

## Grand Rounds Expert Opinion provided by Dr. Stuart Hershman



### About Dr. Stuart Hershman

Dr. Stuart Hershman is a board-certified spine surgeon at Massachusetts General Hospital. Dr. Hershman specializes in spinal deformity and complex spinal reconstruction. He earned his undergraduate degree from the University of Pennsylvania and his MD from Drexel University College of Medicine. Dr. Hershman completed his orthopaedic residency at the NYU Hospital for Joint Diseases. He continued his specialization in spine by completing the world-renowned fellowship in complex spine and spinal deformity surgery at Washington University in St. Louis. While there, he trained in all facets of spinal surgery including adult and pediatric spinal deformity, tumor, trauma, degenerative conditions of the cervical, thoracic, and lumbar spine and minimally invasive spine surgery.

Dr. Hershman has spent the past several years practicing in South Florida, specializing in the surgical management of cervical myelopathy, complex spine and spinal deformity in the adult and geriatric patient. He has specific interests in revision surgery, minimally invasive techniques to treat spinal deformity and the surgical and non-surgical management of spinal conditions in osteoporotic patients. His primary research focus is on patient outcomes.

Dr. Hershman is an active member of several international research organizations including the prestigious Cervical Spine Research Society, the Scoliosis Research Society and the American Academy of Orthopaedic Surgery. He currently is involved in multiple ongoing research studies. Dr. Hershman has published numerous peer-reviewed papers, and his research has been presented both nationally and internationally.

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Medical School	Drexel University College of Medicine
Residency	New York University Hospital for Joint Diseases
Fellowship	Washington University, St. Louis
Specialties	Spinal deformity, scoliosis, kyphosis, degenerative spinal conditions, lumbar stenosis, spinal stenosis, spondylolisthesis, cervical disc degeneration, flatback, thoracolumbar spinal injuries
Publications	<a href="https://www.ncbi.nlm.nih.gov/pubmed/?term=stuart+hershman">https://www.ncbi.nlm.nih.gov/pubmed/?term=stuart+hershman</a>



## Summary of Patient Medical History

Dr. Local Treating Physician,

In order to provide a document that you can easily share with your patient, I will respond as if I were discussing the case directly with your patient.

XXX, thank you for allowing me to review your case. Before answering your questions and providing my recommendations, let me summarize the relevant medical history and concerns based on what I have learned from the medical records and the questions you asked.

You are 60 years old and have had back pain for years. You have managed your pain by doing daily stretches, as well as yoga and physical therapy. However, recently your back pain is getting progressively worse, and you are having pain in your neck as well. You enjoy being physically active and your pain is interfering with these activities. You saw a neurosurgeon and had imaging done, and it is being recommended that you have an anterior cervical discectomy and fusion on your cervical spine, followed by a surgery on your lumbar spine. You want to ensure that surgery is needed, and you are seeking an expert opinion to help evaluate your treatment options.

## Background Information



Before I respond to your specific questions, I'd like to provide you with a bit of background information about back and neck pain. Although you may be familiar with some of what I'm going to tell you, I feel that the information will be helpful in better understanding the recommendations that I make.

### **General spine and herniated disc (lumbar or cervical, including radiculopathy)**

The spinal cord is a long bundle of nerve tissue that extends from the brain and travels down the back; the cord is protected by the spine, which is made up of bones called vertebrae. There are four major segments of the spinal cord: the cervical (C), thoracic (T), lumbar (L), and sacral (S) spine. From the spinal cord, pairs of spinal nerves branch off and travel to other parts of the body where they control both movement and senses (pain, temperature, touch, etc.). The vertebrae and spinal nerves in each segment are numbered (for example, C5, C6, T1, T2, L4, L5, etc.).

