MIDWEST SPINE & BRAIN INSTITUTE™

1950 Northwestern Avenue Suite 102
Stillwater, MN 55082-7615
Phone: 651-430-3800
Fax: 651-430-3827
www.midwestspineandbrain.com

Cervical Spinal Fusion

Introduction
Based on your clinical symptoms, physical examination findings, diagnostic tests and the past treatments you have tried, your doctor has determined that you are a candidate for Cervical Spinal Fusion surgery.

Indications for Surgery
Cervical Spinal Fusion surgery is a treatment option that may be considered when persistent symptoms of pain and/or impairment in ability to function have failed to respond to other treatments. There are several conditions that may contribute to these symptoms such as arthritis, disc degeneration, herniation, deformities or the slippage of one spinal bone (vertebrae) on another which is known as spondylolisthesis.

Description of Procedure
The purpose of Cervical Spinal Fusion surgery is to fuse or "weld" the vertebral bones together to eliminate movement at the painful or affected levels in your spine. To accomplish this, your surgeon will place pieces of bone, and/or bone graft materials, along the sides and/or between the vertebrae. The goal is for the bone cells to grow and become solid. When the bone becomes solid and the vertebrae are fused together it will eliminate movement at that level of your spine. Those spinal levels which were not surgically fused will continue to move as before.

Additional bone used at the time of surgery may be your own bone or bank bone. This is usually determined prior to surgery. Your own bone is usually taken from the pelvis. Bank bone is obtained from the American Red Cross or one of several other certified tissue banks from across the country, where it has been carefully processed and sterilized. Depending on your particular case, either your own bone, bank bone, or a combination of the two will be used. If you have a preference, please discuss it with your surgeon. If removal of bone from the pelvic area results in a substantial defect, bank bone may be used to reconstruct the area.

Your spine surgeon may need to access the front (anterior) part of your cervical spine through an incision on the front of your neck. This anterior approach allows the surgeon to see the front of the cervical spine, remove the diseased disc and to place bone graft materials and/or instrumentation.

Your spine surgeon may need to access the back (posterior) part of your cervical spine through an incision on the back of your neck where the surgeon may place additional pieces of bone graft materials and/or instrumentation.

Your surgeon will talk with you about your specific surgical plan.

Instrumentation
Based on your individual case, your doctor may recommend the surgical placement of rigid hardware or instrumentation. The instrumentation would consist of plates attached to the vertebrae by screws. Wires may also be used. These are placed to immediately stabilize those vertebrae being fused and to increase the likelihood of bone cells growing into a solid bony fusion.

Until the bony fusion has become solid, great stress is placed on the instrumentation which could cause it to become loose or even break, although breakage is rare. For this reason, patients with instrumentation may be required to wear a neck brace to minimize the stress placed on the fusion site. Loose or broken instrumentation can cause neck pain and/or arm pain. Once the affected levels are successfully fused and/or if warranted, the instrumentation can be surgically removed.

After Surgery

Most patients remain in the hospital for one or two days after surgery, but some patients may require a longer stay. When you are discharged following surgery, we expect that in most cases you will be self-sufficient in your personal care. Depending upon your home situation, however, arrangements may need to be made for additional help. These arrangements, including home care services and/or medical equipment for home use, are made in the hospital before discharge.

Medication

You may be provided prescriptions prior to your surgery. These prescriptions may include:

- A special soap-to use the day before and the morning of your surgery for the purpose of reducing risk of infection.
- Stool softener- to begin taking the night before surgery to prevent post-operative constipation.
- Calcium & Vitamin D to support bone health that should be started before surgery.
- Smooth muscle relaxer to decrease the risk of postoperative urinary retention (males with urinary history).

Paperwork

Please do not bring any paperwork that needs to be completed by our office to the hospital with you. All paperwork related to disability, FMLA or other medical legal forms should be mailed to Midwest Spine and Brain Institute, Attention Medical Legal Department, 1950 Northwestern Avenue Suite 102, Stillwater, MN 55082. Please allow 1-2 weeks for forms to be completed. Midwest Spine & Brain Institute does charge an administrative fee for such paperwork to be completed. You may leave a message for our Medical Legal Department at 651-259-4522.

Questions

If you have any questions regarding your surgery, please contact our office at 651-430-3800 to talk with your care team.

