

Intrathecal Drug Pump

Overview

Intrathecal drug delivery, or “pain pump,” is a method of giving medication directly to your spinal cord. The system uses a small pump that is surgically placed under the skin of your abdomen and delivers medication through a catheter to the area around your spinal cord – similar to an epidural that women may have during childbirth. A pain pump may be a treatment option if all other traditional methods have failed to relieve your long-term symptoms. Because the medication is delivered directly to the spinal cord, your symptoms can be controlled with a much smaller dose than is needed with oral medication. The goal of a drug pump is to better control your symptoms and to reduce oral medications; thus reducing their associated side effects.

What is an intrathecal drug pump?

The fluid filled space around your spinal cord is called the subarachnoid or intrathecal space. Cerebrospinal fluid (CSF) flows through this area, bathing and protecting your brain and spinal cord. An intrathecal drug pump works much more efficiently than oral medication because it delivers medicine directly into the CSF, bypassing the path that oral medication takes through your body. In fact, you generally need about 1/300 the amount of medication (morphine or baclofen) with a pump than when taken orally.

The pump is a round metal device about the size of a hockey puck that is surgically implanted beneath the skin of your abdomen. A small plastic tube, called a catheter, is surgically placed in the intrathecal space of the spine and is connected to the pump (Fig. 1). A space inside the pump called the reservoir holds the medication.

The pump is programmed to slowly release medication over a period of time. It can also be programmed to release different amounts of medication at different times of the day, depending on your changing needs. The pump stores the information about your prescription in its memory, and your doctor can easily review this information with the programmer. When the reservoir is empty, the doctor or nurse refills the pump by inserting a needle through your skin and into the fill port on top of the reservoir.

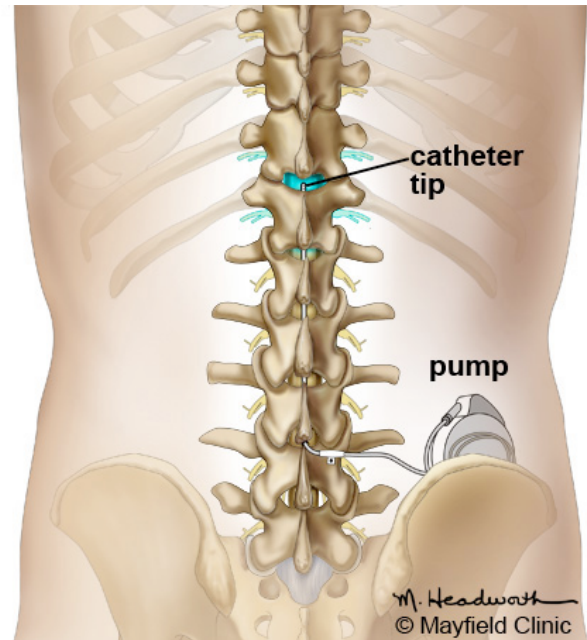


Figure 1. The intrathecal pump system consists of a pump/reservoir implanted between the muscle and skin of your abdomen and a catheter that carries medication (blue area) from the pump to the spinal cord and nerves.

This therapy is completely reversible if you should ever decide to have the pump removed.

Who is a candidate?

You may be a candidate for intrathecal drug delivery if you meet the following criteria:

- Conservative therapies have failed
- You would not benefit from additional surgery
- You are dependent on pain medication
- You do not have psychological problems
- You have no medical conditions that would keep you from undergoing implantation
- You are not allergic to any of the drugs used in the pump
- You have had positive response with a trial dose of medication

A pump can help lessen chronic pain caused by:

- **Failed back surgery syndrome:** failure of one or more surgeries to control persistent leg pain (sciatica), but not technical failure of the original procedure.

- **Cancer pain:** constant pain caused by tumors compressing the spinal nerves, or scarring from previous radiation therapy.
- **Reflex sympathetic dystrophy:** a progressive disease of the nervous system in which patients feel constant chronic burning pain.
- **Causalgia:** a burning pain caused by peripheral nerve injury.
- **Arachnoiditis:** painful inflammation and scarring of the meninges (protective layers) of the spinal nerves.
- **Chronic pancreatitis:** chronic abdominal pain caused by inflammation or blockage of the pancreatic duct.

