

## Microvascular Decompression (MVD)

### Overview

Microvascular decompression (MVD) is a surgery to relieve abnormal compression of a cranial nerve causing trigeminal neuralgia, glossopharyngeal neuralgia, or hemifacial spasm. MVD involves opening the skull (craniotomy) and inserting a sponge between the nerve and the offending artery triggering the pain signals. Medications often provide initial pain relief, but when drugs become ineffective or cause side effects, MVD is an option.

### What is microvascular decompression?

MVD is a surgical procedure to relieve the symptoms (pain, muscle twitching) caused by compression of a nerve by an artery or vein. Surgery involves opening the skull (craniotomy) and exposing the nerve at the base of the brainstem to insert a tiny sponge between the compressing vessel and the nerve. This sponge isolates the nerve from the pulsating effect and pressure of the blood vessel.

Trigeminal neuralgia is an irritation of the fifth cranial nerve causing severe pain that usually affects one side of the face, normally in the forehead, cheek, jaw, or teeth (Fig. 1). To treat trigeminal neuralgia, a sponge is placed between the trigeminal nerve and the superior cerebellar artery or a branch of the petrosal vein. By removing the compression, the painful symptoms are relieved.

### Who is a candidate?

You may be a candidate for MVD if you have:

- trigeminal neuralgia that is not well controlled with medication and you desire minimal to no facial numbness that may be associated with other treatments such as percutaneous stereotactic radiofrequency rhizotomy (PSR) or glycerol injection
- facial pain isolated in the ophthalmic division or in all three trigeminal divisions
- facial pain recurrence after a previous percutaneous or radiosurgery procedure

Because MVD involves the use of general anesthesia and brain surgery, patients with other medical conditions or who are in poor health may not be candidates. MVD is not successful in treating

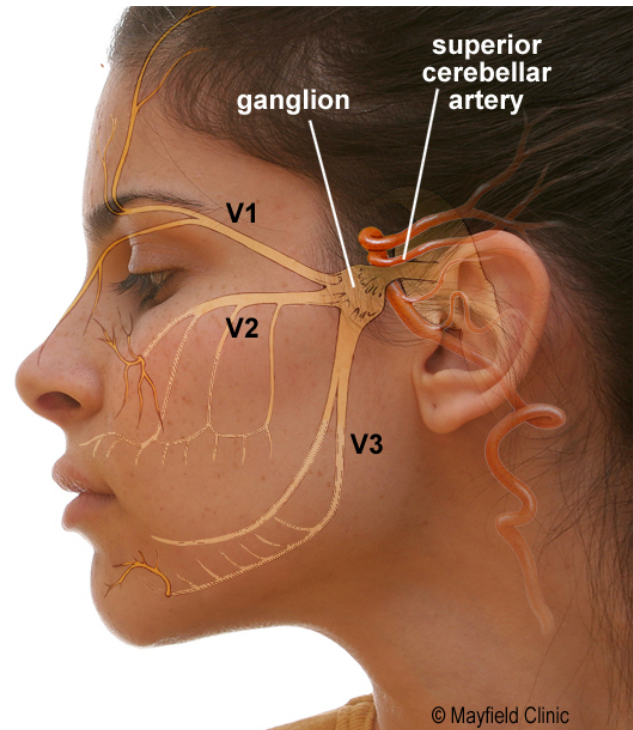


Figure 1. Trigeminal neuralgia can be caused by an artery or vein compressing the trigeminal nerve root as it originates at the brainstem.

facial pain caused by multiple sclerosis. Because of the low risk of hearing loss, MVD may not be suitable for patients who have hearing loss in the other ear.

### What happens before surgery?

In the doctor's office you will sign consent forms and complete paperwork to inform the surgeon about your medical history (i.e., allergies, medicines, anesthesia reactions, previous surgeries). Presurgical tests (e.g., blood test, electrocardiogram, chest X-ray) may need to be done several days before surgery. Consult your primary care physician about stopping certain medications and ensure you are cleared for surgery.

Stop taking all non-steroidal anti-inflammatory medicines (ibuprofen, naproxen, etc.) and blood thinners (Coumadin, aspirin, Plavix, etc.) 7 days before surgery. Stop using nicotine and drinking alcohol 1 week before and 2 weeks after surgery to avoid bleeding and healing problems.

You may be asked to wash your skin and hair with Hibiclens (CHG) or Dial soap before surgery. It kills bacteria and reduces surgical site infections. (Avoid getting CHG in eyes, ears, nose or genital areas.)

Don't eat or drink after midnight before surgery (unless the hospital tells you otherwise). You may take permitted medicines with a small sip of water.

