, but it is still very unlikely. In lumbar surgery, it becomes less likely as the spinal cord ends around the first lumbar level. The rest of the segments, L2-S1, are part of the peripheral nervous system, where weakness is possible, but so is full recovery.

Q: What is the infection rate?

At our clinic, infection rate is minimal at 0.28%. We recommend that patients ask their own provider and hospital for their infection rate.

Q: What are the chances it will be successful?

Many people have done very well with spine surgery. In our clinic and hospital, 89.5% of patients rank their overall experience as a “9” out of “10”. The national average is 71.8%.

Q: If I fall after my spine procedure, will it paralyze me?

Very, unlikely. It is possible to have fractures around the pedicle screws and interbody, but the chance of them dislodging significantly is nearly impossible.

Q: When will I be able to return to work?

A patient’s line of work will influence this decision. Typically, a patient with an office or light duty position can return to work within four to six weeks. A patient with a hard labor or construction job usually will need three months before returning to work.

Q: What medications do I need to stop taking? What medications can I continue to take?

Stop taking NSAIDs, herbal remedies, and diet aids ten days before surgery as they can increase bleeding during surgery. Discuss other medications you take with your surgeon.

Q: How long before I can drive?

Cervical: Once you are no longer taking narcotics as well as no longer wearing your brace.

Lumbar: Once you are no longer taking narcotics.

Q: How long will I be in the hospital?

Cervical: 1 night is typical

Lumbar: Usually 2 nights, maybe 3

Q: How long do I have to wear a brace?

Cervical: Approximately 4 – 12 weeks

Lumbar: Approximately 8 – 12 weeks

Q: How long will I be on pain medications?

Approximately 2 – 3 weeks

Q: When will physical therapy start?

Cervical: Approximately 4 – 12 weeks after surgery

Lumbar: Approximately 6 – 12 weeks after surgery

Q: How long does it take to rehabilitate after these procedures?

Immediately post operatively, a patient should begin walking up to one mile. Physical therapy will begin approximately four to eight weeks after surgery. It is important that the patient follows all post-op exercise and physical therapy instructions.

Goals of Fusion

The basic goals of a fusion surgery are to decompress and relieve the neural elements and realign, stabilize, and fuse the vertebrae together with bone graft to prevent motion at the articulations (places where bones meet) that are producing pain. As a result, function and neurological status should be restored and preserved.

Determining a Fusion Candidate

It should be no surprise to anyone that deciding to undergo a spinal fusion procedure is a big decision for a patient. Spinal surgical procedures are not for the fainthearted! Any surgery, whether it is spine, heart, or knee, is risky, and should be conducted in a hospital that has all the necessary personnel and equipment. Eventually, with the exception of an emergency or trauma situation, the decision to pursue a fusion surgery boils down to the patient's own judgment. Before a patient decides to proceed with fusion, it is very important that s/he understands the pros and cons of both surgical and non-surgical options. Many patients have demonstrated incredibly successful outcomes, but not everyone. The plausibility of all manifestations resolving completely are typically not high. Most importantly, every patient is different, with unique issues and indications. ***A patient should expect and request that their treatment plan be individualized.***

Each clinician has their own personal criteria and steps to determine if a patient is a fusion candidate, but in general, fellowship trained spine surgeons will determine a fusion candidate via a number of tools (imaging, a physical exam, a neurological exam, and a strength exam), a patient's medical history, and psychosocial status. Of course, an emergency or traumatic situation may bypass some of the aforementioned criteria.

Medical history and preoperative comorbidities such as smoking, diabetes, older age, obesity, steroid use, malnutrition, and prior spine surgeries have been established as risk factors for surgical and post-operative complications.³⁻⁶ Smoking has especially been shown to have negative consequences on

patients who underwent a fusion procedure. Nicotine has been shown to cause damaging vascular effects. It is believed that nicotine impedes the fusion process due to these negative vascular, cardiovascular, and pulmonary changes, as both blood flow as well the oxygenation of the blood is diminished to the spine. In our clinic, current smokers must be nicotine free (cigarettes, cigars, chewing tobacco, nicotine gum, or patches) for at least four weeks before we will schedule them for surgery. We want our patients to go in to surgery with the best possible chance of fusion.

What You Should Discuss With Your Doctor When Considering Spine Surgery

Age

A patient should consider and discuss their age with their provider when determining the appropriate non-surgical or surgical treatment. Typically, surgeons are hesitant to do a fusion procedure on someone quite young due to the risk of adjacent segment pathology. For individuals who are older, > 85 years old, assessing comorbidities is one of the most important factors when choosing the most suitable treatment.

Health, Lifestyle, and Medical History – smoking, diabetes, obesity, prior surgeries

A patient's current health status and medical history may negatively impact both non-surgical and surgical outcomes. If applicable:

1. A patient should improve his or her health before pursuing surgical intervention,
2. STOP smoking, both before and after surgery!

There is clear evidence that the fusion rates in smokers are dismal, and as a result, those patients will likely require revision fusion surgery. Additionally, smoking can increase the risk of complications – DVT/PE, poor wound healing, and cardiac and pulmonary complications,

3. It is important that a patient has his or her blood sugar under control. Uncontrolled blood sugar increases the risk of infection, poor wound healing, and pseudarthrosis (nonunion)

4. There are increased risks (infection, increased difficulty, complications with surgery, and possible acceleration of wear of adjacent segments) in patients with obesity. We ask our patients to take some ownership of their health, and if we feel that they are too heavy for surgery, we counsel and guide them to proper exercise and nutrition, prior to surgery.

Type of insurance and financial concerns

A patient should meet with the clinic/hospital's patient financial counselor to discuss billing procedures, his or her insurance policy, and any financial concerns. Additionally, the patient must consider the amount of time he/she will be taking from work as well as extra costs (medications, brace, etc.).

What are my expectations?

In order to prevent any miscommunications, patients should adequately discuss their expectations with their surgeon, the medical team, and the clinic and hospital staff.

Am I committed to what is asked of me before, during and after surgery?

Patients need to be willing and able to follow instructions (prepare themselves for surgery, prepare their home, prepare their family and friends).

Do I have a personal support network?

The patient needs to have family or friends available to assist him/her after surgery.

Do I have an advanced directive prepared? (Medical Durable Power of Attorney, Living Will, Health Care Instructions)

An advanced directive will make sure that the patient's decisions about his/her medical care will be honored in the case that he/she are unable to communicate their wishes.

Have I asked all my questions?

The patient should make a list of questions for the surgeon, patient financial counselor, medical staff, themselves, and family and friends.

Fusion is Important

Before 2004, published short-term data supported the theory that clinical outcomes are not affected by fusion success.⁷⁻⁹ Thus, patients reported good to excellent outcomes in spite of a nonunion. However, a longer-term study published in *Spine* demonstrated that fusion success does have an impact on patient reported outcomes.¹⁰ Clinical outcomes such as pain relief, rise in activity, symptom severity, and physical function were significantly better for patients with a complete fusion compared to patients with an incomplete fusion. In addition, those with a pseudarthrosis (nonunion) had a higher incidence of an additional lumbar surgery or a second try at arthrodesis (fusion).

Cervical Fusion Criteria

The combination of the patient and situation will determine whether surgery is not at all necessary, open to consideration, highly recommended, or urgent. In general, demonstrated radiographic instability (instability found in medical imaging) is an indication for spinal fusion. The literature has defined instability as greater than 3 mm of movement, or greater than 11 degrees of range of motion in a standing or neutral position.¹¹



Stable Cervical Spine



Unstable Cervical Spine

In a flexion/extension position, instability has been described as larger than 3.5 mm of movement or a range of motion greater than 20°. Natural looking images (x-ray, MRI, CT) or only minimal disc degeneration and segregated neck pain rarely would be considered reasons to pursue surgery. Similarly, an imaging abnormality, but no physical marks and non particular symptoms, typically would not be an indication to undergo a fusion procedure. However, surgery may be an option when there is an existence of a valid radiographic abnormality, and not longstanding, or insensitive to conservative treatments, despite a lack of neurological deficits (no difficulties with walking, able to hold a spoon). Additionally, neck pain with reproducible and accurate neurological evidence and symptoms such as numbness and tingling in the arms and fingers, and positive sensory and motor assessments (lack of sensations and strength), could be considered rationale for surgical intervention.

Lumbar Fusion Criteria

Similar to the cervical spine, treatment will be guided by the intensity of symptoms and the fundamental goal of improving a patient's function. Yet, the indications for lumbar fusion can still be debatable. The literature has cited indications for lumbar fusion including spondylolisthesis of grade 2, 3, or 4 that requires decompression, after multiple discectomies, demonstrated habitual pain, after a bilateral facetectomy, or radiographic instability with advancing neurologic deficits or pain.¹¹ Radiographic instability for the lumbar spine has been specified as movement of more than 3 mm, and at L5/S1 as 5 mm of motion or a range of motion greater than 10° in the flexion/extension position.¹¹

Back pain and the obscurity of radiographic parameters (such as stenosis, disc herniation, or instability) is the most challenging diagnostic predicament for the patient and physician. It is nearly impossible for the physician to narrow the pain to a specific motion segment. Typically for patients who present with pain as their main symptom and an absence of definitive radiographic signs, conservative treatment is the most logical care path.



Stable Lumbar Spine



Unstable Lumbar Spine

What to Ask Your Potential Surgeon

What's your training and educational background?

The surgeon should have completed an orthopedic surgery or neurosurgery residency program as well as a spine fellowship.

How long have you been in practice?

Our surgeons have been in practice for at least six years. Although the number of years may make a patient feel more comfortable, we value a surgeon's training (fellowship trained), and that they continually educate themselves and are up to date on the latest technology and advancements.

How many fusion surgeries have you performed?

Since our surgeons have been in practice for quite a few years, they have both performed more than 300 fusion procedures. Although the number of surgeries may make a patient feel more comfortable, we (again) value a surgeon's training (fellowship trained), and that they continually educate themselves and are up to date on the latest technology and advancements.

Do I really need a fusion? Would decompression alone suffice?

We recommend fusion surgery in the setting of instability and when decompression alone will not be adequate to relieve the neural elements.

What are your safety scores or ranking?

Our infection rate, VTE, PE, mortality and readmission rates are minimal at 0.28%, 0%, 0%, 0%, and 2.83%, respectively. We recommend that patients ask their own provider for their rates. A patient should feel comfortable with the hospital's and surgeon's safety record.

What are your quality or satisfaction scores or ranking?

Our patient satisfaction scores average ~4.8 out of 5.0. We recommend that patients ask their own provider for their quality and satisfaction scores. A patient should feel comfortable with the hospital's and surgeon's quality and satisfaction scores.

Fusion Gold Standard

At this time, fusion procedures will continue to prevail as the gold standard of treatment for patients who have squandered all forms of conservative therapies. The motion suppression decreases pain, preserves space for the decompressed spinal cord and nerve roots, and limits kyphosis, or a hunchback posture of the spine. Additionally, fusion procedures can be completed successfully at multiple levels, which is often the case for many patients. As Mr. Norton says, "don't deteriorate, fight back."