Between each of the vertebrae of the spine sit intervertebral discs, often referred to simply as 'discs'. Discs act as shock absorbers and facilitate motion in the spine. As discs wear out (disc degeneration), the gel inside them begins to dry out. This causes discs to collapse and can potentially cause parts of the disc to bulge or "herniate" into the spinal canal. Over time, everyone experiences some amount of disc degeneration, but there are factors that make certain people more prone to disc degeneration than others. Some of these factors are genetic (it's just the way we're born). Sometimes, trauma or injuries can lead to degeneration. Lastly,

smoking is also a large risk factor for disc degeneration - it reduces blood flow to the discs, causing them to degenerate faster.

When discs begin to bulge or herniate, they may place pressure on nearby spinal nerves, causing what is called 'radiculopathy'. Radiculopathy involving the lumbar spine can trigger sharp pain that extends from the low back into one or both legs; radiculopathy can also cause numbness or weakness. Radiculopathy involving the cervical spine can trigger similar symptoms in the arms.

### **Herniated discs**

Because of the way we have evolved to stand and move, a lot of weight and force is directly placed upon the spine, especially the lower lumbar spine. Over many years, and with constant use, the discs that cushion the bones of the spine may begin to break down. This occurs for multiple reasons, but most significantly because the discs do not have a good blood supply and, thus, are unable to really repair themselves. Sometimes a weakness forms in the outer, tougher tissue of the disc, called the annulus fibrosis. Once this weakens, a piece of the gelatinous inner structure, the nucleus pulposus, sometimes either bulges out of the small weakness in the annulus fibrosis or can actually "herniate" where a large piece may come through the wall of the annulus fibrosis. This is called a herniated nucleus pulposus, abbreviated in medical jargon as "HNP," and more commonly known as a "herniated disc".

Herniated discs can cause pain in a number of ways. First of all, the damage to the disc itself can be painful. Also, the disc protrusion (or "herniation") can put pressure on a nearby spinal nerve, which can lead to irritation of that nerve and can cause pain to spread down the path of the nerve (this is called "radiculopathy" and can cause pain that frequently spreads into the arms or legs). Pressure on the nerves can also cause weakness or numbness or other loss of nerve function. Even if the protruding disc is not physically pressing on a nearby spinal nerve, the body's natural immune response to help heal the disc often leads to inflammation that can irritate the nearby spinal nerves and lead to radiculopathy. Finally, when people get pain from disc protrusions, the muscles of the spine tend to overwork themselves and spasm in an attempt to stabilize and "splint" the spine. These spasms can be very painful.

Herniated discs are very common and the symptoms generally improve over time as the body heals itself. While there will always be some degree of damage to the disc, the protrusion (or herniation) will generally shrink, the inflammation will subside, and the pain will decrease.

Even though a herniated or bulging disc may cause problems in some people, almost everybody has evidence of bulging discs as they age (if they were to have an MRI of their spine), even though most people do not have any symptoms.

Now, with that information stated, let me move on to address your questions as best I can.



## Patient Questions

**1. Based on the testing, what is causing my back and neck pain? Please explain your reasoning and how you came to your conclusions.**

Your imaging reveals a moderate-sized disc herniation in your neck at C3-4 as well as a left-sided disc herniation at C5-6. In addition, you have a condition that you were born with called congenital cervical stenosis (congenital = something you are born with, cervical = pertaining to your neck, and stenosis = narrowing). This means that the amount of space available for your spinal cord is slightly narrower than it “should” be. Most people have at least 13 mm of space available for their spinal cord; in the most spacious portions of your neck, you only have 11 mm. In some areas, your spinal canal measures as little as 7 mm. This condition is incredibly common - in fact, up to 20% of the population has this condition; most people don't even know that they have it. By itself, this condition is not dangerous, however, because of the compromised amount of space that you start out with, there is not a lot of room to accommodate the degenerative changes that occur with time, for example, the disc herniation at C3-4. The C3-4 disc herniation is not particularly large; your neck pain is likely due to the moderate sized disc herniation coupled with your smaller than average spinal canal. While most disc herniations in the neck cause pain in the arms or hands, a disc herniation at C3-4 causes pain in the C4 nerve root - this nerve root provides sensation to your neck.

