

## Z-Joint Injections, Medial Branch Blocks, and Radiofrequency Ablation

### Background

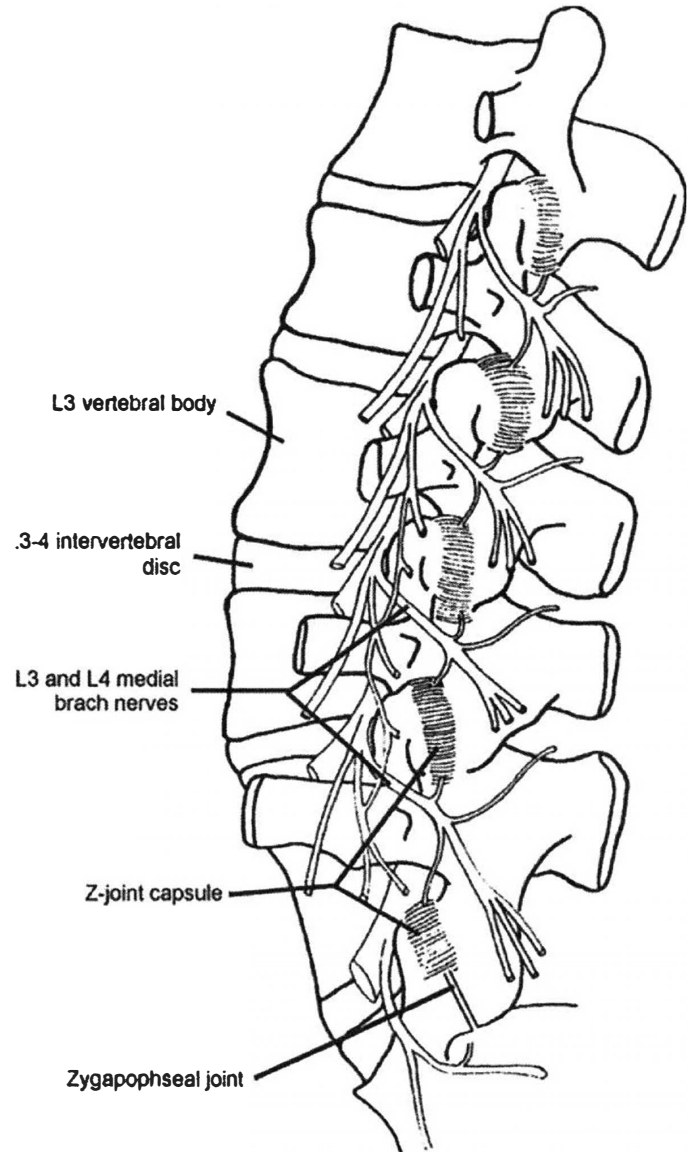
For convenience purposes, the spine can be divided into an anterior (front) section and a posterior (back) section, that work together to maintain proper function. The anterior section contains the vertebral bodies and the intervertebral discs and is the primary load-bearing part of the spine. The posterior portion, which contains the zygapophyseal (Z or facet) joints, lamina, and the transverse and spinous processes, controls the motions of the spine and provides for all musculotendinous insertions on the spine. In the low back, the usual location of injury is the intervertebral disc which is usually injured by bending forward while twisting to pick something up, often with an outstretched arm. The posterior section of the spine accounts for about 20-25% of low back pain and over half of chronic neck pain and can be injured through repeated bending, a hyper-extension (bending back too far) injury such as “whiplash”, or through “wear and tear” of the facet joints, a problem which can happen with age.

The facet joints are small joints in the back of the spine that form a connection between each vertebrae. Each vertebrae is a part of four facet joints, two on the upper or superior surface, and two on the lower or inferior surface. These joints are diarthroidal which means that there are only two surfaces rubbing together, like the hip joint and the finger joints. The inner surface of each joint contains articular cartilage which can be injured through a single, high-velocity injury, or more commonly, slowly be injured over time, a “wear and tear” problem known as osteoarthritis. These joints, as with most joints are surrounded by a soft tissue capsule which holds the fluid in the joint. As the joint capsule becomes swollen from fluid collecting in the joint, which is typical with osteoarthritis, the joint capsule begins to produce discomfort and frequently muscle spasm. As well, the injury to the cartilage in the joint and often the underlying bone also directly produces discomfort. The capsule, cartilage, and facet bone are all innervated from nerves arising from the *medial branches* of the dorsal rami. These nerves transmit pain upward, through multiple connections, to the brain, causing us to sense pain.

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All of the procedures discussed here are to reduce or eliminate pain from the posterior spine and more specifically the Z-joint.