*For a full list of references please visit SpineRF.org





NUTRITION FOR HEALING POST-SURGERY

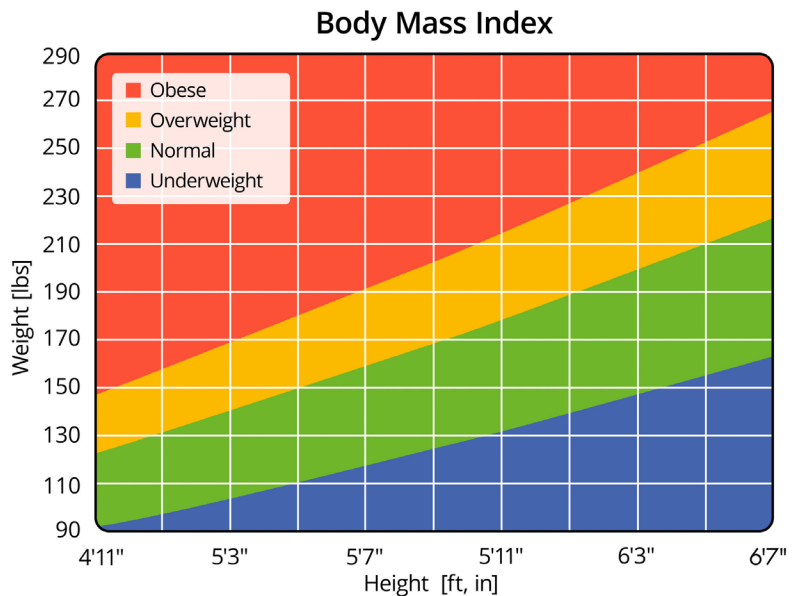
Susan S. Brady, MPT
Nurtured Bones and Integrative Nutritional Healing, LLC

Spinal surgery is often required to relieve pain, improve daily function, and regain one's quality of life. The ability to heal efficiently after surgery is essential to ensuring a good outcome. Unfortunately, surgery, by its very nature, causes stress and trauma to the body. Surgery can result in local tissue damage and inflammation as well as metabolic stress and weakening of the immune system. Maintaining a proper diet both before and after surgery can help reduce these side effects and help you heal faster.

After surgery people often neglect their diet, yet optimal nutrition is essential during this time to aid in recovery and recuperation as well as for preventing loss of muscle mass during this period of inactivity. Healing requires that the body create new tissue, repair injured tissue, and produce cells that repair wounds. These complex processes cannot occur efficiently if one's diet is short on essential nutrients.

Even though after surgery you are often inactive for a while and require more rest than usual, this is not the time to be cutting calories. After surgery your body goes into a hyper-metabolic state where the body's metabolism increases, resulting in the breakdown of muscle protein, fat tissue, and neurotransmitters. The breakdown of these tissues provides energy for the increased metabolic needs that aid in the healing process. Therefore, after surgery it is important to eat enough calories to provide the extra nutrients to sustain the hyper-metabolic activity needed to promote tissue healing. You should strive to eat 10-12 calories for every pound of your ideal body weight.

So if are currently overweight, you can use the BMI chart to determine your ideal body weight (BMI between 18.5-25) to determine the appropriate calories you will need to consume during the healing process.



Because the post-surgical hyper-metabolic state stimulates tissue breakdown, it is also important to increase the intake of protein at this time as well. Protein is a key building block of our body and is necessary for tissue growth and repair. Adequate protein recovery is extremely important for rebuilding tissue, fighting infection, slowing down muscle loss, and helps to decrease the inflammatory phase.

The suggested protein intake after major surgery is 1.5 grams/kg body weight. One kg equals 2.2 pounds of body weight.

This table indicates protein needs per pound of body weight after major surgery.

BODY WEIGHT	GRAMS OF PROTEIN
120 lbs	82 grams / day
140 lbs	95 grams / day
160 lbs	109 grams / day
180 lbs	122 grams / day
200 lbs	136 grams / day
220 lbs	150 grams / day
240 lbs	163 grams / day

The highest demand for protein is during the first two weeks after surgery. To get the recommended amount of protein every day, focus on eating a protein source with every meal and snack. If you experience constipation, refrain from eating dairy products which often can contribute to the problem. The following chart gives you some ideas on how to get the needed protein into your diet.

FOOD	QUANTITY	PROTEIN
Almonds	3/4 cup	8 grams
Beans	1 cup	15 grams
Beef	4 ounces	26 grams
Chicken	4 ounces	35 grams
Cottage Cheese	1/2 cup	16 grams
Cheese (cheddar)	1 cup	7 grams
Egg	1	7 grams
Lentils	1 cup	17 grams
Salmon	4 ounces	26 grams
Tofu	4 ounces	17 grams
Tuna	4 ounces	33 grams
Turkey	4 ounces	34 grams
Yogurt	1/2 cup	11 grams
Whey	1/3 cup	25 grams

One of the best protein sources during the healing and recovery period is whey. Whey protein is a high-quality protein found in cow's milk. It is an excellent source of branched-chain amino acids which are important for tissue growth and repair and also contains immunoglobulins that support the immune system. Whey protein also contains the amino acid glutamine. Glutamine plays a critical role in muscle repair and is also important in immune defense and reducing infections associated with surgery. Additionally, glutamine is a precursor nutrient to glutathione, the body's most powerful antioxidant. Because whey protein powder is very easy to digest, a nutritious shake made with whey protein powder is a great way to get needed nutrients if you are experiencing nausea or lack of appetite after surgery.



Whey Protein Shake

Just as increased protein consumption is required for post-surgical recovery, consumption of complex carbohydrates and essential fats is crucial as well. Complex carbohydrates, such as whole grains, brown or wild rice, quinoa, barley, oats, and sweet potatoes, provide the body with not only the needed energy to heal, but also fiber to help prevent and alleviate constipation. Vegetables and fruits are also complex carbohydrates that supply energy and fiber, as well as vitamins, minerals, and phytonutrients that are essential to aid in healing. For example, many fruits and vegetables are rich in vitamin C. Vitamin C is critical to wound healing and the production of new connective tissue, as well as being an important antioxidant which helps to prevent excessive damage to our cells and tissue.



Avoiding simple carbohydrates like white rice, white bread, pastas, and refined foods and sugars is very important during the post-surgical healing process. These simple carbohydrates have few nutrients and will not adequately nourish the body. In fact, refined sugar depletes the body of important minerals that are needed for healing, such as magnesium and calcium. Consuming refined sugar may also suppress the immune system and cause fluctuating blood sugar levels that lead to fatigue. Excessive intake of these sugars can also lead to high blood sugar which can increase the chance of post-surgery wound complications. If you experience nerve pain, avoiding foods made from wheat, such as bread, pasta, and snack foods, may be helpful in decreasing those symptoms.

When deciding on what to eat in the days following surgery, don't skimp on the healthy fats. Healthy fats, such as those found in olive oil, fish, avocados, coconut oil, nuts and seeds, and nut butters, provide an important energy source and are needed for proper function of the inflammatory system and immune response. Fats also help in the absorption and transportation of important fat soluble vitamins like A, D, E, and K. Vitamin A helps with wound healing, vitamin D supports bone health, vitamin E protects the body against free radical damage, and vitamin K is necessary for both blood clotting and bone health.

In addition to eating foods that are rich in nutrients, one must stay well hydrated after surgery. Consuming water or water based fluids are essential for maintaining adequate hydration, preventing constipation, and allowing your body to heal. It is best to sip water throughout the day rather than to drink large amounts at once. Strive for a daily water intake of half your body weight in ounces of water a day. For example, a 180 pound person should aim to drink 90 ounces of water or water based fluids a day. High sugar drinks like soda and pure fruit juices should be avoided. If drinking juice, try diluting it with water or sparkling water to reduce the amount of sugar consumed. Caffeinated products like coffee and black tea are acceptable, but should be limited to one to two cups a day. Water based fluids such as broths and herbal teas are great ways of both getting the needed fluids and other healing nutrients as well.

Two of my favorite post-surgical drinks are homemade chicken bone broth and ginger-lemon tea. Broths made from bones have been used throughout history for medicinal and health benefits because they provide the body with the raw materials to rebuild strong, healthy cells. Ginger lemon tea is a soothing tea that calms the stomach while providing the powerful anti-inflammatory effects of ginger. You can make ginger tea by peeling and chopping 1 inch of fresh ginger root and ¼ lemon and placing in a mug with 1 tsp of honey. Add hot, but not boiling water and let sit for 15 minutes. Strain out the ginger and lemon and enjoy!

Chicken Bone Broth

(You could also use turkey, duck, or lamb, following the same basic directions.)

Ingredients

- 1 whole free-range chicken or 2 to 3 pounds of bony chicken parts, such as necks, backs, breastbones, and wings
- 4 quarts cold filtered water
- 2 tablespoons apple cider vinegar
- ¾ inch peel of 1 large white potato, discard the center
- 1 large onion, coarsely chopped
- 2 carrots, peeled and coarsely chopped
- 3 celery stalks, coarsely chopped
- 1 bunch parsley

Cooking Directions

Fill up a large stockpot (or large crockpot) with pure, filtered water. Add vinegar and all vegetables except parsley to the water. Place the whole chicken or chicken carcass into the pot. Bring to a boil, and remove any scum that rises to the top. Reduce the heat to the lowest setting and let simmer. If cooking a whole chicken, after the meat begins to separate from the bone, remove the chicken from the pot and separate the meat from the bones. Place the carcass back into the pot and continue simmering the bones for another 12-24 hours.

There are many nutrients that have been shown to be important in the healing process. The chart on the following page outlines the most beneficial vitamins and minerals, the amount needed on a daily basis, and the best food source for each nutrient. Obtaining your nutrients from food is always best, but one may also choose to supplement your dietary intake with a vitamin and mineral supplement. You can take supplements with these quantities of vitamins/minerals for up to four weeks after surgery. Supplementing with these nutrients prior to surgery would be beneficial as well, but check with your doctor. In addition, you may also consider taking bromelain, a pineapple enzyme, to help reduce swelling and bruising after surgery. You can take 200-400 mg of bromelain 3x/day on empty stomach.

Top 10 Foods To Help You Heal Fast!

- *Poultry and lean meats*
- *Fatty fish like salmon*
- *Citrus fruits*
- *Sweet potatoes*
- *Whole grains like brown rice*
- *Yogurt and Kefir*
- *Green leafy vegetables like spinach, kale*
- *Eggs*
- *Beans and lentils*
- *Nuts and seeds*

Just eating from this food list every day after your surgery will enhance your nutrition and healing processes.

Having surgery is never an easy decision. There is always the potential for side effects and complications. But by enhancing your ability to heal, you can improve your chances for having a successful surgical outcome. A healthy diet, free of refined sugars, with adequate amounts of protein, complex carbohydrates, and essential fats, will provide the body with the necessary nutrients to promote optimal healing. This includes healing from the surgical wound itself as well as helping to decrease inflammation, prevent excessive tissue breakdown, and maintain immune function during the healing process. So prepare for your surgery by taking a trip to the grocery store where you can stock up on the top 10 foods for healing and all the ingredients you need to prepare healthy, nutritious foods that will help you repair, recover, and return to your daily activities.