The MRI of your back happens to look pretty good. You have some mild degenerative changes which occur in everyone with time. In particular, you have some mild to moderate stenosis (narrowing) of the space available for the L5 nerve root on the left. This narrowing occurs at the hole where the nerve exits the spine. Typically, people with this type of narrowing would experience symptoms in their buttock and/or leg and would only experience it on the left side. Because your symptoms are in your lower back more so than your leg and both sides are involved, I don't think that this stenosis is causing you any pain or discomfort. Most low back pain is due to muscle strain and fatigue. These problems are typically treated non-operatively with many of the treatment modalities that you are already doing such as home exercises, yoga, stretching, and physical therapy.

**2. Are there additional diagnostic tests or procedures that would be indicated to help guide diagnosis or treatment? If so, what tests would you recommend and how would the results impact my treatment options?**

With respect to the neck, I would want to check your balance as well as some of the reflexes in your hands. Your surgeon's notes comment on some of the reflexes that we typically test, but does not state any of the balance tests that we typically do to evaluate people with cervical spine stenosis. Many times patients who have some spinal cord compression don't necessarily have pain but will have issues related to balance and their manual dexterity. If this occurs (this is part of a syndrome called myelopathy), we generally recommend surgery in order to take pressure off the spinal cord. If this condition is not present, then we may continue to treat this non-operatively for as long as you would like. Spinal cord compression may sound scary and may look scary on your MRI

however it is remarkably common, and in you, has likely been going on for many years. As a spine surgeon, we don't treat everyone who has spinal cord compression, we only treat the people with spinal cord compression who have symptoms that are related to myelopathy, or those that have pain that is not responsive to nonoperative treatment.

For your back, I would recommend a selective nerve root block on the left side at L5. Your surgeon states that you have had some weakness in that leg but the notes don't specify where that weakness is. The physical exam states that your strength is perfect throughout your leg. If the mild to moderate narrowing around the L5 nerve root is the source of your pain, then a selective nerve root block at L5 will give you at least an hour or two of pain improvement. If this is the case, then it is safe to say that the mild to moderate stenosis at L5-S1 is the source of your back pain. If this does not help very much, it suggests that the stenosis is not the source of your pain and I would recommend looking elsewhere in your back in order to find the pain generator.

**3. What is your suggested treatment plan? Is surgery indicated, and if so, what type of surgery? How urgent is the surgery?**

Neither your neck or back needs urgent surgery; in fact, you may not need surgery at all. Given the spinal cord compression seen in your neck, I would address your neck first. If you have signs or symptoms of myelopathy (your doctor should test your balance and look for some abnormal reflexes), then I would absolutely recommend surgery. However, if you do not have signs or symptoms of myelopathy, and it is just spinal cord compression seen on MRI along with neck pain, then you may continue to treat this nonoperatively using physical therapy, injections, medications, and many other treatment modalities like the ones you are currently doing. If these treatments fail to provide long-term relief, or if you are dissatisfied with the amount of pain relief you are getting, then surgery would likely be a very good option for you. If it is neck pain that is bothering you and you have no signs or symptoms of myelopathy, I would recommend either an ACDF (anterior cervical discectomy and fusion) at C3-4, or perhaps a disc replacement (which I see you are interested in). Both surgeries are excellent options for you. In general, I reserve disc replacements for people under the age of 55, however, there are some older, more active patients who may also benefit from a motion preserving procedure like a disc replacement. That being said, a single level ACDF will not limit your motion by any perceptible amount, so I don't feel that that a disc replacement would provide you much benefit. In addition, the C3-4 level does not typically move very much, and I don't feel that there are many compelling reasons to do a disc replacement over a single level fusion. If you have signs or symptoms of myelopathy, I would recommend a posterior based surgery for you, in particular, a procedure called laminoplasty. This is a motion sparing procedure (no fusion) that addresses your narrow canal at all the levels in your neck. It is a minimally invasive procedure that takes about 2 hours and usually requires just one night in the hospital. Following the surgery, patients will have some neck pain and fatigue for the first few weeks. However, once this resolves, patients generally feel significant improvement in their pain and many have improvements in their spinal cord dysfunction as well (balance and manual dexterity improve). Following this type of surgery, you have no restrictions on the activities you like to do.

