

Arteriovenous Malformation (AVM)

An arteriovenous malformation (AVM) is a tangle of blood vessels that connects your arteries and veins in the brain. Arteries and veins are normally connected by smaller vessels called capillaries. When an AVM occurs, blood goes from your arteries directly to your veins without going through capillaries. When this happens, blood flow and oxygen are interrupted. Your arteries are meant to bring oxygen from your heart to your brain. The veins are meant to bring the blood from your brain back to your lungs and heart. The arteries and veins in an AVM can rupture, causing bleeding into the brain.

Symptoms of AVM:

- Headache
- Dizziness or visual changes
- Seizures
- Weakness, numbness, or tingling
- Trouble with speaking
- Confusion and/or trouble with memory

Treatment

Your surgeon has determined surgery is the best option for you. Surgery options include embolization or craniotomy. During an embolization, your surgeon will place a long narrow tube into the artery in your groin. This tube is guided up to the AVM in your brain. A glue-like substance or coils may be placed into the AVM through the tube. The glue-like substance or coils prevent the AVM from bleeding. You are awake during this procedure. Another option is for the surgeon to perform a craniotomy, which is when the surgeon removes part of your skull to drain the blood or fluid. The portion of your skull that was removed, is replaced during surgery.

After Surgery

Most patients remain in the hospital for a few 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.

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.

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

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Fax: 651-430-3827
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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.

Recovery at Home after 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

- If you have had Carpal Tunnel surgery, do not change your dressing until 2 days after surgery.
- If you have had Ulnar Nerve Transposition surgery, do not change your dressing until 3 days after surgery.
- If you have had spine surgery, 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 you have had a hardware removal, spinal cord stimulator, carpal tunnel release, or ulnar nerve transposition, you typically will not need a brace. Your surgeon will let you know if one is needed.

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.

Questions

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

Potential Risks and Complications of Neurosurgery

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.

- Your surgeon cannot guarantee relief of pain or other symptoms following surgery. Based on your surgical outcome, additional surgery/treatments may be necessary.
- 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, injury to a major blood vessel and wound infections can occur.
- Fluid or blood accumulation near the wound is possible. This can cause increased intracranial pressure, which can lead to visual problems, speech disturbance, memory problems, muscle weakness and/or loss of balance/coordination.
- Seizures can occur after surgery, regardless of if they were already present before surgery or not. Treatment is provided to help prevent seizures, though they still could occur with treatment.
- Cranial nerve palsies (lack of function of the cranial nerve) can occur. This may result in complete or partial weakness or paralysis of the areas of the body affected by a specific cranial nerve.
- 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 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 the blood bank, risks include hepatitis, allergic reactions, and on extremely rare occasions HIV/AIDS.

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:** _____

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.