NUTRIENT	THERAPEUTIC RANGE	HEALTHIEST FOOD SOURCE
Vitamin C	1000-3000 mg/day	Papaya, Bell Peppers, Broccoli, Brussels Sprouts, Strawberries, Pineapple, Oranges, Kiwi
Vitamin A	5,000-10,000 IU/day	Sweet Potatoes, Carrots, Dark Leafy Greens, Winter Squash, Bok Choy, Cantaloupe
Vitamin E	200-400 IU/day	Sunflower Seeds, Almonds, Green Leafy Veggies, Asparagus, Avocado, Shrimp, Olive Oil
Vitamin D	2,000-5,000 IU/day	Cod Liver Oil, Salmon, Sardines, Tuna, Eggs, Fortified Dairy
Zinc	20-30 mg/day	Beef, Lamb, Sesame Seeds, Pumpkin Seeds, Lentils, Turkey, Beans, Quinoa, Mushrooms
Magnesium	400-800 mg/day	Dark Leafy Greens, Pumpkin Seeds, Sunflower Seeds, Beans, Cashews, Quinoa, Brown Rice
Calcium	1,000-1,200 mg/day	Dairy Products, Leafy Green Veggies, Sesame Seeds, Sardines, Tofu
Probiotics	50 billion viable cells/day	Kefir, Yogurt, Probiotic Supplements

For more information please visit
www.nutrihealing.info & www.nurturedbones.com





REPUTATION MANAGEMENT: SPINAL FUSION SURGERY

Meaningful and Positive Progress in Spinal
Fusion Results: A Journey towards Excellence

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SpineCare Medical Group

As a practicing spine surgeon, I can attest to the fact that the majority of the patients I see struggle to find positive information about successful spinal fusion surgeries. I can't remember how many times patients will say something like, "You know what they say? Never let them operate on your back." When I reply, "Who is 'they'?" the patients usually mention a friend, neighbor, someone in line at the coffee shop, or sometimes even their primary doctor. Clearly, spine surgery has a reputation problem, and those of us who practice the art have not done a great job of conveying how things have changed for the better. Until now...

Many patients are driven away from surgery by fear. Many are discouraged by a lack of tangible success stories. Over my 20 years in spine surgery I have asked thousands of patients what drives your fears, and how can we assess the objective data to help you make intelligent decisions? The goal of this article is to address why many patients harbor negative impressions of spine surgery (compared to knee or hip surgeries, for example) and look at some of the facts that reflect modern spine surgery results.

What Drives Patients' Fears?

Patients are more comfortable considering surgeries on their shoulders or knees as they tend to know more patients who have had these, compared to spine surgeries. Being a bit more afraid of a complication with spine surgery is also common. This is understandable as the spinal cord and nerves are delicate structures and are an integral part of spine surgery. Many patients express a fear of paralysis or nerve damage from surgery, even though these risks are less than 1%.¹

The press also plays a role in generating fear. More often than not, the lay press will gravitate towards stories that deal with controversy, highlighting issues of complications or potential abuse. This is not unique to spine surgery, but plays a role in painting a negative picture of our discipline and our results. Shocking, provocative headlines sell magazines and fuel the public (mis)perception that surgery harms most and helps few. For example:

- Why You Should Never Get Fusion Surgery For Plain Back Pain; *Forbes* 2011
- A Knife in the Back; Is surgery the best approach to chronic back pain?; *The New Yorker* 2002

Sensationalism and selective highlighting of only the negative data creates a skewed information platform for the patients, biasing their opinions even if they don't have a spine problem.

The medical journals can also be a source of bias against spine surgery. When researchers assess the number of spine fusions in the U.S., they note that the rates of surgeries are increasing more rapidly than what might be expected for the population.² Some authors cast blame on the surgeons, implying that they are over-reaching, operating for incidental back pain, and possibly taking advantage of patients who don't know better.^{3,4}

When researchers see similar trends of dramatic rises in the rates of total hip and knee replacement surgeries, the authors more commonly focus on the increasing aging population as well as worsening rates of obesity as the primary explanations.⁵ Spine fusion surgery has long suffered in the orthopedic literature as an outcast compared to the more routine joint replacement procedures. As physicians rely on the medical literature and patients rely on physicians as a primary source of advice, it is understandable how a negative bias propagates and persists.

Surgeon Training Advances

Another meaningful source of concern from patients is the wide variability in terms of the clinical results obtained between different surgeons, all treating similar problems. Again, this is not unique to spine surgery. Much of this can be traced to the individual surgeon's skill set, not only in the operating room but also in the clinic where the actual decision to perform surgery is made. Years ago, there was no formal spine training after the basic orthopedic or neurosurgery residency years. Many surgeons' techniques, training, and skills never improved and patients suffered. Over the past 15-20 years formal spine surgery fellowship training programs are the norm, often mandatory, for surgeons to obtain privileges in spine surgery at many hospitals.

So how does a doctor actually become a spine surgeon? Spine surgeons attend four years of medical school and then gain acceptance to either an orthopedic surgery or neurosurgery residency-training program. These residencies are usually five to six years in duration, depending on the program. After residency, a one to two year fellowship in spine surgery is next. During his or her fellowship, the surgeon-in-training is focused 100% on spine care. Experienced surgeons supervise clinical and surgical training. Most programs require research publications. These fellowship-training programs are now the norm, which is extremely important for creating a fundamental consistency in the spine field. This helps patients obtain better results than in the past.

Spinal fusion surgeries are more complex than most routine hip and knee surgeries. Unfortunately, some surgeons still use outdated techniques, learned in residency, and do not stay current with modern spine surgery advancements. These issues can lead to surgeons recommending very different surgery options to patients from one practice to another. That, in turn, confuses patients seeking second opinions before committing to a surgical procedure. The rapid advancements in spine surgery over the past 10-15 years require a substantial ongoing training commitment from the surgeons so that the benefits can be transferred to the patients

seeking better outcomes. Spine surgeons now must dedicate 120 hours / 3 years on continuing medical education in order to maintain certification, which is good for them and good for their patients.

What is a Spinal Fusion?

Spinal fusion surgery is an operation that reduces pain attributable to pathological (painful) motion at an unstable or severely degenerated disc segment.

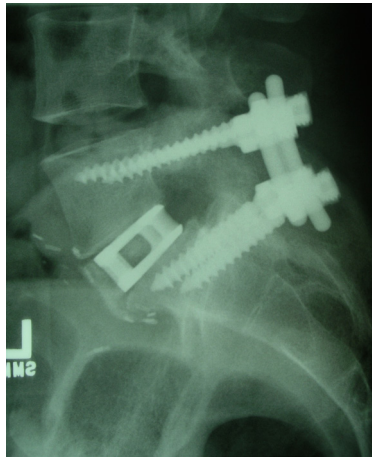


Figure 1: A one-level interbody spinal fusion with posterior fixation

The pain is due to a loss of the good, functioning cartilage of the spine (disc and facet joints), which then leads to painful inflammation/ irritation of the bones during sitting, bending, twisting, and lifting. A fusion eliminates the painful motion and stabilizes the spine, which, in properly selected patients, leads to a reduction in pain.

Spinal fusion surgery is essentially an orthopedic intervention, where the surgeon must get two bones to grow together. While we often do a decompression of the nerves as well, it is the bone work that is most critical to the success of a fusion.

Historical Perspective on Fusions

Much of the negative data on surgery outcomes came from the early days of spinal surgery. Before the availability of modern instrumentation (titanium implants) patients had to often endure months of painful bracing to hold their spines' still during healing. While external bracing is occasionally

still needed, its use has almost completely been eliminated by the benefits of internal fixation.

In order to fuse a spine segment together, a bone graft is needed to pack the area around the spine. This bone grows together to the spine bones (fuses). In the past (and occasionally still today) the surgeons had to remove (harvest) bone from the patient's pelvis and then place it in the spine. This bone-grafting procedure has been shown to have a higher complication rate and often left patients with a structural defect.⁶ The bone grafting procedure, while essential to the success of early spine fusions, still remains a very high concern for many patients considering surgery.

The fusion rates (percentage of cases where the bones successfully grow together) in the past were quite poor. Historical data showed fusion rates for many lower back and neck surgeries were as low as 60%.⁷ If the bones fail to fuse (non-union/pseudarthrosis) then the patient must undergo a revision fusion that has a much higher rate of complications.

Technological Advances

As the field of orthopedic surgery has witnessed incredible technological advancements over the past 30+ years in trauma (broken bones) as well as hip/ knee replacements, we have also seen remarkable improvements in spine technology as a result. Our instrumentation arrived a bit later than the others, hence our being a bit behind the curve.

The advent of pedicle screw fixation for spine fusions was the most important advancement to stabilize the spine and dramatically improve fusion rates.⁸ These internal fixation tools directly hold the spine segments and allow most of our patients to recover without wearing braces (Figure 1). These tools improved fusion rates achieved with internal fixation range from 85-90% compared to fusion rates in the 60% range before.

Synthetic bone graft substitutes or extenders have also made a positive impact on the outcomes of spine surgery while reducing the need to harvest bone from the patient's pelvis. The most powerful

bone graft substitute is BMP (bone morphogenetic protein), which has demonstrated fusion rates in various papers from 95%-100%.^{9,10} There are some concerns that this product may have deleterious side effects in some patients while other papers found no such concerns. Less biologically potent products including beta tri-calcium phosphates, allograft bone grafts, and stem cells are also commonly used for spinal fusions.

Nano-technology has recently become available in spine. Biologically active spine fusion implants can help form a successful fusion.¹¹ Scientific advancements in our understanding of how the implant can generate a favorable reaction in the patient's own bone have led the way to this remarkable advancement in spine surgery. To date, only one implant has FDA clearance for this nano-scale technology (Titan Spine, LLC; Mequon WI).

Minimally invasive techniques have become more common in spine surgery over the past ten years. Similar to other surgical disciplines, many spine fusions can be performed using small incisions with tubes or minimally invasive systems to reduce trauma and muscle damage. Several studies have shown faster early recovery times with minimally invasive techniques.¹² Given the complexity of certain spine surgeries however, many operations must still be performed with open techniques.

Myths and Myth-Busters

An important yet difficult issue for patients is trying to separate fact from fiction as it pertains to spine surgery. Possible versus probable is a concept that doctors are comfortable with but can be vexing for patients. While there are many things that "could" lead to complications in spine surgeries, very few are "likely." Let's take a look at some of the common myths surrounding spine surgery.

Myth: Many patients are paralyzed after spine surgery.

While paralysis is a possible complication after spine surgery, it is extremely rare. Various studies place the risk of paralysis at less than 1%. An injury to a nerve (not paralysis) is slightly more common, but the risk, like any other surgery, is still small (1-2% depending on the complexity and type of surgery).¹

Myth: Most patients are worse after the surgery than before. I never met a patient who did well after spine surgery.

Clinical outcomes data (i.e. how well did the patient do) from spine surgeries are relatively common and easy to find. Again, one must look at the type and complexity of the surgeries to draw conclusions. The majority of patients that underwent spinal fusions for low back degeneration report statistically significant rates which lead to better clinical improvements for patients after surgery. There is, however, a small group of patients who do not improve as much, and a few feel worse but these are not the likely outcomes in most scientific studies. Most studies demonstrate patient satisfaction with fusion surgery averaging 71%.^{13,14}

Myth: Once you do one spine fusion you will inevitably need another one at the next disc.