### What happens during surgery?

Patients are admitted to the hospital the morning of the procedure. You will meet with a nurse who will ask your name, date of birth, what procedure you're having, and the side of your facial pain. They will explain the pre-op process and discuss any questions you may have. An anesthesiologist will meet with you and explain the effects of anesthesia and its risks.

There are 5 steps of the procedure. The operation generally takes 2 to 3 hours.

#### Step 1: prepare the patient

In the OR room, general anesthesia is administered while you lie on the operating table. Once asleep, your body is rolled over on its side and your head is placed in a 3-pin skull fixation device, which attaches to the table and holds your head in position during the procedure. Next, the area behind your ear is prepped with antiseptic. A hair-sparing technique may be used, where only a 1/4-inch wide area along the proposed skin incision is shaved.

#### Step 2: perform a craniectomy

A 3-inch curved skin incision is made behind the ear. The skin and muscles are lifted off the bone and folded back. Next, a 1-inch opening is made in the occipital bone with a drill (Fig. 2). The bone is removed to expose the protective covering of the brain called the dura. The dura is opened with surgical scissors and folded back to expose the brain.

#### Step 3: expose the nerve

Retractors placed on the brain gently open a corridor to the trigeminal nerve at its origin with the brainstem. The surgeon exposes the trigeminal nerve and identifies any offending vessel causing compression (Fig. 3). The vessel and nerve are often restricted by thickened connective tissue that must be dissected free with scissors and knife.

#### Step 4: insert a sponge

The surgeon cuts an appropriate size of teflon sponge and inserts it between the nerve and the vessel (Fig. 4). Sometimes a vein is adherent to the nerve and causing compression. In these cases, the vein is cauterized and moved away.

#### Step 5: closure

Once the sponge is in place, the retractor is removed and the brain returns to its natural position. The dura is closed with sutures and made

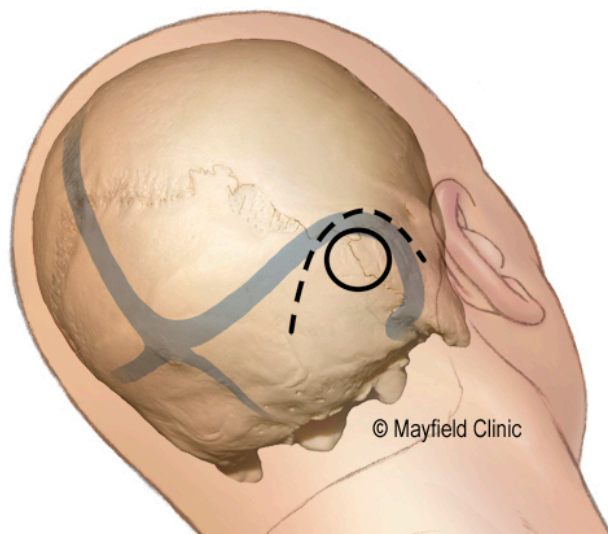


Figure 2. A skin incision is made behind the ear (dashed line) and a 1-inch craniectomy (solid line) is made in the skull.

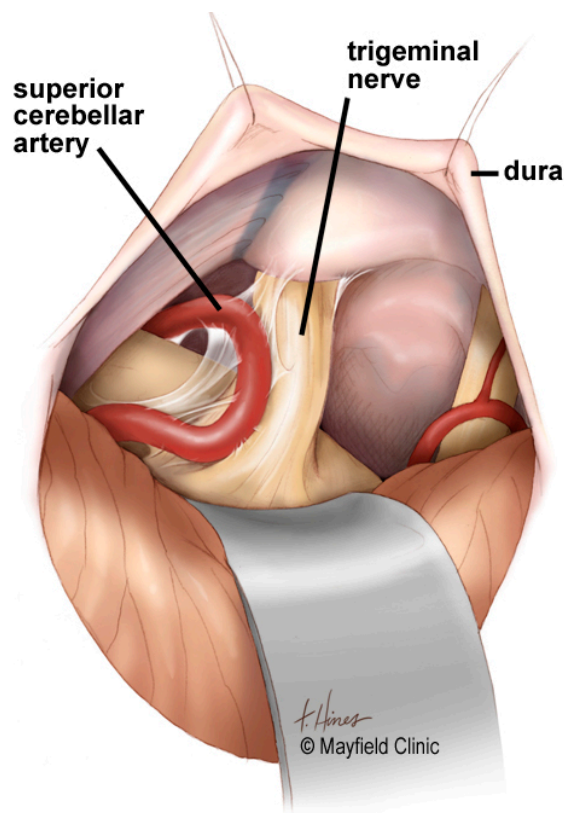


Figure 3. The superior cerebellar artery is adherent to the trigeminal nerve causing compression and painful trigeminal neuralgia attacks.

watertight with tissue sealant. Since the bone opening is very small, it is not replaced. Instead, a titanium plate covers the skull opening and is secured with tiny screws (Fig. 4). The muscles and skin are sutured back together. A soft adhesive dressing is placed over the incision.