A pump can help lessen spasticity (muscle rigidity and spasms that make movement of the arms and legs difficult) caused by:

- **Cerebral palsy:** a nervous disorder that impairs control of body movement.
- **Multiple sclerosis:** a disorder of the brain and spinal cord caused by damage to the outer layer (myelin) of nerve cells.
- **Stroke:** damage to the brain from lack of oxygen; due to an interruption of the blood supply.
- **Brain injury**
- **Spinal cord injury**

Who performs the procedure?

Neurosurgeons and doctors who specialize in pain management and spine disorders implant drug pumps.

The surgical decision

Determining whether an implantable drug pump will be a good pain management option for you is a complex process. Before a permanent pump can be implanted, you must undergo a trial to see if the device decreases your level of pain or spasticity. Depending on your particular condition, one of the following screening tests will be necessary:

1. **Single injection:** you will receive one injection of intrathecal medicine (morphine or baclofen) through a lumbar puncture.
2. **Multiple injections:** you are given multiple injections over a series of days by either a lumbar puncture or catheter.
3. **Continuous trial:** a catheter is placed in the correct area of your spine and connected to an external pump. The dose is increased every 2 hours until you notice pain relief.

During the trial, the doctor gathers information about the best location for the catheter and the type and amount of drug that works best for you. If the trial is successful, you will be scheduled for surgery.

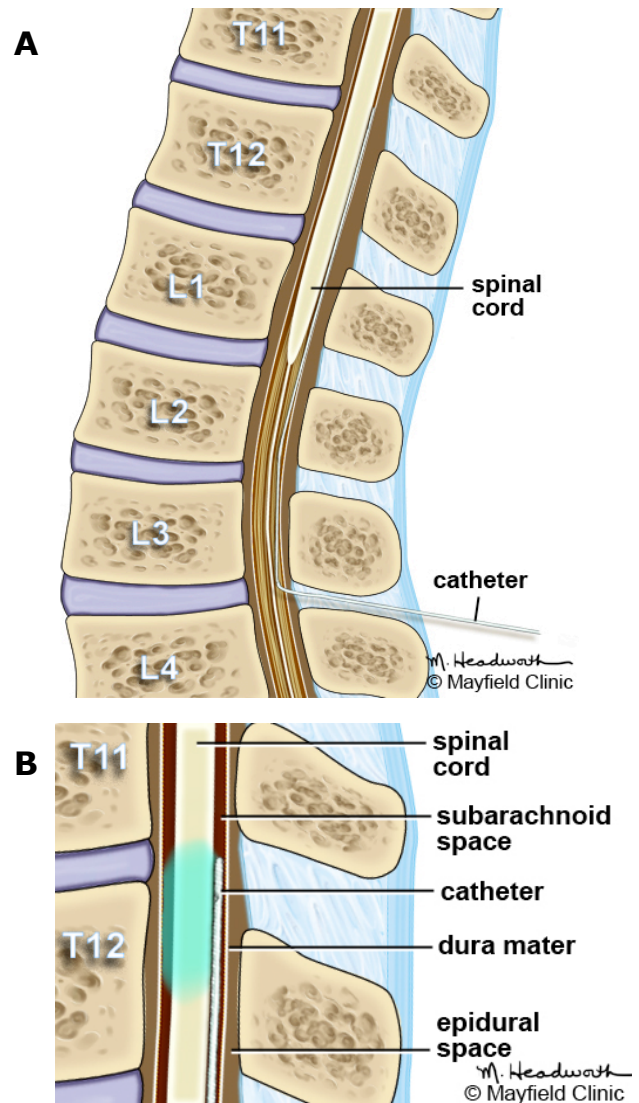


Figure 2. **A**, The catheter is inserted into the intrathecal (subarachnoid) space in the low back area. **B**, The catheter is then positioned in the best location to bathe the spinal cord with medication (blue) and block the transmission of pain signals to the brain.

