

## Pain Pump (intrathecal drug pump)

### Overview

A “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. The pump delivers medication through a catheter to the area around your spinal cord. Because the drug is delivered directly to the pain area, your symptoms can be controlled with a much smaller dose than is needed with oral medication. Thus reducing the side effects of medication.

### 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 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.

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

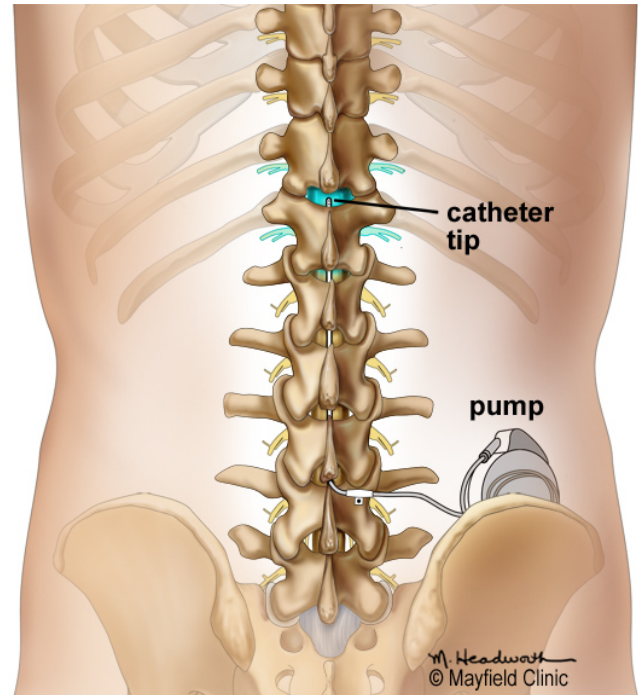


Figure 1. The intrathecal pump system consists of a pump/reservoir implanted between the muscle and skin of your abdomen and a catheter that carries medication (blue area) from the pump to the spinal cord and nerves.

### 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 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.

### What happens before surgery?

In the doctor's office you will fill out paperwork and sign consent forms. 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.

You may be asked to wash your skin 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.

Patients are admitted to the hospital the morning of the procedure. An anesthesiologist will explain the effects of anesthesia and its risks.

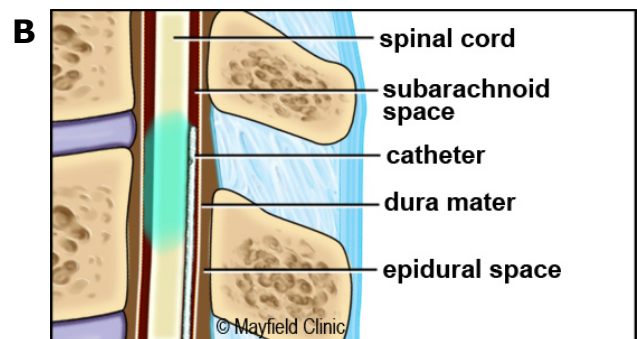
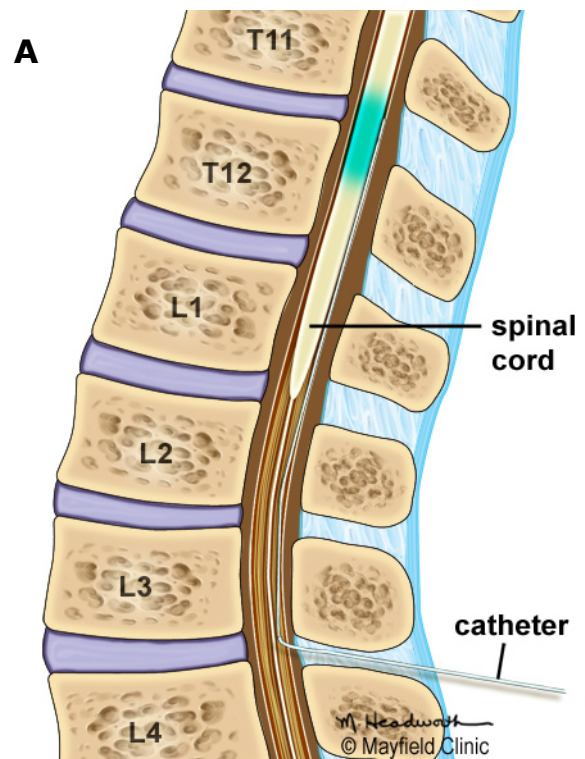


Figure 2. **A**, The catheter is inserted into the intrathecal (subarachnoid) space in the low back area. **B**, The catheter is then positioned in the best location to bathe the spinal cord with medication (blue) and block the transmission of pain signals to the brain.

## What happens 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 awaken in the recovery area. Your blood pressure, heart rate, and respiration will be monitored, and your pain will be addressed. Most patients are discharged home the same day. Be sure to have someone at home to help you for the first 24 to 48 hours.

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 bend, lift, twist your back or reach overhead for the next 6 weeks. This is to prevent the catheter from moving out of place until it heals.
- Don't lift anything heavier than 5 pounds.
- No strenuous activity including yard work, housework, and sex.

- Avoid straining during a bowel movement.
- Don't drive until after your follow-up visit.
- Don't drink alcohol. It thins the blood and increases the risk of bleeding. Also, don't mix alcohol with pain medicines.

### Incision Care

- Wash your hands before and after cleaning your incision to prevent infection.
- You may shower the day after surgery.
- Gently wash the incision covered in Dermabond skin glue with soap and water every day. Don't rub or pick at the glue. Pat dry.
- If there is drainage, cover the incision with a dry gauze dressing. If drainage soaks through two or more dressings in a day, call the office.
- Don't soak the incision in a bath or pool.
- Don't apply lotion/ointment on the incision.
- Dress in clean clothes after each shower. Sleep with clean bed linens. No pets in the bed until your incision heals.

### Medications

- 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.

### Activity

- Ice your incision 3-4 times per day for 15-20 minutes to reduce pain and swelling.
- Don't sit or lie in one position longer than an hour unless you are sleeping. Stiffness leads to more pain.
- Get up and walk 5-10 minutes every 3-4 hours. Gradually increase walking, as you are able.
- You may have a headache that is worse when you sit/stand, but better when lying down. Spinal headaches are caused by leakage of cerebrospinal fluid around the catheter. The leak often heals on its own. Lie flat and drink plenty of fluids.
- You may have been given an elastic abdominal binder to support the pump while the incision heals. Wear it at all times except when bathing.

### When to Call Your Doctor

- Fever over 101.5° (unrelieved by Tylenol).
- Unrelieved nausea or vomiting.
- Severe unrelieved pain.
- Unable to urinate 6-8 hours after surgery despite having a full bladder.
- Signs of incision infection.
- Rash or itching at the incision (allergy to Dermabond skin glue).
- Swelling and tenderness in the calf of one leg.
- New onset of tingling, numbness, or weakness

- in the arms or legs.
- Dizziness, confusion, nausea or excessive sleepiness.

### 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, please contact Mayfield Brain & Spine at 800-325-7787 or 513-221-1100.

#### 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

- <http://www.spine-health.com>
- <http://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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