This issue of "adjacent segment degeneration" is a problem somewhat unique to spine because we have multiple disc segments connected to the next. Spine fusions stabilize a painful disc by stopping the motion, but this will put more pressure on the adjacent disc. The important issues are how do the discs look now and over how much time do you think the next disc will maintain good function? The longer time frames, the more likely one will see an adjacent segment deteriorate. This is logical. Scientific studies place the rates of symptomatic degeneration (next to a fusion) at 0.6% to 3.9% per year.¹⁵ Approximately 13%-20% of patients will need an adjacent disc fusion at ten years after their first fusion.

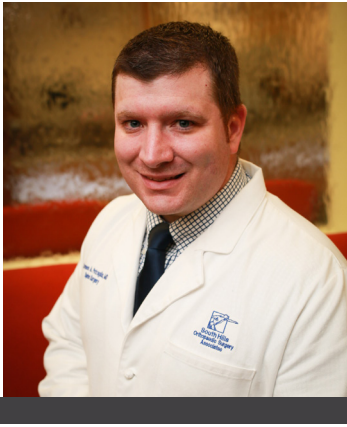
What Can Patients Do To Improve Outcomes From Spine Surgery?

- Consult with fellowship trained spine surgeons.
- Ask questions about the surgeon's outcomes and ask if you can speak with a patient who has had the surgery you are considering.
- Be an active healthy participant in the success of your surgery: Lose weight if obese/ stop smoking/ ask to see a psychologist if you are depressed or overwhelmed/ don't abuse alcohol or pain medications/ engage your spouse or significant other in the pre-op process.
- Learn about your diagnosis so that you will ask good questions. A few great resources are: www.SpineRF.org and www.spine-health.com.
- Be mentally prepared to address any complications that may arise. While these are rare they can occur and require fortitude to endure.
- Once you commit to the surgery, be optimistic that you will recover well and improve. A positive mental attitude, along with good preparation, is essential to success.

Conclusion

Spinal fusion surgery is performed when the patient and the surgeon, using a shared-decision making process, determine that it is the best option to improve the patient's pain. Prior to the advent of modern spinal surgery techniques, the outcomes were often unpredictable. Over the past 20 years, there has been substantial improvements in surgeon training and implant technology, which had led to better results for patients. Most clinical studies find that in carefully selected patients, spinal fusion surgery can reduce pain and improve quality of life in the majority of patients, with a very low rate of complications.

*For a full list of references please visit SpineRF.org



SCREWS, RODS, HOOKS, AND HISTORY, OH MY!

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Spinal fusion is used primarily to eliminate the pain caused by abnormal motion of the vertebrae by immobilizing the faulty vertebrae, which is usually caused by degenerative conditions. In medical terminology, this is called arthrodesis.

Spinal fusion history is interesting, and actually extensive. One of the first spinal fusions was performed by Berthold Hadra in 1891, as an effort to treat a fracture dislocation of the cervical spine. Metal wires were used to wrap around adjacent spinal components in an effort to immobilize the bones for healing.

In 1909, Fritz Lange of Munich made spinal fusion history when he used steel bars to stabilize the spine. Although the metals now used for spinal fusion surgery are much different metals, the original surgery performed by Lange is very similar to the techniques used today by spinal surgeons.

Drs. Fred Albee and Russell Hibbs, orthopedic surgeons from New York City, were the first surgeons to employ bone graft for the purpose of spinal fusion in 1911. During spinal fusion, bone graft is used to cause two opposing bony surfaces to grow together and eliminate abnormal motion and pain. From the work of Albee and Hibbs, posterior spinal stabilization, utilizing a patient's own bone harvested from the same surgical

procedure, became standard surgical procedure. The classic intent behind "fusion" was to create a rigid union between vertebral segments in order to correct segmental dysfunction or instability.

However, this classic non-instrumented spinal bone "fusion" has always been a relatively crude and bloody procedure involving significant tissue disruption and long periods of hospitalization, immobilization, and prolonged recovery. In the 1950s-1970s, patients were often hospitalized for weeks and then discharged on bed rest, in body casts and braces, and then continued bed rest for many months.

As the curtain descended on the twentieth century, spine stabilization technology finally began to advance. Metallic instrumentation was introduced as a means of creating faster and better solid fixation.

The purpose of instrumentation is to maintain spinal stability while facilitating the process of fusion. Bone tends to fuse more effectively in an environment where there is little motion. Instrumentation helps the fusion set up by limiting the motion at the fused segment. These procedures are used to restore stability to the spine, correct deformity (such as scoliosis), and bridge a space created by the removal of a spinal element (i.e. intervertebral disc).

Dr. Paul Harrington developed spinal instrumentation in the late 1950s. During this time, many children with polio developed spinal deformities. In an attempt to treat these children, Dr. Harrington developed the first

spinal instrumentation system (Harrington Instrumentation). Rods were secured to the spine at two ends using hooks. The position of the spine was then adjusted to correct the spinal deformity. Through Dr. Harrington's experience, fusion was discovered to be a necessary adjunct to instrumentation. Today, fusion remains an integral part of procedures utilizing instrumentation.

There are three primary types of spine surgery instrumentation: pedicle screws, anterior interbody cages, and posterior lumbar cages.

Pedicle screws provide a means of gripping onto a vertebral segment and limiting its motion. The screws are placed at two or three consecutive spine segments (i.e. lumbar segment 4 and 5) and then a short rod is used to connect the screws.

Anterior interbody cages are devices that are made to be inserted into the lumbar disc space through an anterior (from the front) approach. They can be made of allograft bone, titanium, or carbon/PEEK (radiolucent cages).

Posterior lumbar cages are also made to be inserted into the lumbar disc space, but are modified to be inserted through a posterior (from the back) approach. They can be made out of the same materials as an anterior cage.

With instrumentation, there is less need for rigid external bracing. Much like a cast stabilizes a broken bone to heal, instrumentation stabilizes the two bony components of a fusion while they heal. The hardware basically functions like an internal brace. In fact, most instrumented spinal fusions are so stable that bracing is only used for comfort.

Moving into the 1980s, instrumentation evolved into a three-dimensional approach to spinal correction. Rods, hooks, and screws were streamlined to meet individual patient needs with less demand on the surgeon to customize implants on the spot.

Spinal instrumentation continues to develop as technology advances the machining, biomechanics, and usability of these implants. Areas of development include smaller, lower profile instrumentation to reduce patient discomfort, implants that can be placed through minimally invasive approaches and bioabsorbable implants that can dissolve after the bony fusion has occurred. With any type of spine surgery, the specific technique used is largely dependent on the spine surgeon's experience and his or her comfort level with the approach.

There has been a recent trend in spine surgery toward trying to do more minimally invasive types of procedures. Anterior fusions (approached from the front) are done through a laproscope or a mini-open incision and carry less morbidity. No matter how the spine fusion surgery is done, the goal is to obtain a solid fusion and stop the motion at the level fused.





PHYSICAL THERAPY POST-FUSION

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Orthopedic spinal fusion surgery is a major undertaking for most people. Patients will maximize the benefits of surgery by following post-surgical recommendations and guidelines. How a patient manages activities and needs after surgery will change over time and will continue to change over several months following their surgery. Even though spinal fusion surgeries may be named the same and consistencies exist on the procedure and recovery, many variations are possible depending on the damaged anatomy and a patient's response to the procedure. As a result, every surgeon will provide different recommendations based on: 1) the surgeon's preference, 2) the patient's needs, 3) the type of spine fusion surgery performed, and 4) the extent of anatomical repair required during the surgery. Physical therapy can significantly help patients recover from their spinal fusion surgery as quickly and completely as possible. As with most other treatments for back pain, the more effort put forth by the patient, the better overall outcome from spine fusion surgery. The final course of treatment will depend on the functional goals of the individual. For instance, an elite athlete and sedentary individual might find some similarities between their rehabilitation treatment paths, but will also have significant differences.

Following spinal fusion surgery, physical therapy treatments should be designed to achieve the following four objectives:

Objective 1: Patient Education

Objective 2: Pain Reduction & Inflammation Control

Objective 3: Promotion of Active Movement

***Objective 4: Enhancement of Neuromuscular Performance:
Functional Exercise***

Objective 1: Patient Education

Knowing what to expect before and after surgery is the first step of patient education. Improvement of pre-surgical symptoms is achieved in approximately 80% of patients.

Even though improvement and healing can continue for nearly two years following surgery: much of the healing and improvement takes place in the first three to nine months.

The rate of recovery is largely related to the ongoing healing process, maturation of the fusion mass, recovery of nerve damage, and conditioning of muscles following surgery.

Patients should also be educated on what factors unique to them might influence their surgery and whether they need to make any lifestyle changes. For example, an important factor for patients to know prior to surgery is the impact of smoking. Nicotine from smoking is toxic to healing bone and keeps fusions from fully maturing. The nonunion (when bone mass has not fully formed between the spinal segments post-surgery) rate for non-smokers is 14%, patients who quit smoking is slightly higher at 15%, and failed fusion patients who continue to smoke is at 26%.

During the rehabilitation process, post-surgery patient education will continue. Patients will be encouraged and taught how to appropriately reintroduce active movements gently and within limited ranges. There will be more limitations up until the three-month follow-up. If the surgical site looks good at the follow-up and symptoms are improving, then the patient will be allowed to do more.

Key Post-Surgical Recommendations and Suggestions

1. *Apply ice to the surgical area 2-3x/day for 15-20 minutes*
2. *Take pain medication as instructed by your doctor*
3. *“Listen” to your body*
4. *When needing to sit, limit sitting to 30 minutes, move briefly, and return to sitting*
5. *Minimal bending, lifting, and twisting (BLTs) for the first 3 months*
6. *No lifting > 5 pounds for first 2 weeks, up to 15 pounds until 3-month follow-up*
7. *Make daily short walks a priority and gradually increase each day*
8. *Restricted driving for 2 weeks following general anesthesia*
9. *First post-operative visit will be approximately 2 weeks after surgery*
10. *Return to work, for people who work at a desk, is usually in 2-6 weeks*
* *Working from home can begin immediately when comfortable*
11. *The patient will be cleared to do more strenuous exercise once their fusion is mature (3 months)*
12. *The more effort put forth by the patient, the better overall outcome from spine fusion surgery*

Objective 2: Pain Reduction & Inflammation Control

Physical therapists are trained to help manage a patient's pain from injury and/or surgery. Some pain following the operation is normal, especially in the area of the incision. Pain in the arms or legs is also not unusual. Arm pain would be related to a cervical spinal fusion surgery, and leg pain would be more related to a lumbar spinal fusion surgery. In some cases you may experience "new pain" or pain in new areas. This is no cause for alarm as this is usually related to normal post-surgical inflammation or slight nerve tightness as a result of the new disc height with the fusion implants. Numbness, tingling, or slight weakness is often the last symptoms to resolve after surgery. On occasion, surgery can worsen symptoms by irritating formerly compressed nerves. In general, residual symptoms are no cause for alarm. However, if symptoms seem to be getting significantly worse instead of better, you may want to call your surgeon's office to discuss further.