What happens before surgery?

You may be scheduled for presurgical tests (e.g., blood test, electrocardiogram, chest X-ray) several days before surgery. In the doctor's office you will fill out paperwork and sign consent forms. Patients are admitted to the hospital the morning of the procedure. No food or drink is permitted past midnight the night before surgery. An intravenous (IV) line is started in your arm. An anesthesiologist will explain the effects of anesthesia and its risks.

What happens during surgery?

There are two parts to the procedure: 1) placement of the catheter in the intrathecal space surrounding the spinal cord, and 2) placement of the pump/reservoir in the abdomen. There are five main steps of the procedure. The operation generally takes 3 to 4 hours.

Step 1: prepare the patient

You are placed on the operative table and given anesthesia. Once asleep, your body is rolled onto its side. Next, the areas of your back and stomach are shaved and prepped where the catheter and the pump are to be placed.

Step 2: placement of the catheter

A small skin incision is made in the middle of your back. The bony arch (lamina) of the vertebra is exposed. The catheter is placed in the subarachnoid, or intrathecal space, above the spinal cord and secured in place with sutures (Fig. 2).

Step 3: tunneling of the extension

Once the catheter is in place, an extension catheter is passed under the skin from the spine, around your torso to the abdomen where the pump will be implanted.

Step 4: placement of the pump

A 4-6 inch skin incision is made in the side of your abdomen below the waistline. The surgeon creates a pocket for the pump between the skin and muscle layers. The extension catheter is attached to the pump. Next, the pump is correctly positioned under the skin and sutured to the thick fascia layer overlying the stomach muscles.

Step 5: close the incisions

The incision in your back and abdomen are closed with sutures or staples and a dressing is applied.

What happens after surgery?

You will wake up in the postoperative recovery area, called the PACU. Your blood pressure, heart rate, and respiration will be monitored, and your pain will be addressed. Most patients are discharged home the same day. You will be given written instructions to follow when you go home.

Discharge instructions: Discomfort

1. Right after surgery, pain is managed with narcotic medications. Because narcotic pain pills are addictive, they are used for a limited period (2 to 4 weeks). Also, their regular use may cause constipation, so drink lots of water and eat high fiber foods. Laxatives (e.g., Dulcolax, Senokot, Milk of Magnesia) may be bought without a prescription. Thereafter, pain is managed with acetaminophen (e.g., Tylenol).
2. Ask your surgeon before taking nonsteroidal anti-inflammatory drugs (NSAIDs) (e.g., aspirin; ibuprofen, Advil, Motrin, Nuprin; naproxen sodium, Aleve). NSAIDs may cause bleeding and interfere with bone healing.
3. Spinal headaches are caused by leakage of cerebrospinal fluid around the catheter or lead site. Lie flat and drink plenty of caffeinated non-carbonated fluids (e.g., tea, coffee).

Restrictions

4. Avoid these activities for 6 to 8 weeks to prevent movement of the catheter/leads:
 - do not bend, twist, stretch, or lift objects over 5 pounds
 - do not raise arms above your head
 - do not sleep on your stomach
 - do not climb too many stairs or sit for long periods of time
5. Do not drive for 2 to 4 weeks after surgery or until discussed with your surgeon.
6. Housework and yard-work are not permitted until the first follow-up office visit. This includes gardening, mowing, vacuuming, ironing, and loading/unloading the dishwasher, washer, or dryer.
7. Postpone sexual activity until your follow-up appointment unless your surgeon specifies otherwise.

Activity

8. Gradually return to your normal activities. Walking is encouraged; start with a short distance during the 1st two weeks and then gradually increase to 1 to 2 miles daily. A physical therapy program may be recommended.