### What happens after surgery?

After surgery, you'll be taken to the recovery room where vital signs are monitored as you awake from anesthesia. Next, you are transferred to the intensive care unit (ICU) for close observation overnight. You may experience some nausea and headache after surgery; medication can control these symptoms. When your condition stabilizes, you'll be transferred to a regular room where you'll increase your activity level (sitting in a chair, walking). In 1 to 2 days you'll be released from the hospital and given discharge instructions.

Patients taking anticonvulsant or pain medication for trigeminal neuralgia prior to surgery will be weaned off the medications according to a schedule to decrease risk of withdrawal and side effects.

Follow the surgeon's home care instructions for **2 weeks after surgery** or until your follow-up appointment. In general, you can expect:

### Restrictions

- Don't lift anything heavier than 5 pounds.
- No strenuous activity including yard work, housework, and sex.
- Don't drink alcohol. It thins the blood and increases the risk of bleeding. Also, don't mix alcohol with pain medicines.
- Don't smoke or use nicotine products: vape, dip, or chew. It may delay healing.
- Don't drive, return to work, or fly air travel until your surgeon says it's OK.

### Incision Care

- You may shower the day after surgery and wash your hair with mild baby shampoo. Gently wash the incision area with soap and water every day. Don't scrub or let the water beat hard on your incision. Pat dry.
- If Dermabond skin glue covers your incision, don't rub or pick at the glue.
- Don't submerge or soak the incision in a bath, pool or tub. Don't apply lotion/ointment on the incision, including hair styling products.
- You may hear strange noises (popping, crackling, ringing) inside your head. This is normal healing as air and fluid reabsorb.
- Don't color your hair for 6 weeks. If you cut your hair, use caution near the incision.

### Medications

- Headaches are common after surgery. You may take acetaminophen (Tylenol).

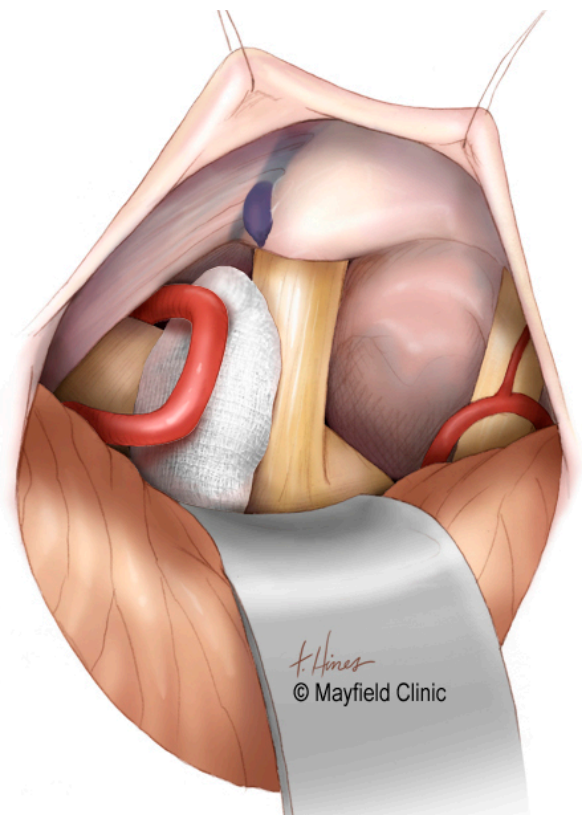


Figure 4. A sponge is inserted between the nerve and the blood vessel causing compression.

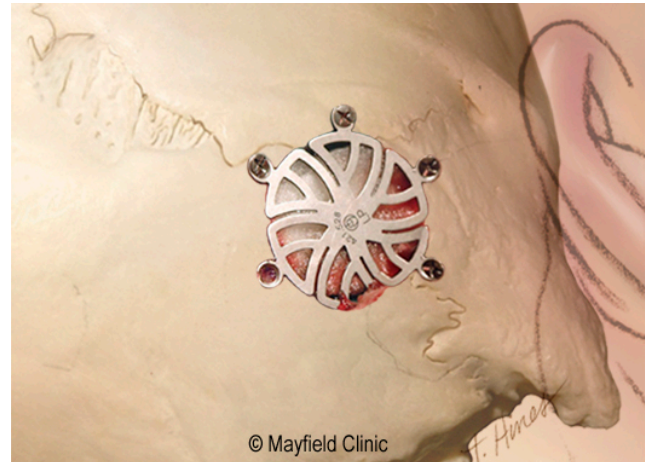


Figure 5. A circular titanium plate secured with screws covers the craniectomy made in the skull.