For your back, I would use the selective nerve root block to determine whether or not surgery is likely to benefit you. If you get good pain relief following the injection, then it is likely that surgery will provide a similar amount of pain relief. If this does not provide you with pain relief, as mentioned earlier, I would look elsewhere for your pain generator. It should be noted though, if you are getting adequate pain relief with nonoperative treatment then I would continue doing this; surgery should always be the last resort.

**4. Do you think steroid injections would be a good way for me to get through the next few months prior to surgery?**

Absolutely. Steroid injections are very effective for both neck pain and back pain related to stenosis. One caveat to this is that if you have symptoms or signs of myelopathy, while the injection may help with your neck pain, it is not making any more room for your spinal cord. If you have myelopathy (even if it's very early in the disease process), surgery is recommended.

**5. What do you suggest for timing of surgery? Do I need surgery on both my neck and my lower back? If so, do you think I should have neck surgery first?**

As mentioned earlier, there is absolutely no rush for surgery on your back or neck. If you have signs or symptoms of myelopathy, surgery on your neck should happen within the next several months just to ensure that there is no worsening of your balance and dexterity. If you do ultimately decide to have surgery on your back this can be done at your convenience and on your schedule. If you need surgery on any part of your body before your neck is addressed, I would advise you to inform the anesthesiologist that you have cervical stenosis. In cases with cervical stenosis, the anesthesiologist typically uses a camera to help with intubation rather than manipulating your neck while you are asleep.

**6. I am concerned about having a fusion surgery in my neck. Would a disc replacement surgery without a fusion be an option for me?**

Yes, a disc replacement is an option for your neck, however at C3-4, I don't think that a disc replacement provides any advantage over a fusion. If you required surgery at a level that was more mobile, for example C5-6 or C6-7, then I would suggest the disc replacement instead of the fusion.

**7. What are the risks of the surgery? What is success rate of this surgery?**

ACDF surgery is one of the most successful surgeries that we do in all of medicine. There is a greater than 90% success rate following this procedure, and patients recover from the surgery very quickly. Risks associated with this procedure specifically include infection, damage to the spinal cord, nerve roots, or membrane that surrounds them. All of these risks are extraordinarily low - well below 0.1%. The most common complications are issues with swallowing (this happens in virtually 100% of patients but usually resolves after several weeks), and there is a ~10% chance that the bones will not fuse.

If you have symptoms or signs of myelopathy I would recommend a posterior based surgery like a laminoplasty. This would be able to address all your levels of spinal cord compression and would not limit your motion in the future. This surgery also has an incredibly high success rate and has equally low complication rates. Since this surgery is not a fusion, you would not have to worry about the bones not fusing, and since the surgery is a posterior based procedure there are no issues with swallowing. With this surgery there is approximately a 7% chance of a nerve stretch injury which is called a C5 nerve root palsy. This can cause some pain and weakness in your shoulder, however it is a transient phenomenon that resolves on its own in the vast majority of cases. If you have signs or symptoms of myelopathy you should discuss this option with your surgeon.

**8. I was advised that there is a danger of paralysis from the cervical disc herniation in the event that I fall. Do you agree that I am at risk for this?**

Yes, and no. While there is a theoretical risk of a neurologic injury, the reality is that we see patients with cervical stenosis all the time (even cases that are far worse than yours), yet catastrophic neurologic injuries like paralysis are exceedingly rare. Your neck has likely looked like this for at least a couple of years, and there has not been any sort of catastrophic neurologic injury during that time. Typically, we see catastrophic neurologic injuries from major trauma (car accidents, falls from height, high risk sports, etc); we don't typically see these injuries from low energy injuries. If surgeons operated on every patient who walked into our office with cervical stenosis our schedules would be booked through 2025.