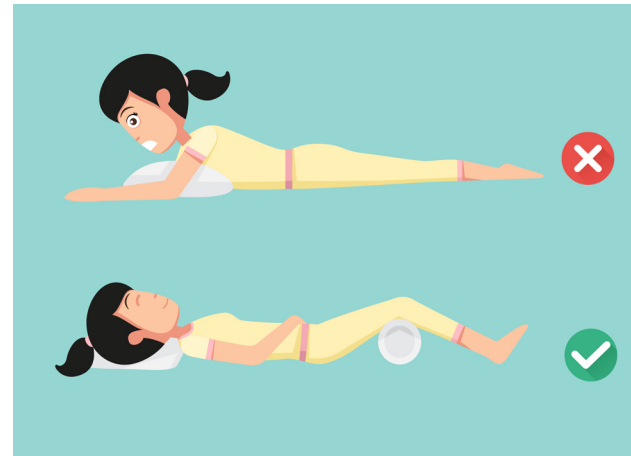
To manage the pain, medication will most likely be prescribed by your surgeon.

A patient should not take any anti-inflammatory medication for three-months after their surgery. These medications can cause the fusion to not heal properly.

Controlling your pain is an important first step in promoting a healing environment following surgery. A patient can also use ice at the surgical location two to three times per day for 15-20 minutes to help reduce pain and manage secondary inflammation. It is recommended to continue to use ice when discomfort is present.

Additionally, sleep is a necessary part of the healing process. Finding a comfortable position that will allow a patient to sleep will support recovery. For both neck and back surgeries, it is recommended to sleep on your side or back. You can sleep in a recliner or reclined position as needed. Do not sleep on your stomach. Stomach sleeping causes additional stress to both the neck and lower back and is not recommended at all following fusion surgeries.

Getting up out of bed also must be done with care post-surgery to minimize stress to surgical area. When rolling over in bed, use a log-rolling technique. When getting out of bed log-roll to the side and sit up from a side-lying position.



Choose the correct sleeping position for optimal healing

Another tool used to reduce pain post surgery is to use a back brace or collar for the first three to six weeks. The spinal surgeon may have a patient wear a brace that will be fitted at the time of the fusion surgery. A brace/collar is mostly used to provide postural support and comfort to the patient, but can also be used to remind the patient to initially limit their active movements. A brace or collar worn correctly and for a limited amount of time can assist in the healing process and improve comfort following surgery. While there are concerns of muscles becoming weaker when using a brace or collar, this will only occur if a patient becomes too reliant on the brace and wears the brace for several months or extended period of time.



When this stage of physical therapy is reached, a patient should expect the use of modalities (treatment tools such as thermal or electronic used to encourage healing), gentle movements closer to the surgical areas, and manual therapy techniques in surrounding areas to help normalize movement. Modalities typically are used when acute inflammation is present. Modalities are not necessarily indicated or needed when the inflammation is no longer an issue. Modalities such as ice, moist heat, cold laser, and ultrasound are frequently used for spinal fusion

patients post-surgically. Manual therapy techniques can be used, especially in areas adjacent to the surgical areas. In the case of a lumbar surgery, tight hip joints and a stiff thoracic spine are common. Joint mobilizations are often helpful mobilize stiff joints and take compensatory stress away from the surgical area. Gentle core isometric strengthening, gentle nerve mobility exercises, and regular comfortable movements are also beneficial.



Ultrasound treatment on the back

Objective 3: Promotion of Active Movement

Physical activity is important following your operation, but must be gradually increased. Initially a patient will be limited and should keep bending, lifting, and twisting movements (BLTs) to a minimum. Moderate active movements have been demonstrated to benefit tissue recovery following injury, surgery, and immobilization. There is a strong body of evidence to support minor and moderate stress to tissue is essential for connective tissue nutrition and repair. Early active movement after surgery contributes to good circulation and promotes rapid healing of incisions, maintains muscle, and helps to allow for proper tissue remodeling, tissue repair, and regeneration.

The initial goal post-surgery is to protect the surgical site, but it is also necessary to promote some movement to the body. It is highly recommended the patient gradually increase their physical activity. Beginning to walk and gradually increasing the distance walked each day is recommended. Since it may be painful at first, a patient can make frequent

shorter trips, any distance can be comfortably done 10 times a day, instead of one long walk. Begin with a walk to the bathroom, then to the door, then around the house, and later outside. Walking and active movement will significantly reduce the risk of deep vein thrombosis (DVT (when blood clots form resulting in pain and/or swelling)). Throughout the recovery, patients should “listen” to their bodies and not attempt movements and postures that aggravate their pain.

It may be surprising, but sitting and standing will also require gradual conditioning to these postures and will need to be gradually increased. With discomfort, it is recommended to change positions frequently and avoid sitting for longer than 30 minutes the first few weeks after surgery. A lumbar support can assist with improving sitting postures and should be considered for both lumbar and cervical rehabilitation. Additional post-surgical recommendations are not to lift more than five pounds for two weeks and 15 pounds after two weeks. You will be able to do more after being cleared at your three-month follow-up. Patients are alright to climb stairs and it suggested to initially hold onto the railing. It is also alright to ride as a passenger in an automobile.

A patient’s first post-operative visit, once discharged from the hospital, will most likely be approximately two weeks after their surgery. This visit will be a check-up to make sure things are moving in the right direction, check on incision healing/closure, and restate recommendations to the patient in regards to rehabilitation. Driving will be introduced two weeks after general anesthesia and when the patient also feels safe driving. For patients working in sedentary jobs, they are able to return to work when they are ready (mainly sitting/desk work). Individually working from home can be done if an individual feels ready. Most patients return to work between two to six weeks after their first post-operative visit. Patients with more labor intensive jobs will be cleared at a later date when they are able to successfully handle the labor intensive tasks of their work environment. This may include a modified work environment or light-duty activities at first.



It usually takes two weeks for the skin to heal and incision to superficially close. Once the incision is closed superficially, aquatic therapy is a strong recommendation to introduce additional active movements and gentle core stabilization exercises. The deeper aspects of the incision will not fully heal for approximately six weeks and the fusion will not fully mature for eight to twelve weeks. Therefore, care must be taken in the type of movements and exercises which are prescribed at this time. Aquatic therapy is an excellent way to get the patient moving in an environment which is usually less painful because it provides a reduced gravity environment and decreased forces acting on the body. When a person is submerged in the water up to their chest they have reduced the weight of gravity by 80%. Working in a gravity reduced environment allows for more freedom of movement and less pain in a functional environment to promote walking and gentle resistance. Gentle nerve glides can also be introduced in the water to help promote nerve mobility.

Nerve glides are gentle exercises which can be included in the post-operative rehabilitation program soon after surgery. Improving neural mobility can greatly improve general pain and specific nerve pain. Nerves are different than muscles and should not be held in a stretched position. They should be dealt with gentle oscillatory movements where a gentle stretch is felt, but without a prolonged hold. The emphasis of nerve glides to “loosen” neural tension is a gentle stretching sensation by moving into and out of the gentle stretch repeating the oscillatory movements several times. This technique is often called “flossing,” as it is similar to how dental floss is pulled back and forth gently between our teeth and gums.

Nerves can be very reactive and should to be dealt with significant care. An irritated nerve or a nerve with tension with cause a compensatory response of pain and muscle spasm in surrounding muscles to protect the nerve. If nerves are stretched too much they can cause significant pain responses that can present immediately or delayed and present pain at a later time.

Active movements should also include joints and anatomy in surrounding areas adjacent to the surgical area. When prescribing active movements and exercises early and late in the rehabilitative process several variables should be considered:

1. *Specific type of surgery*
2. *Joints and anatomy directly impacted by the surgery*
3. *Surrounding areas indirectly impacted by the surgery*
4. *Tissue quality at the surgical site*
5. *Patient's body type and physical condition*
6. *Patient's goals following surgery*

The type of surgery will determine many of the restrictions imposed on the patient following surgery. In the case of a fusion surgery a patient will have one or several vertebral levels fused together. The overall impact on mobility will be more significant the more levels involved. The nerve tension will also be more significant the more levels involved. It is often the case that the mobility lost during surgery is no more than the limitations which existed before surgery. The first three months are an important phase of recovery to allow the bone between the vertebral bodies to fully fuse and mature around the fusion hardware. The healing time for bone to fully form and heal averages eight weeks. The follow-up is three months to allow for proper healing and full osteointegration of the fusion site. During the first three months movement is introduced initially in areas surrounding the surgical area and then progressing to joints and anatomy directly impacted by the surgery. The intensity of the movements and exercises will increase as the patient progresses.

The tissue quality and the patient's physical condition, at the time of surgery, will also impact the amount and intensity of exercises and movements introduced. Even though surgeries with different patients are called the same (i.e. 1-level Anterior Lumbar Interbody Fusion (ALIF) or 1-level Anterior Cervical Disc Fusion (ACDF)), they can present with large variability based on the patient's physical condition, involved anatomy, and tissue quality. These differences can significantly impact how a patient feels after surgery and how they progress following surgery. A person with poorer tissue quality, greater damage to their anatomy, and who is in poor physical condition will have a longer road to full recovery than an individual in excellent shape and less damage to deal with. An excellent surgeon will relay information to the physical therapist in regards to the tissue quality of the surgical area to help formulate a reasonable prognosis and rehabilitation program. In addition, the patient's goals for normal everyday activities, recreational activities, and work-related activities will be considered in what functional exercises are prescribed in their rehabilitation program.

Objective 4: Enhancement of Neuromuscular Performance: Functional Exercise

Exercise is critical to getting better after surgery. It is the key to getting patients safely back to activity, eliminating fatigue, promoting proper movement strategies, enhancing strength, and avoiding re-injury. A physical therapist should develop an individually tailored exercise program based on knowledge of the type of surgery to help improve dysfunctional movement strategies, improve strength, and restore function. Patients will learn exercises in physical therapy and then continue to do them on their own at home. Exercises which increase pain moderately to significantly should be avoided. There are many choices of exercises available. If the patient and therapist work together, they should be able to find alternative exercises which continue to be beneficial.

Often times, pain causes our bodies to deviate from normal movement patterns in its attempt to avoid pain. These changes cause compensations that cause new dysfunctional postures and faulty movement patterns, causing additional pain.

Specific strengthening exercises can help strengthen weak muscles, but unless the patient learns how to apply the strength gains into better postural movements through functional exercise they will most likely continue to experience pain. Functional exercise is training the body for the activities they perform in their daily life. The primary goal of functional exercise, for the spine patient, is to achieve normal everyday tasks while maintaining a neutral spine. Neutral spine describes a spinal position where the spine maintains its normal curvature, but with no imposed flexion, extension, or rotation. Without proper functional training of the postures and movements we encounter every day, the same dysfunctional patterns the patient had before surgery can continue after surgery.

Studies show the most success with physical therapy when there is an integration of manual therapy techniques and use of specific functional exercise to address the patient's dysfunctional movement patterns and muscle imbalances and help retrain the patient's body. The manual therapy delivered is a reflection of what joints that have been found to be dysfunctional, usually stiff and less mobile. Joint mobilizations are used in surrounding joints close to the fusion location and also in adjacent regional locations, such as the hips and rib cage/thoracic spine for lumbar fusion patients. In order for manual therapy to have the greatest benefit specific exercises are used in conjunction with manual therapy to reeducate the body when new joint motion is established with manual therapy techniques.