- Take pain medicines as directed by your surgeon. Reduce the amount and frequency as your pain subsides. If you don't need the pain medicine, don't take it.
- Narcotics can cause constipation. Drink lots of water and eat high-fiber foods. Stool softeners and laxatives can help move the bowels. Colace, Senokot, Dulcolax and Miralax are over-the-counter options.



- Anti-seizure medicine may be prescribed. Some patients develop side effects such as drowsiness, balance problems, or rashes. Call the office if any of these occur.
- Don't take anti-inflammatory pain relievers (Advil, Aleve), blood thinners, or supplements without surgeon's approval.

### Activity

- Get up and walk 5-10 minutes every 3-4 hours. Gradually increase walking as you are able.
- Swelling and bruising of the ear or face may occur. It will take several weeks to go away.
- Sleep with your head elevated and apply ice 3-4 times per day for 15-20 minutes to help reduce pain and swelling.

### When to Call Your Doctor

- Fever over 101.5° (unrelieved by Tylenol).
- Signs of incision infection, such as spreading redness, separation, or colored drainage.
- Increased drowsiness, weakness of arms / legs, increased headaches, vomiting, or severe neck pain that prevents lowering your chin to chest.
- New or worsening vision, speech or confusion.
- Swelling at the incision with leaking of clear fluid from your ear or nose.
- Swelling and tenderness in the calf of one leg.
- Seizure

### What are the results?

MVD is highly successful in treating trigeminal neuralgia (95% effective) with a relatively low risk of pain recurrence (20% within 10 years). The major benefit of MVD is that it causes little or no facial numbness compared to percutaneous stereotactic rhizotomy (PSR).

### What are the risks?

No surgery is without risks. General complications of any surgery include bleeding, infection, blood clots, and reactions to anesthesia. Specific complications related to a craniotomy may include stroke, seizures, venous sinus occlusion, swelling of the brain, and CSF leak. The most common complication related to MVD is nerve damage, which varies depending on the nerve being treated; these include hearing loss, double vision, facial numbness or paralysis, hoarseness, difficulty swallowing (dysphagia), and unsteady gait.

### Sources & links

If you have more questions, please contact Mayfield Brain & Spine at 800-325-7787 or 513-221-1100.

### Support

Support groups provide an opportunity for patients and their families to share experiences, receive support, and learn about advances in treatments, pain control, and medications. Please contact the [TNA Facial Pain Association](http://www.tnafacialpain.org) at 800-923-3608.

### Sources

1. Taha JM, Tew JM Jr: Comparison of surgical treatments for trigeminal neuralgia: Reevaluation of radiofrequency rhizotomy. *Neurosurgery* 38:865-871, 1996.
2. McLaughlin MR, Jannetta PJ, Clyde BL, Subach BR, Comey CH, Resnick DK: Microvascular decompression of cranial nerves: Lessons learned after 4400 operations. *J Neurosurgery* 90:1-8, 1999.

### Links

TNA Facial Pain Association [fpa-support.org](http://fpa-support.org)

### Glossary

**diplopia:** double vision.

**dysesthesia:** troublesome or bothersome numbness.

**dura mater:** a tough, fibrous, protective covering of the brain.

**hemifacial spasm:** an irritation of the seventh cranial nerve (facial nerve) causing involuntary contraction of the muscles on one side of the face, also known as tic convulsif. Can sometimes cause pain behind the ear and loss of hearing.

**glossopharyngeal nerve:** a nerve originating in the brain that supplies feeling and movement to the tongue and throat.

**glossopharyngeal neuralgia:** an irritation of the ninth cranial nerve causing pain at the back of the throat.

**multiple sclerosis:** a chronic degenerative disease of the central nervous system in which the myelin (sheath) surrounding the nerves is destroyed.

**neuralgia:** nerve pain.

**neurogenic keratitis:** inflammation of the cornea.

**tic douloureux:** French for trigeminal neuralgia.

**trigeminal nerve:** a nerve originating in the brain that supplies feeling and movement to the face. The trigeminal nerve has three divisions: ophthalmic, maxillary, and mandibular.



updated > 1.2021

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