**9. If I were to have surgery, what should I expect during recovery? Will I need physical therapy or other interventions? How long until I can be physically active?**

Most patients recover from an ACDF very quickly. As mentioned earlier, almost all patients will complain of difficulty swallowing to some degree. This typically goes away after weeks to months. Most people who undergo a single level ACDF do not require physical therapy. While every surgeon is different, most surgeons will allow patients to return to their normal physical activity, somewhere between 6-12 weeks after surgery.

**10. Are there other non-invasive/nonsurgical or less invasive alternatives I should consider? Are there medications, procedures or other treatments that can provide pain relief?**

Surgery should always be the last resort. As discussed earlier, steroid injections can be very beneficial for both your neck pain and your back pain. I would also continue some of the nonoperative treatments you are currently doing such as physical therapy, yoga, and home exercises. I would also speak to your doctor about medications like gabapentin or Lyrica.

**11. What can I expect in the future? As I age, will my condition recur or worsen even if I have surgery? What can I do to avoid future injury and back and neck pain?**

As we age, all of us experience some degenerative changes in our necks and backs. There is no way to predict whether these changes will cause pain or symptoms in the future. Because you were born with a narrowed spinal canal in your neck, there is a greater than average chance that you could develop cervical myelopathy in the future. In my patients with congenital cervical stenosis, I give them specific instructions on what symptoms and signs to watch out for, and I make them come back annually for a new MRI and a new exam. Keeping fit, staying active, and eating right may all help prevent some of the degenerative changes that can occur in our spines, however, there is no way to truly prevent these changes.

People who undergo a fusion procedure have a higher chance of degenerative changes occurring at the level above and the level below the fusion. The C2-3 level is relatively immobile and is not generally prone to degenerative changes, so this is not of much concern. However, the C4-5 level is fairly mobile and may develop degenerative disc disease if you have a fusion at C3-4. Unfortunately, disc replacements have not demonstrated a reduced incidence of degenerative disc disease at the levels above and below the surgical procedure, so having a disc replacement instead of a fusion will not prevent this.



Recommendations from Dr. Stuart Hershman

I have not had the opportunity to examine you and talk to you face-to-face. I am therefore not your treating physician. You should use this consultative second opinion that I am providing to you and your treating physician as a basis of discussion with your treating physician. You need to work with your treating physician, who can examine you in person, to determine the optimal treatment for you.

Grand Rounds does not determine whether a procedure is covered by your health plan. Contact your health plan provider to determine what is covered.

Let me summarize my thoughts and recommendations for you:

- 1) Surgery is always the last resort. If you are getting good relief from nonoperative treatment I would continue treating your symptoms nonoperatively. The one situation where this isn't true is in the setting of cervical myelopathy. At this time, it does not sound like you have cervical myelopathy.
- 2) I would recommend steroid injections for both your neck and your back.
- 3) If nonoperative treatment fails to provide you with adequate or sustained relief, I would consider surgical intervention. Assuming that both your neck and your back are causing significant pain, you should have your neck addressed first.



- 4) If you don't have surgery on your neck in the near future, you should return to see your doctor on an annual basis for a new MRI of your neck and a new exam to ensure that you are not developing cervical myelopathy.

I hope I have been able to answer your questions and that the information I have provided is helpful for you. I wish you the best moving forward with your treatment.



## Links for the Patient

### **Cervical myelopathy:**

- <http://www.spineuniverse>
- <http://orthoinfo.aaos.org/topic.cfm?topic=A00541>

### **Low back/lumbar disc herniation home exercise plan:**

- <http://www.rickysinghmd.com/wp-content/themes/ypo-theme/pdf/lumbar-disc-herniation.pdf>

### **Online educational program on Anterior Cervical Discectomy and Fusion provided by Grand Rounds, produced by Emmi:**

- [https://www.my-emmi.com/EmmiServer/FlashDetectAutoStart.jsp?message\\_id=000000&access\\_code=17617705185&dobm=01&dobd](https://www.my-emmi.com/EmmiServer/FlashDetectAutoStart.jsp?message_id=000000&access_code=17617705185&dobm=01&dobd)