The 6 Fundamental Types of Functional Movement

- 1. Squat Action:** *Sitting and standing, lifting, etc.*
- 2. Lunge Action:** *Walking, running, kneeling down, shoveling, lifting, etc.*
- 3. Push Action:** *Opening doors, grocery carts, etc.*
- 4. Pull Action:** *Opening doors, vacuuming, raking, etc.*
- 5. Twist Action:** *Rolling over, turning, looking over our shoulder, etc.*
- 6. Gait:** *Walking, running*

Basic fundamental movements can be painful and difficult for some people who have lost the ability to establish and maintain neutral spinal postures and are suffering from pain. Simple tasks such as rolling over in bed, prolonged sitting, prolonged standing, pushing or pulling a door, or getting out of a car can trigger pain. Once the patient has learned how to find and maintain a neutral spinal posture, exercises to promote these 6 basic fundamental functional movements should be at the core of any spine patient's exercise program. Exercise should be performed on a daily basis, a minimum of five days a week, to maintain movement strategies and postures learned in physical therapy. The physical therapist will safely progress and challenge each patient as they heal and are able to achieve more.

The desired end goal for each patient will be different. It will largely reflect where the patient was physically prior to surgery. A sedentary individual requiring back surgery will have different post-surgical goals than a high-level athlete. Both types of individuals will have to respect the healing process of the human body. But often times, a healthy and athletic individual will heal a bit faster and progress quicker to higher-level functional exercises. In the end, the athlete will go further progressing with higher-level exercises because they need to function at a higher baseline level.

Any patient's success in recovery from spinal surgery will depend on his/her willingness to work hard at home as well as with his or her physical therapist. The patient must "toe-the-line" and work hard, but not work so hard to continually trigger inflammation. Working with a physical therapist will help guide the patient and help form individual goals and strategies to achieve a successful outcome.

Lumbar Fusion Post-Surgical Protocol:

I. Pre-surgical visit with physical therapy

- a. Core instruction
- b. Neutral spine instruction
- c. Post-surgical instructions
 - i. Icing
 - ii. Wearing brace
- d. Supplies
 - i. Large lumbar ice pack
 - ii. Long shoe horn
- e. Reacher

II. Minimal Physical Activity, 1-2 weeks

- a. Protect incision to avoid infection
- b. Gentle core isometrics
- c. Regular walking daily
- d. Rest, but avoid sitting longer than 30 minutes
- e. Icing for pain relief

III. Phase I: Aquatic Therapy, 2-8 weeks (after incision heals)

- a. Gait retraining
- b. Hip range of motion (ROM)
- c. Neural mobility to ease numbness and tingling sensations
- d. Gentle core strengthening

IV. Phase II: Land Therapy, 8-12 weeks

- a. Begin aerobic exercise program
 - i. Biking (recumbent)
 - ii. Walking
- b. Soft tissue massage
- c. Joint mobilization to restore normal mechanics
 - i. Hips
 - ii. Thoracic spine
 - iii. Lumbar spine (adjacent segments, not fusion site)
- d. Postural re-education (neutral spine)
- e. Flexibility exercises
- f. Range of motion (ROM) exercises

V. Phase III: Functional Land Therapy, 12-20 weeks

- a. Progression of all the above
- b. Begin functional strengthening program
 - i. Incorporate 6 basic fundamental function movements
- c. Progression of weights with strengthening program
- d. Sports specific training

VI. Phase IV: Discharge from Land Therapy, 20 weeks – 1 year

- a. Return to sport (i.e. golf, tennis, skiing)
- b. Begin fitness center program
- c. Maintain healthy lifestyle

Cervical Fusion Post-Surgical Protocol:

I. Pre-surgical visit with physical therapy

- a. Core instruction
- b. Post-surgical instructions
 - i. Icing
 - ii. Wearing brace
- c. Supplies
 - i. Long shoe horn
 - ii. Reacher
 - iii. Cervical ice pack

II. Minimal Physical Activity, 1-2 weeks

- a. Protect incision to avoid infection
- b. Gentle isometrics
- c. Regular walking daily
- d. Rest, but avoid sitting longer than 30 min
- e. Icing for pain relief

III. Phase I: Aquatic Therapy, 2-6 weeks (after incision heals)

- a. Upper extremity (UE) range of motion (ROM)
- b. Neural mobility to ease numbness and tingling sensations
- c. Gentle UE strengthening

IV. Phase II: Land Therapy, 6-12 weeks

- a. Begin aerobic exercise program
 - i. Biking (recumbent)
 - ii. Walking
- b. Soft tissue massage
- c. Joint mobilization to restore normal mechanics (above/below fusion site)
- d. Postural strengthening
- e. Flexibility exercises
- f. Range of motion (ROM) exercises

V. Phase III: Functional Land Therapy, 12-20 weeks

- a. Progression of all the above
- b. Begin functional strengthening program
 - i. Incorporate 6 basic fundamental function movements
- c. Progression of weights with strengthening program
- d. Sports specific training

VI. Phase IV: Discharge from Land Therapy, 20 weeks – 1 year

- a. Return to sport (i.e. golf, tennis, skiing)
- b. Begin fitness center program
- c. Maintain healthy lifestyle



PAIN POST-SPINAL FUSION

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The vast majority of patients who undergo spinal surgery have significant improvement in their back pain or leg pain, but there are unfortunately some who do not experience relief post-surgery.

Continued pain surgery is known as “postlaminectomy syndrome” or “failed back syndrome”.

There are usually three ways in which a patient might feel pain post-fusion. First, there might be initial pain relief, but then gradually pain returns. Second, there might be a different source of pain that surgery did not address. Third, there might have been no relief at all, and the same pain remains. Figuring out if the pain is new and different or the same from before is the first thing a doctor must determine.

When Pain Returns: Adjacent Segment Disease

A reality of spine fusions is that sometimes when one disc level is fused and corrected, another adjacent level begins to be the cause of back pain. Fusion can lead to stress at the joint above or below. The percentage of patients that require adjacent disc treatment has lessened and will likely continue to decrease with continued advancements in spinal surgery.

More Than One Source of Pain

It is possible that a patient had more than one cause of pain at the time prior to surgery, and after one was treated, the other cause of pain remained. It is not uncommon to have multiple diagnoses for back pain. For example, over 30% of patients with low back pain also have some accompanying sacroiliitis, which can contribute to back pain. Other common additional diagnoses might include: sciatica, arthritis, or disc degeneration.

The Pain Never Left: Non-Union

Experiencing a non-union, or pseudoarthrosis, means the vertebrae that the surgeon intended to have joined together does not, thus continuing the same back pain previously experienced. This might be a result of factors out of the doctor’s control, such as smoking or osteoporosis. If you experience this sort of pain, your doctor will likely approach treatment initially with conservative options but might eventually have to suggest a revision surgery if conservative approaches fail.

What to Do if the Pain Remains

Considerations of the current symptoms in conjunction with obtaining a good history, evaluating a physical exam, reviewing diagnostic studies (such as x-rays, CT scans, or MRIs), and seeing what the results of physical therapy, medications, the passage of time, and possible injections can all lead toward a much more precise diagnosis than postlaminectomy syndrome. With the more precise diagnosis, a more precise treatment can be offered.

Sometimes the best treatment is to continue with medicine, physical therapy, increasing activities, and having no further surgery. Other times, the best treatment is another surgery. Advanced pain management technology might be beneficial, such as the placement of a spinal cord stimulator for patients who have ongoing severe nerve pain but are not a candidate for surgery.

In any event, reevaluating continued pain or chronic pain, even in the patient who has had previous surgery, can also lead toward a more precise diagnosis of a pain generator. With a good diagnosis and a better idea of where the pain can come from, a more precise treatment can be offered. It can often help a patient with ongoing pain.





JOURNALISM AND HEALTH CARE: THE GOOD, THE BAD, THE CLARIFICATION

Melanie F. Gutmann, M.S.
Spinal Research Foundation

Spinal fusions are no stranger to bad press. And the press undoubtedly is scary. Reports of doctors unnecessarily performing spinal fusions, and pain worsening post-surgery are not comforting. It is hard to be at ease after receiving a surgeon's recommendation for spinal fusion when there is so much negativity surrounding the procedure.

The media can be an extremely powerful tool in the amount of influence it has on the public, and in regards to medical news, very useful. With that said, it is necessary to read any news story on a new health finding with caution. If something really surprises you and piques your interest or is on a topic you are not knowledgeable on, maybe do a little extra research yourself. If it directly relates to your health and wellbeing, it will be worth it to put in the time and do some extra homework.

Medicine Needs Journalists

The world of science and medicine needs journalists. Complicated medical jargon is a foreign language to regular folks like you and me, and a good journalist can serve as a translator that lets us know what we should take away from a medical discovery or a scientific finding.

Journalists are so powerful that by translating important findings for the public, they arguably have helped shape health behavior for the better. Assuming the average person does not browse through the latest medical journal publications daily, their best way of learning of new health findings is via media outlets. If there is a new medical study releasing findings, undoubtedly a reporter will find

value in reporting on it. And we should be happy that journalists are there to do that work for the public. They are doing their job of informing us on health news that can help shape our decisions on how to lead a healthy life.

Credentials of Journalists Writing Health Stories

In the journalistic world there are usually two different types of journalists that will report on a health story: those who have specifically dedicated their journalism career as a health, medical, and/or science reporter, but also those who are assigned to cover the beat (genre in journalism) for a day. Often times the reporters who have been spending their careers reporting on the medical field are fluent in medical terminology, well-schooled in translating scientific studies, and even have a deeper understanding of the science they are reporting on. Likely, they understand that there is more to a journal study than reading the abstract (summary of study's findings).

Beat journalists are extremely impressive because they will cram to learn as much information as they can to write an educated article on deadline. However, they are not true experts and will probably be assigned to write about topics ranging from politics to weather for their next assignment. And these reporters will undoubtedly become fast experts in other fields as well. This is an extremely admirable quality about journalists to gain so much knowledge in short amounts of time. However, those in the science fields know, it takes more than a day of cramming to become an expert.

Journalism and Science Journals

There is another complexity added to the journalist covering science and medicine. Scientific journal articles are often cautious in reporting findings. Journal articles will share what the study suggests, but they will be hesitant to commit to the findings 100%. This is the practice of a good study, to recognize that there are potential flaws to their findings and state the study's shortcomings.

To a journalist, this is dull. A common phrase among the journalism community is: if it bleeds, it leads. Journalists have a responsibility to inform the public, but they also need their stories to be read. A negative spin on a journal finding might draw more readership than a wishy-washy headline saying more studies need to be done. However, if you read a reporter's story and the writer has strong journalistic ethics, they will write that more research needs to be done, but generally towards the end of the article. In the case of the unnecessary fusion surgeries, good reporters will also say that it is a small percentage of doctors. Admittedly, it is easier to put to memory what the first couple of paragraphs say and even to think about the negative aspects.

The Numbers Don't Lie...Or Do They?

When browsing medical news stories, it is not uncommon to see statistics. Statistics are valuable as they can validate a news story. However, numbers can be misleading. In the world of journalism, a journalist might find a very convincing statistic, but not realize that there is more to the number that they found. They might also do research that leads them to very specific statistics that prove a specific point. Statistics are great, but there might be more to them than a daily news story can share.

So...

What does this mean for you? When you see an article inciting fear and spouting negativity about fusions, it is ok to be scared. It is a big surgery after all, and uneasiness is only natural. But take control of your health by educating yourself. If a negative story comes your way and cites a specific study, take the initiative to look at that study yourself. Bring up your concerns to your doctor, and even get a second opinion. Do some research on your doctors too. Journalism is great, but it should not be your only source on making decisions about your health.