1950 Northwestern Avenue Suite 102
Stillwater, MN 55082-7615
Phone: 651-430-3800
Fax: 651-430-3827
www.midwestspineandbrain.com

Medication Instructions Before Surgery

You will need to stop taking certain medications and supplements before surgery.

If you have any questions, please contact our office at 651-430-3800.

Blood Thinning Medication

Although it is not safe to proceed with surgery while taking the following "blood thinner" anticoagulant medication, it is also not safe to stop these medications without first consulting with the medical doctor who prescribed it for you. **If you are taking blood thinning medication, discuss a plan with the doctor who is prescribing the medication.**

These medications include, but are not limited to:

- Coumadin (warfarin)
- Plavix (clopidogrel)
- Eliquis (apixaban)
- Xarelto (rivaroxaban)
- Pradaxa (dabigatran)
- Brilinta (ticagrelor)

Anti-Inflammatory Medication

It is recommended that you stop taking anti-inflammatory medications **10 days before surgery.** These medications include, but are not limited to the following:

Advil	Indocin
Aleve	Lodine
Anaprox	Motrin
Aspirin	Naproxen
Celebrex	Orudis
Daypro	Oruvail
Disalcid	Relafen
Ibuprofen	Vioxx
Excedrin	Meloxicam

Herbal Supplements

It is recommended that you stop taking the following herbal supplements **7 days before surgery**.

Danshen	Ginseng
Dong quai	Goldenseal
Echinacea	Kava
Ephedra	Licorice
Feverfew	St. John's Wort
Garlic	Valerian
Ginger	Vitamin E
Gingko	Yohimbe
Fish Oil	Any Multivitamin

Weight Loss Medications/Supplements

Preoperative Instruction

Dear Patient: Please take this preoperative instruction sheet to your family physician when you have your pre-op examination.

Dear Health Care Provider,

Please perform pre-operative evaluation and testing listed below, which is based on patient's health condition(s) and current evidence-based guidelines. Thank you!

Lumbar Fusion (One or Two Levels), Lumbar Artificial Disc Replacement and Laminectomy (Cervical, Thoracic and Lumbar) to Include:

- CBC
- POTASSIUM — If on diuretics, anti-hypertensive or cardiac medications
- BMP — If patient is taking an ACE/ARB medication
- EKG — Male/Female 65 years of age or greater – needs within 1 year prior

Anterior/Posterior Spine Surgery (Cervical and Lumbar), Lumbar Spinal Fusion (3 or More Levels) and Thoracic Fusion to Include:

- CBC
- INR
- BMP
- POTASSIUM — If on diuretics, anti-hypertensive or cardiac medications
- EKG — Male/Female 50 years of age or greater – needs within 1 year prior

Please see the following for any additional condition specific testing:

- Cardiovascular Disease
  - CBC
  - BMP
  - EKG
  - CXR
- History of Stroke
  - EKG
- Bleeding Disorder/Anemia
  - CBC
  - INR
- Pulmonary Disease
  - CXR
- Hepatic Disease
  - CBC
  - INR
  - CMP
- Renal Disease
  - CBC
  - BMP
  - EKG
- Endocrine Disorder
  - BMP
  - EKG
- BMI >35 **AND** another risk factor
  - EKG
- Chemotherapy
  - CBC

1950 Northwestern Avenue Suite 102
Stillwater, MN 55082-7615
Phone: 651-430-3800
Fax: 651-430-3827
www.midwestspineandbrain.com

Attention: Medical Facilities Performing Pre-Op Examinations

Please fax a copy of the pre-op exam to the hospital where the patient is having their surgery performed. Also, please fax a copy to Midwest Spine & Brain Institute. It is imperative that the hospital and Midwest Spine & Brain Institute have a copy before the surgery can be performed. Many times the surgery is early in the morning and the clinic where the pre-op was performed has not opened making it difficult to obtain a copy of the pre-op if necessary. Please ask the patient what particular hospital they will utilize.

Please bring a copy of your pre-op physical to the hospital ONLY if your surgery is scheduled for the next day.

Midwest Spine & Brain Institute fax number: 651-430-3827

Fax Numbers to commonly used Hospitals and Surgery Centers:

Fairview Ridges Hospital	**952-892-2078**
Fairview Ridges Surgery Center	**952-898-3482**
Greenway Surgery Center	**612-728-2660**
Maplewood Surgery Center	**651-471-9748**
North Memorial Health Hospital	**763-581-3821**
St. Croix Regional Medical Center	**715-483-0519**
St. John's Hospital (HealthEast)	**651-326-8631**
United Hospital	**651-241-5073**
Woodbury Surgical Suites	**651-493-0344**

Thank you for your assistance.