Bathing/Incision Care

9. You may shower as directed by your surgeon. Do not take a tub bath or submerge yourself in water for 4 weeks. Pat your incision dry with a soft towel to avoid irritation.
10. Inspect the incision line twice daily.
11. Fluid may accumulate under the skin around the catheter/leads or the device creating a visible swelling. Call the doctor if this occurs. Seromas usually disappear by themselves but may require a drain.
12. Steri-strips may cover the incision. After showering, gently pat dry the steri-strips. Gently remove steri-strips after one week. Sutures or staples that remain in place when you go home will need to be removed. Ask your surgeon or contact the office to find out when.
13. Wear loose clothing over the incision site to maintain comfort and prevent skin irritation.

When to Call Your Doctor

14. If your temperature exceeds 101° F or if the incision begins to separate or show signs of infection, such as redness, swelling, pain, or drainage.
15. If your headache persists after 48 hours.
16. If you have sudden severe back pain, sudden onset of leg weakness and spasm, loss of bladder and/or bowel function - **this is an emergency** - go to a hospital and call your surgeon.

What are the results?

Results will vary depending on the underlying condition being treated and its severity. Chronic pain patients may experience a reduction in pain, as well as overall improvement in activities of daily living [1]. Spasticity patients may experience a reduction in rigidity and muscle spasms [2]. Oral medications are reduced because the medicine is delivered directly to the spinal cord and much smaller dosages are needed.

What are the risks?

Side effects for intrathecal drug pumps are minimal, although they do exist. As with all surgeries, complications may include infection and bleeding. The catheter could move or become blocked, or the pump could stop working (rare). Accumulation of fluid (cerebrospinal fluid leak) can occur around the pump causing a clear watery discharge from your incisions or a headache. These usually disappear on their own, but may require a drain. Reasons for removal of the device include infection, failure to relieve pain, and patient misuse.

Side effects from the drugs (over- or underdose) may include respiratory depression, twitching, muscle spasm, urinary retention, constipation, nausea, vomiting, dizziness, anxiety, depression, and edema.

Depending on how much medication the pump delivers, the battery will eventually need to be replaced every 5 to 7 years.

Living with an intrathecal pump

You must schedule medication refills on a regular basis with the surgeon or a pain management specialist. At your refill appointment, the effectiveness of your treatment will be assessed and your pump will be adjusted accordingly. The goal is to find the optimal amount of pain or spasticity control while having minimal side effects. You should tell your doctor if you experience unusual symptoms, drug overdose, or feel that your dosage is ineffective. You may need to take supplemental oral medicine if you have periods of stronger pain.

Just like a cardiac pacemaker, other devices such as cellular phones, pagers, microwaves, security doors, and anti theft sensors will not affect your pump. Be sure to carry your Implanted Device Identification card when flying, since the device is detected at airport security gates.

If you hear the pump making beeping sounds, call the doctor's office immediately. This may indicate that the pump needs refilled, battery needs replaced, or other maintenance.

Withdrawal symptoms from the medication you are receiving may cause you some discomfort or in extreme cases may require emergency treatment. Inform family members and friends about what to do in an emergency; always carry your Emergency Information and Procedure cards with you at all times.

Sources & links

If you have more questions or would like to schedule an appointment with one of our Spine Center specialists, please call (515) 875-9888.

Sources

1. Winkelmuller M, Winkelmuller W. Long-term effects of continuous intrathecal opioid treatment in chronic pain of nonmalignant etiology. *J Neurosurg* 85:458-467, 1996.
2. Coffey RJ, Cahill D, Steers W. Intrathecal baclofen for intractable spasticity of spinal origin: results of a long-term multicenter study. *J Neurosurg* 78:226-232, 1993.

Links

www.spine-health.com
www.theacpa.org

Glossary

baclofen: a muscle relaxing drug used to treat spasticity; Lioresal.

intrathecal space: the space surrounding the spinal cord through which cerebrospinal fluid (CSF) flows; also called the subarachnoid space.

morphine: a potent drug used to treat severe and persistent pain.

seroma: a mass formed by the collection of tissue fluids following a wound or surgery.

spasticity: severe muscle rigidity and spasms caused by damage to motor pathways; makes movement of the arms and legs difficult.

spinal hygroma: an accumulation of cerebrospinal fluid under the skin, which produces a visible swelling, caused by leakage around a catheter, drain, or shunt.



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