*For a full list of references please visit SpineRF.org

FROM SURGERY TO HOME THERAPY:

Home Care Considerations for the Post-Operative Spinal Fusion Patient

Greg Lutz, D.P.T., Nicky Segura, L.P.T.A., A.C.E.,

Kathy Martz, R.N., Kelli Miller, R.N.,

Capital Home Health Care

More patients are having spinal fusions for lower back pain than ever before. Last year the Dartmouth Institute for Health Policy and Clinical Practice reported that of Medicare beneficiaries age 65 and over, these operations increased 67% between 2001 and 2011 (US News and World Report).

With an increased number of various spinal surgeries being performed throughout the country, more patients are being referred to home health care for post-operative management and home therapy. Home health care is covered 100% by Medicare and most private or commercial insurance companies (dependent individual patient's home health benefit). Depending on the patient's coverage and specific plan limitations, patients may owe a small co-pay for home visits for both the registered nurse and the therapy team. The patients should always be made aware of their financial responsibilities prior to the initiation of home care.

The patient's treatment plan post discharge may vary depending on the type of surgery and location. In order for the patient to achieve maximum rehab potential and return to their daily routine, a collaboration of nursing and therapy services after discharge allows for a quicker recovery and less post-op complications.

Prior to leaving the hospital, the patient will be given specific discharge instructions and will more than likely be seen by a physical therapist. Initial teaching regarding "log rolling," stabilization precautions, and a home exercise program should take place prior to going home. In addition, brace fitting as well as any other adaptive equipment should be ordered for the patient.

It is recommended that the patient identifies a caregiver that can stay with the patient the first few days after surgery. This is important as application of the brace, toileting, bathing, and other activities of daily living can be difficult to do on your own.

A **registered nurse** will complete the initial assessment and evaluation the day after discharge. His or her main responsibilities include evaluation of the patient's pain and pain relief measure as well as assessment of skin integrity with a focus on the surgical incision and teaching regarding signs and symptoms of infection. The RN will also provide education regarding diet and ways to avoid constipation which is a common side effect of narcotics and opioids used for pain management. If the patient does not have additional medical problems, the nurse usually completes the plan of care with goals met within a few visits.

The **physical therapist** also evaluates the patient within 24 hours after discharge. Patients are usually seen two times per week for two weeks to accomplish the following:

- Proper donning/doffing of the Thoracic Lumbar Sacral Orthosis (TLSO)- Back Brace
- Gait training- walking with front wheeled walker/cane
- Stair negotiation
- Pain relief techniques
- Transfer training
- Bed mobility
- Lower extremity strengthening exercises
- Education on home exercise program

Lastly, the **occupational therapist** evaluates the patient for safety and for any assistive devices they might need such as:

- Long handled shoe horn
- Sock aid
- Reacher/grabber
- Bedside commode
- Elevated toilet seat

The occupational therapist will instruct the patient on how to properly use all the equipment in a safe manner, making sure the patient adheres to all bending and twisting restrictions. Patients usually transition to an outpatient setting within two weeks.

Depending on the surgeon's preference and protocol the patient may start out participating in aquatic exercises utilizing a pool and then progress to land therapy in an outpatient rehab gym. Continued precautions need to be adhered to in regards to trunk flexion and extension for many weeks, and a home exercise program should be carried out during the remaining rehabilitation period.

Goals for Patients After Spine Surgery:

- 1. Patient will be able to complete ambulation with least restrictive device on even surfaces a distance of 350 feet in order to access community in two weeks.*
- 2. Patient will be able to complete proper log rolling technique and bed mobility while adhering to post op precautions with modified independence (MOD I) in two weeks.*
- 3. Patient will be able to safely climb stairs with MOD I in order to access second level of home in two weeks.*
- 4. Patient will be able to don/doff TLSO brace properly with MOD I in two weeks.*
- 5. Patient will be independent with Home Exercise Program (HEP) in two weeks.*



PUBLIC HEALTH:

Demystifying Finding Your Perfect Running Shoe

Ray Pugsley
Potomac River Running, Inc.

Spinal discomfort or pain can often limit or completely stop a person from continuing his or her previous exercise routine. But an active lifestyle is a key piece of long-term health and also important to the quality of life for many. Spinal problems should not be ignored, and advances in treatment approaches and technology now allow people to get back to active lifestyles after both surgical and non-surgical treatments.

As every medical professional will attest, the first step to supporting a healthy back in the long term is a strong healthy body, with a particular focus on a strong core – whether for an already healthy individual or one recovering from a surgery. Once your body is working properly, appropriate

equipment can allow you to return to your previous exercise routine or even start one. Previous spinal issues do not necessarily prevent exercise at a high level.

If running or walking is your choice of activity, a good pair of running/walking shoes should be a high priority. However, there are literally hundreds of shoe options. How do you pick the right one? In the most basic terms, you want a comfortable shoe. But what makes it comfortable? Different shoes are designed for different purposes, different foot types, and different running/walking forms. To guide your selection, visit a specialty store where the staff can help guide you through the otherwise intimidating wall of options.

Running shoes have come a long way. Gone are the days of sore arches, beat up toes, and persistent blisters. From advanced cushioning to motion control technology, there is a shoe out there for everyone. Running shoes are designed to accommodate a wide variety of foot shapes, body types, and biomechanical inefficiencies. The challenge is matching the right shoe to each person.

Fitting for Comfort

No two athletes are the same. The dimensions of your feet, as well as the strength and flexibility of the muscles and joints in your legs make you one of a kind. Running and walking shoes are designed to accommodate a wide variety of foot shapes, body types, and biomechanics. A video gait analysis allows you to view how your foot strikes the ground at the precise running/walking speed that is comfortable for your routine includes running and walking. You might even see different results depending on your activity. By carefully assessing this unique gait, experienced shoe fitters will identify the correct stability category of shoe for that person. Slow motion can help to highlight the way gait is affected by different shoes. In addition to considering how the foot strikes the ground, one can also assess overall running/walking mechanics to gain additional input toward the best shoe choice.

Together, both practices enable each person to choose the best shoe for him/her. For runners and walkers, identifying ways to improve running/walking economy can help to enhance comfort, reduce injury, and make exercise routines of all levels more manageable. Repeating this process each time new shoes are needed (every four to seven months or 300-500 miles) may help to minimize common repetitive use injuries associated with running and walking. As fitness changes—whether due to change in running form, activity level, or lifestyle—it's best to reconfirm shoe choice, as what is best may also change.

Tips for Choosing the Right Shoe For You

There are many ways to choose the “wrong” or “not quite perfect” shoe and a few points worth keeping in mind while narrowing down to a choice. At service-focused running specialty stores, staff are trained to

guide each person to a good choice, but at the end of the day, the individual who is running in that shoe must evaluate if it is comfortable. When choosing a shoe, pay attention to size, width, unique mechanics, the brand, and technical information about the shoe and its designed function. Below are five tips for making the “right” choice.



1. Size Matters

It's not a cliché. Buy the right size. Be aware that an athletic shoe is typically cut shorter than a leather dress shoe, so shoe size typically increases up .5 to 1.0 full sizes just in that conversion. Why? Part of the difference is due to the shoe mold used in making the shoe as well as the synthetic (i.e. less stretchable) materials used to provide cushioning and the shoe outer materials themselves. But beyond that standard conversion, a person's size may need to increase further because you need room for your feet to swell during exercise (and the longer the duration of your planned activity, the more chance for this swelling, so it becomes even more important for someone training for an endurance event). If the feet do not have room to swell, the chance of blisters, calluses, black toenails, and other nuisance problems increases. More importantly, if shoes are too tight and the forefoot bones (metatarsals) don't have room to expand as the foot strikes, the body cannot absorb shock correctly, and you are at risk for many more significant injuries to weak areas in the skeletal and muscular systems, including the back and spine.

If shoes seem to fit fine in the store and have plenty of room but later give trouble out on the trail, you may want to shop for shoes late in the day or after a

workout when some swelling has already occurred. If you have a favorite thickness of sock, bring your sock with you or be sure to do your trying on with a similar weight sock. Ultra thin socks take up less room in the shoe than thick cushioned socks do. When trying on shoes, be aware of “first feel” of the foot in the shoe. If you can feel your toe hitting the front end or top, it is too small. If you can wiggle your toes freely, that is a good sign. If your heel slides out of the back or your foot slides side to side in the shoe, it is too big or not cut correctly. Also, many people have feet of slightly different lengths — always fit to the larger foot, even though the smaller one may have to adjust to the feeling of extra space.

As mentioned, running shoes don’t stretch out due to the synthetic materials. Why synthetic? Light meshes are breathable, and synthetic materials aren’t compromised by moisture and won’t lose their shape. As such, a running shoe should fit very comfortably from the first time it is tried. That is not to say there isn’t a “break-in” period. Ease into a new shoe, especially a new model. For runners, spend some time first walking in the shoes, and then take a few short runs before a longer run. The body needs to adjust to the new shoe and let some of the flex points in the midsole and upper begin bending where the foot bends. If it all possible, don’t wear a brand new shoe for a long run on the first day out! Try the shoes out on a treadmill for a few miles before going out for a longer run — that way if you have a problem, you can address it before you find yourself a long way from home.

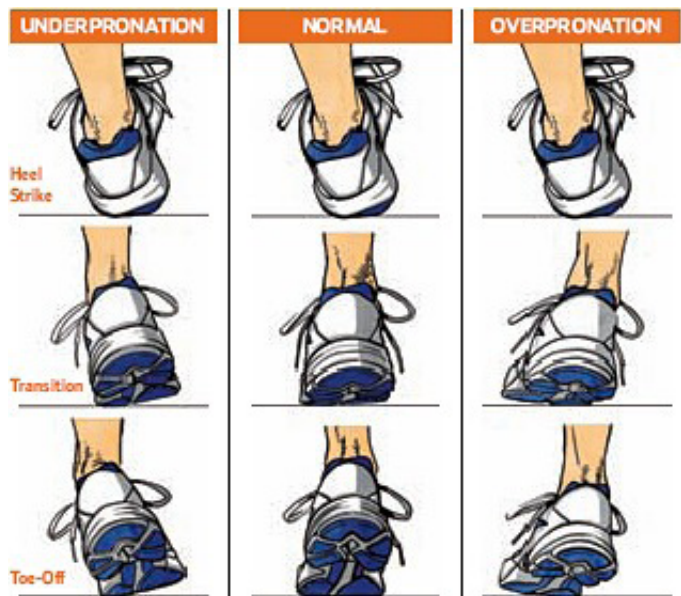
2. Width Matters Too

The average men’s shoe is a D width and women’s width is a B width. Some models labeled as a standard width are actually cut a little narrower or wider, and can be a good choice for someone with a slightly wider or narrower foot. If your foot is significantly wider or narrower than average, you may consider styles available in widths. Most all the major running shoe brands make some of their shoes in wide and narrow. While most stores do not carry all styles in all widths, typically there should be something that gives you a good fit.

3. Basic Biomechanics Are Important

The type of shoe you should look for is best determined by knowing your biomechanics.

Pronation is the natural way the foot moves as it goes through the process of striking the ground, transferring force forward, and toeing off for the next step. Over-pronation occurs when this movement is exaggerated and can be a contributor to some injuries in certain individuals. Arch height and flexibility can be a factor in over-pronation. Over-pronators typically feel most comfortable in a stability style shoe which accommodates more flexible (and sometimes lower) arches and yields additional control. Excessive over-pronators often find a motion-control or extra stable model is likely the correct shoe type. Those with relatively “normal” pronation may be most comfortable in a neutral shoe with good cushioning. A very small percentage of the population actually under-pronates, or supinates. These individuals typically also look to a neutral shoe but may need extra cushioning throughout the midsole.