1950 Northwestern Avenue Suite 102
Stillwater, MN 55082-7615
Phone: 651-430-3800
Fax: 651-430-3827
www.midwestspineandbrain.com

Recovery at Home after Neck Surgery

Recovery Time

The symptoms you had before surgery can take weeks or months to improve. It is common for these symptoms to come and go after surgery.

Be patient and allow your body time to heal.

Bathing

For three to six weeks after surgery, or until your incision is healed, you can only take showers. Do not take baths.

- Cover your incision with plastic wrap and tape until drainage stops. Once your incision is no longer draining, you may shower with it uncovered.
- You may use a stool to sit on (like you did in the hospital).
- Keep your soap, shampoo and other items within reach.
- If you drop something, do not try to pick it up. Ask for help or have extra supplies handy.

Dressings & Bandages

- Change your dressing daily, using light gauze and tape, until drainage stops.
- Once drainage has stopped, you can leave your incision uncovered.
- Keep your incision clean and dry.
- Change your dressing after showering, and when it becomes wet.

Stitches, Staples & Surgical Glue

- If you have staples along your incision, they will be removed at your follow-up visit two to three weeks after surgery.
- If you have small strips of tape (Steri-Strips) along your incision, they will fall off on their own within 2-3 weeks. Do not pull these off. When they fall off, they do not need to be replaced.
- If your wound was closed with dissolving sutures and your skin closed with surgical glue, you may get your skin wet immediately. You do not need to cover your incision.

Call an Ambulance

CALL 911 IF YOU ARE EXPERIENCING CHEST PAIN, SHORTNESS OF BREATH, OR DIFFICULTY BREATHING

Call Your Care Team

Call 651-430-3800 to speak with your care team if you have:

- a temperature of 101° F or higher
- yellow or green drainage or more than a slight amount of bloody drainage from your incision
- redness, swelling, or warmth by your incision
- new or unusual pain, numbness, or tingling
- pain you cannot control
- any bowel or bladder changes
- an opening in your incision
- pain in your calf or pressure in your legs
- been sent home from surgery with a drain
- any other questions or concerns

Movement & Exercise

Walking

- Initially, walk for exercise and to regain your strength and endurance. Begin slowly, and increase the amount you walk as tolerated.
- If you become sore or have pain, decrease the amount of walking for 1-2 days. Slowly increase the amount you walk again as tolerated.

Sitting

- Practice good posture.
- Use fatigue as a reminder to rest.
- Increase the length of time you sit as necessary and as tolerated.

Bending, Twisting & Lifting

- Do not bend or twist a lot.
- If bending and lifting are necessary, do so at your knees and keep your back straight.

- Use a “reacher” to pick items up off the floor.
- Try not to lift items heavier than 5 pounds until your first follow up appointment.
- Carry items close to your body at waist level.
- Avoid activities like sweeping and vacuuming.

Steps

- Limit steps to only a few initially. You may gradually increase the number of steps you take as tolerated.
- Take your time. Steps may be challenging as surgery may make it hard to see where your feet are placed. Be sure your feet are firmly placed on each step before shifting your weight.

Driving

- Do not drive while taking prescription pain medication.

Sexual Activities

- You may resume sexual activities as your symptoms allow.

Bracing

- If a brace has been recommended, wear it as directed by your surgeon.
- Do not take your brace off before you are supposed to, even if you are feeling better.
- Your provider will review your x-rays at follow-up visits and will discuss wearing your brace less.
- Keep your skin healthy under your brace.
    - Wear a dry, wrinkle-free cotton undershirt under the brace.
    - Apply Witch Hazel with brisk but gentle slapping movements until dry.
    - Use powders sparingly.
    - Contact your orthotist if you develop redness, pressure areas or sores under your brace. Your orthotist may be able to adjust your brace.
    - Wash your brace and pads daily using a damp cloth and clean water.

Avoid Constipation

Prescription pain medicine, anesthesia and decreased activity can slow your digestion and cause constipation.

- Take stool softeners, such as Colace, as needed while you are taking narcotic pain medicine.
- Do not strain to have a bowel movement.
- You may try Milk of Magnesia or Miralax if stool softeners are not effective.
- Drink plenty of water.
- Include fruits and vegetables into your diet.

Prescription Pain Medication

Depending on your surgery and condition, your medicine will be refilled for a short time after surgery. If you still need pain medication after this time, your provider may refer you to your primary care physician or a pain clinic for further management.

- Take your recommended doses when your pain is at its worst. Slowly cut back (taper) on the narcotic when you think your pain is under control.
- Benzodiazepines (medications to calm or relax you) may need to be reduced or stopped before surgery and while taking any pain medication after surgery. Please discuss a plan for this with your primary care physician.
- Please call your care team if you have questions about your pain medication plan.

Medications That Affect Bone Healing

- If you have had a ***fusion surgery***, take Calcium and Vitamin D for 12 months after surgery.
- If you had a fusion surgery:
    - Do NOT take nonsteroidal anti-inflammatory medications (known as NSAIDS) such as ibuprofen (Advil® or Motrin®) and naproxen (Aleve®) for 6-12 months after surgery.
    - Do NOT take Bisphosphonates, including Reclast®, for 12 months after surgery.
    - The above medications can interfere with bone healing.

Questions

Call 651-430-3800 to speak with your care team.

1950 Northwestern Avenue Suite 102
Stillwater, MN 55082-7615
Phone: 651-430-3800
Fax: 651-430-3827
www.midwestspineandbrain.com

Potential Risks and Complications of Surgery

Although the most likely complications are identified below, this is not a complete list, and other complications can occur. These risks should not be taken lightly, however, the possibility of any of these happening is very low. Risks specific to certain spine surgeries are outlined in addition to the general spine surgery risks below.

- Your surgeon cannot guarantee relief of pain or other symptoms following surgery.
- X-ray may be used during your surgery. If you are pregnant, this could be unsafe for your baby.
- There is a risk for an allergic reaction to general anesthesia (being put to sleep).
- Lung problems (such as pneumonia), blood clots, heart attack, stroke, fluid or blood accumulation near the wound, injury to a major blood vessel and wound infections can occur.
- If a spinal nerve is injured, it could result in permanent pain, numbness, or weakness in a limb, or loss of bowel or bladder control.
- If the spinal cord is injured, it could result in permanent paralysis in the legs and possibly parts of the arms.
- The spinal nerves and spinal cord travel through the vertebrae in a sac filled with spinal fluid. If the sac is punctured, spinal fluid will leak out. This is known as a dural leak. If this occurs you may be advised to remain flat in bed to prevent a spinal headache and allow the puncture site to heal. On rare occasions, an injection or further surgery may be required to seal the puncture site.
- A significant amount of blood can be lost during spine surgery, which may require you to have a blood transfusion. Your surgeon may recycle your own blood during surgery so, if needed, you may receive it back in a transfusion during or after surgery. We will help you make the necessary arrangements. If you do need blood from a blood bank, risks include hepatitis, allergic reactions, and on extremely rare occasions HIV/AIDS.
- If hardware or other implants are used during your surgery, there is a chance this could become loose or dislodged. Additional surgery may be required to correct this.

Anterior Cervical Surgery

- The incision for an anterior neck surgery is located near the esophagus, trachea, and major blood vessels such as the carotid artery. Injury to the esophagus or trachea could result in severe infection. Injury to the carotid artery could result in stroke. Recurrent laryngeal nerve injury, swallowing difficulty, temporary speech difficulty/hoarseness can also occur.

Anterior Lumbar or Thoracic Surgery

- The incision for an anterior surgery of your low or mid back is made on the abdomen or thorax (rib cage). For male patients only, small nerves may be cut causing sterility. Following surgery, sperm are still produced but are not ejaculated outside the body. The male patient's ability to achieve erection and orgasm are not affected.

Discectomy, Laminectomy, and Decompression Surgery

- Because some of the inner jelly-like material may remain after surgery, there is a small risk of developing another disc protrusion in the same area.