How do you understand your biomechanics for the purpose of selecting appropriate footwear? Magazines and online shoe guides may suggest a “wet foot test,” looking at the wear pattern of your shoe or using another formula to help you determine your stability category. However, by definition, when running or walking, a person is in motion. Gait analysis shows exactly what the foot does while moving. For instance, many people mistake outside heel wear as a sign they under-pronate. Rather, they should consider what happens after

the initial contact with the running surface. Most everyone will roll inward (medially) to some extent. The extent of the medial rotation can help determine the right shoe choice. Don't assume that flat feet demand more support or that high arches indicate no support is needed. These are fair generalities but are often disproved when considering an individual in motion. Take the time to have an education evaluator watch you and make sure they are able to explain to you what they saw and what it means.



4. Minimal vs. Maximal

Running in minimalist shoes gained popularity over the past ten years. A “minimal” shoe is one that tries to approximate barefoot running as much as possible, often having engineering composed of a low heel-toe drop (drop is the difference between the height of the back of the shoe and the front) and reduced cushioning. While a minimal shoe has a purpose for some runners, (particularly more competitive ones who may wear different shoes for different types of training and racing) many others aren't

prepared or conditioned to exercise in this type of footwear. As with most things in life, one size doesn't fit all. Someone who decides to move toward a minimalist shoe should do so gradually to make sure his/her body reacts favorably to the changes inherent with these types of shoes. Others want a lot of cushioning on their minimalist shoes, meaning they aren't minimal at all, but actually maximalist. Maximalist models share some features of minimalist footwear like the lower drop, but add cushioning

features to reduce the amount of force passing from the ground to the body. Both ends of this spectrum have a loyal following and can be useful tools for runners and walkers to employ for different activities.



Minimal and maximal shoe side by side

5. Brand Does NOT Matter

Shop by running shoe type, not brand. Running shoes are like cars — there are many major manufacturers, each of whom makes shoes in different categories designed to fit and appeal to different customers. (There are many different mid-size sedans out there... you and your neighbor don't necessarily feel the same one is “right.”) If you know what type of shoe works best for you, know your biomechanics, and know the features of your foot (width, volume, etc.), then you may find yourself regularly returning to a particular style or brand. If you don't know what you like, if your shoe of choice has recently changed, or if you have had other changes (pregnancy, introduction of a new type of training, injury, etc.), you will want to keep an open mind and revisit your biomechanics before selecting a shoe. Have a gait analysis to determine the right category of shoe for you (i.e. motion control, stability, or neutral). Then consider the various options in that category. Try not to be predisposed against a particular brand because of a bad experience you had in the past — “I got a stress fracture wearing Brand X... I'll never wear those shoes again.” It may be that the category of shoe was wrong, in which case any brand's offering in that category would have caused you similar problems.



Choose the Shoe by Its Fit, Not Its Color, Recent Magazine Award, or Your Friend's Experience

Don't buy a brand or shoe model based on someone else's success with it, or because you read great things about it somewhere. Gathering information about what works for others is great, but ultimately be guided by what feels comfortable to you, not someone else. Ultimately, models change relatively often (12 months is typical) and the footwear designers change companies/brands almost as frequently. Being loyal is fine, but don't be blindly loyal, and don't buy by color alone!

Summary

There are literally hundreds of running and walking shoes on the market. Ultimately, the "right shoe for your back" is one that allows you to stay healthy while maintaining a consistent exercise routine and in the process develop proper running form. Running or walking with proper biomechanics takes the stress off of all parts of your body including your back, and having the right shoes help facilitate good form. High cushion or moderate cushion shoes? Traditional or low drop foot-beds? Regular or wide widths? All questions that can be answered with the help of educated staff at a running specialty store.



Should I Change My Form?

Understanding your foot strike does not necessarily mean you need to change it. In recent years, the barefoot running trend had many people attempting to completely modify their biomechanics, often resulting in significant injury. Some medical professionals believe you should simply support your foot as it currently functions. Others argue for some "correction," particularly if the runner or walker is chronically or currently injured. Over-pronation is not always bad – a runner with years of activity under his or her belt who has never been injured and does over-pronate moderately may just want a shoe that best fits his other foot. Again, comfort is king. It's worth being aware of that potential for future problems, though. By contrast, a newer walker or runner without that history who does over-pronate severely might be better served to start with a shoe designed to manage that motion. As the runner/walker develops a routine and history, he or she can then attempt to reduce the "control" if less stable shoes are attractive for other reasons.

Biomechanics do extend beyond the foot-strike. Making changes to running or walking form can improve efficiency (allow you to go faster at the same level of effort) and minimize the risk of injury. Such changes may be as simple as relaxing the shoulders or increasing cadence (how many steps you take in a particular period of time). "Over-striding" is extending the leg out in front of the body such that the foot hits the ground first at the back of the heel with the leg extended. **Learning to land with the foot under the hips/center of gravity can dramatically reduce the shock that the body must absorb.** A healthy body can sometimes handle that repetitive stress, but over-striding can be problematic for anyone with a history of aches and pains (in the back or elsewhere). Taking steps to improve form and reduce any propensity to over-stride will increase efficiency and mitigate the risk of injury. All changes should be made gradually, however.



SPINAL RESEARCH FOUNDATION'S SPINAL HERO

Domagoj Coric, M.D.

Specialization:
Neurosurgery

Practice:
Carolina Neurosurgery & Spine Associates

1.) Why did you choose your specialization?

I chose to specialize in spine surgery because given the ubiquitous nature of spinal pathology, it gave me the opportunity to make a positive impact in the everyday lives of patients.

2.) What is your favorite way to stay healthy?

I try to spend an hour on the elliptical trainer at least four days a week. I also enjoy going for five mile walks with my wife every weekend.

3.) Why is research in the field important to you?

Research is of paramount importance in the continued evolution of spine surgery. Research fuels innovation and allows spine surgeons to deliver cutting edge technologies to improve patient outcomes.

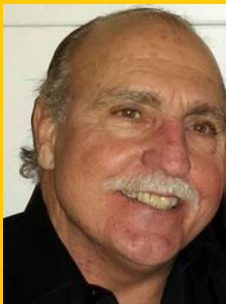
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The Spinal Research Foundation recognizes outstanding clinicians and researchers in the field of spinal research and profiles them as Spinal Heroes. These dedicated spine care professionals embrace excellence in both research and education, contributing significantly to improvements in the diagnosis and treatment of spinal disorders. We recognize Domagoj Coric, M.D. as a Spinal Hero.

IN MEMORY

The Spinal Research Foundation and our Centers of Excellence partners have a unique opportunity to become connected to many inspirational people. It is with a heavy heart we share that we lost a memorable Spinal Champion this summer, Stephen Hembree, a former Virginia Spine Institute patient. Hembree was a loving husband and father, a dedicated community member, and an all around good guy that knew how to put a smile on anyone's face.

Mr. Hembree was celebrating his 16 year old daughter's birthday by taking her and some of her friends out on a pontoon boat on Lake Linganore. There had been rain for the preceding few days, but the rains had stopped, and on the evening of June 29, Mr. Hembree, who had been boating on the lake for thirty years, took his daughter and her friends out. The eight partygoers aboard the pontoon boat approached the Linganore Dam, and the boat was caught in a current that swept the pontoon boat toward the dam itself. The boat's electric motor could not overcome the current, and the situation grew more dramatic. Mr. Hembree brought the boat as close to shore as possible so that at least four of the eight passengers could jump toward shore and grab branches and rocks to avoid going over the dam. Once the boat slipped over the dam and crashed into the rocks below, Mr. Hembree scrambled to save his remaining passengers. Mr. Hembree's daughter was not among the victims; she had stayed on shore to make room for the other party guests on the boat. A witness said, "He was trying to help everyone else and then he just disappeared into the rocks and no one saw him." Maryland State Police and local rescue teams were able to pull the teenagers from the rushing water below the dam. None of the injuries to the teens were significant. Mr. Hembree will be remembered fondly by his family and friends who knew him well.



Mr. Hembree is clearly a hero. Not only was he able to save the eight teenagers in the boat from serious injury, but in doing so sacrificed himself.

Thank you, Mr. Hembree, for your efforts and your valor. You are truly a hero.

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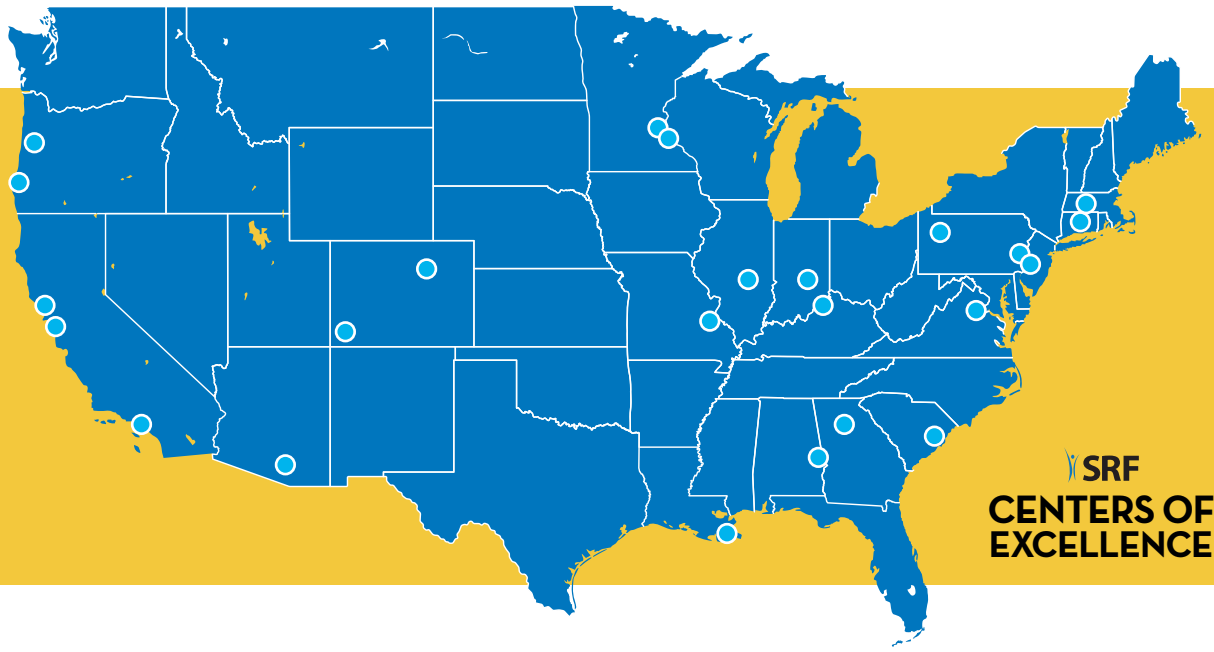
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The Spinal Research Foundation has named 26 Research Partners across the country that share one core mission: improving spinal health care through research, education, and patient advocacy.

These centers offer the best quality spinal health care while focusing on research programs designed to advance spinal treatments and techniques.



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