Fusion Surgery

- Unfortunately, there is no way to guarantee the bone in your fusion will mature and become solid.
- Solid fusions will not always eliminate your pain.
- Factors such as metabolism, age, and activity level play a role in your body's ability to "weld" together the pieces of bone placed during surgery. The process of your fusion will be monitored with x-rays at your follow-up appointments.
- Studies have clearly documented that smokers have a significantly lower rate of successful solid fusions as compared to non-smokers. For this reason, it is strongly recommended that any patients contemplating spinal fusion surgery stop smoking prior to their surgery.
- Occasionally, fusion cases include harvesting bone from the patient's pelvis. Immediately following surgery, this area may be the greatest source of pain. In most cases, the pain subsides over time but may not completely go away.

- Some fusions require the use of bone plugs or synthetic cages. During the first several months following surgery, and before the fusion is solid, these bone plugs can become dislodged. Depending on the amount of movement that occurs, additional surgery may be required to reposition the bone plug.
- A fusion surgery places extra pressure/stress on levels immediately above and below your surgical site. This added stress can cause degeneration at those levels and may cause a need for additional surgery in the future.

Spinal Cord Stimulator Surgery

- A successful trial does not guarantee the leads will be placed in the exact same spot during the permanent implant.
- Reprogramming of the spinal cord stimulator following the implant may be necessary depending on your pain and symptoms.

Coccygectomy Surgery

- The rectum lies in front of the coccyx (tailbone). During removal of the coccyx, the rectum, if punctured, can become infected. While the chance of this happening is low, a diverting colostomy (redirecting the colon to evacuate feces via the abdomen) would be necessary to allow the rectum to heal.

Kyphoplasty

- Occasionally, local anesthesia is used in place of general anesthesia. Risks of bruising, numbness, tingling and weakness at the insertion site, temporary blurred vision, dizziness, vomiting, headache, and muscle twitching can occur.
- The cement can leak into, or up against, organs, vessels, and/or nerves.

I understand the potential benefits of the proposed treatment and any alternative forms of treatment, including my option of receiving no treatment. By signing below, I agree that I have had the opportunity to ask any and all questions that I may have and wish to proceed with surgery.

Patient (or Representative) Signature: _____ Date: _____

Witness Signature: _____ Date: _____

1950 Northwestern Avenue Suite 102
Stillwater, MN 55082-7615
Phone: 651-430-3800
Fax: 651-430-3827
www.midwestspineandbrain.com

Notice of Disclosure

The following disclosures may apply to the treatment you receive at Midwest Spine & Brain Institute (MSBI). Please contact your MSBI physician or Administration if you have any questions about any of the following disclosures.

Disclosure of Ownership in Ambulatory Surgery Centers

If your MSBI physician refers you to Maplewood Surgery Center, Woodbury Surgery Center or Greenway Surgical Suites, the following disclosure applies:

Your health care provider is referring you to a facility or service in which your health care provider has a financial or economic interest. The MSBI physicians who are listed below have an ownership interest in these ambulatory surgery centers. You are free to choose a different ambulatory surgery center. If you would like to do so, please notify your physician and we will be happy to accommodate your request.

This disclosure applies to the following MSBI Physicians for Maplewood Surgery Center: David T. Chang, M.D., Ph.D.

This disclosure applies to the following MSBI Physicians for Greenway Surgical Suites: Stefano M. Sinicropi, M.D.; Glenn R. Buttermann, M.D.; David T. Chang M.D. Ph.D.; Todd E. Jackman, M.D.

This disclosure applies to the following MSBI Physicians for Woodbury Surgery Center: Glenn R. Buttermann, M.D., M.S.

Disclosure of Ownership in Outside Facilities

Your health care provider is referring you to a facility or service in which your health care provider has a financial or economic interest. The MSBI physician listed below has an ownership interest in this outside clinic. You are free to choose a different clinic. If you would like to do so, please notify your physician and we will be happy to accommodate your request.

This disclosure applies to the following MSBI Physicians for HyperCharge Clinic: Stefano M. Sinicropi, M.D.

Disclosure of Industry Relationships

If you are scheduled to receive a neurosurgical or orthopedic implant, biologic product or device during your surgical procedure, it is possible that your spine surgeon may have a financial relationship with the manufacturer. Your surgeon will be glad to discuss the reasons for his/her choice of implant/product. You have the right to choose another facility or provider for your procedure. Glenn R. Buttermann, MD holds multiple patents. His industry consulting relationships include FG Solco. He also owns shares in Nexxt Spine LLC.

Insurance Coverage for Other Facilities

Some facilities may be out of network for certain health plans. Please contact the facility as well as your insurance plan for details regarding your coverage.