## How does a facet or Z-joint injection work?

Zygapophyseal (or facet) joint injections are a diagnostic and a potentially therapeutic procedure. Diagnostically, a small amount of local anesthetic is usually injected into the joint. Pain is usually assessed immediately after the procedure. If there is a resolution or a reduction in the symptoms as compared with the symptoms prior to the procedure, there usually is considered confirmation that the joint injected is producing pain.

From a therapeutic standpoint, a small amount of corticosteroid is usually injected in addition to the local anesthetic. Corticosteroids are potent anti-inflammatory medications. Reducing the inflammation in the joint will decrease the amount of joint effusion and therefore decrease distention of the capsule, which will often offer longer lasting pain relief. It is possible that this injection will block the pain long enough to allow the body to begin the process of repairing itself.

The chief effect of a Z-joint injection is to reduce pain, but the effect is not always long lasting and differs from person to person. Most patients will receive good relief for some weeks or months after injection.

Your physician will probably request that you participate in physical therapy to mobilize the affected joints and begin strengthening and stabilizing the affected area.

## What is the purpose of medial branch blocks?

Medial branch blocks are a purely diagnostic procedure. These injections are normally used to confirm that the pain impulses are traveling through a particular set of medial branch nerves (each Z-joint is innervated by two medial branch nerves). If pain can be eliminated by blocking these nerves, the patient may benefit from radiofrequency ablation of the same nerves to produce a more permanent reduction in pain.

## What is radiofrequency ablation?

Radiofrequency ablation is a procedure in which a special needle is directed to a spot adjacent to the medial branch nerve. The needle is then connected to a radiofrequency generator which, as the name implies, produces a high-frequency radio wave. This wave produces a small area of heat in the tissue surrounding the needle (the nerve). This heated area is essentially burned, killing or ablating the nerve at that point. This ablation prevents pain impulses from traveling up the nerve to the spinal cord and brain, eliminating the perception of pain. The results of this procedure are often permanent.

## How are these injections administered?

With some of these procedures, you may be asked to stop medications that thin your blood. However, current medical advice for most of these procedures, is that the risk of stopping these medications is worse than the risk of having a bleeding complication from the procedure. If you are on medications that thin your blood, such as aspirin, warfarin, heparin, enoxaparin, ticlopidine, clopidogrel, dabigatran, dipyridamole, prasugrel, or any other blood thinning agents such as anti-inflammatory agents, please let your physician know at least one week prior to the procedure. Do not take your regular *pain* medications for six hours before or after the procedure. You should continue to take your routine medications (such as high blood pressure and diabetes medications) before the procedure. If you are on antibiotics please notify your physician, he may wait to do the procedure. **If you have an active infection or fever we will not do the procedure.**

These procedures (with the exception of radiofrequency neurotomy) typically do not require sedation. When receiving IV sedation you should not eat or drink anything (except your routine medications) for four hours prior to the procedure; this again, lowers the chance of having complications. You are expected to have a ride to and from the procedure. The procedure usually takes about fifteen minutes though you may be at the facility for as long as 45 mins. Once you arrive to the facility, if having sedation, a nurse will place an IV in your arm. After this has been done and the doctor is ready, you will be taken to the room and positioned on the table.

Local anesthetic will be injected into the skin and underlying tissues to decrease the discomfort of introducing the spinal needle. Once the local anesthetic is working the spinal needle is advanced to the appropriate location using bones as landmarks. Your physician will use fluoroscopy (a live x-ray) and other technical aids to ensure that the needle is in the right place.

For Z-joint injections, once the needle is in the joint, a small amount of contrast will be injected to confirm the appropriate location of the needle tip and to evaluate the competence of the joint capsule. After making sure that the needle is in the joint, the doctor will inject the solution of local anesthetic and steroid. The doctor may inject more than one joint depending on the symptoms you present with and the physical examination performed by the doctor.

For medial branch blocks, the physician will place the needle adjacent to the nerve based on bony landmarks that can be visualized with the fluoroscopy unit. He will then inject a small amount of contrast to confirm that the needle tip is not in a blood vessel. If the needle is in the appropriate position, he will inject a small amount of solution to “block” the nerve. You will be expected to keep a pain diary following the procedure to record pain each hour and note how long the block lasts. Remember, this is a diagnostic test and not a permanent treatment for pain.

For radiofrequency ablation, the physician will place the needle adjacent to the nerve based on bony landmarks that can be visualized with the fluoroscopy unit (the same location used in medial branch blocks). He will place multiple needles based on how many nerves he plans to block. Once the needles are placed, he will connect the needle to the radiofrequency generator. You will be asked to let the physician know as soon as you feel a change in the quality or type of pain. This technique is used to localize the nerve and confirm the needle tip is very close to the nerve. The physician will then use another setting to stimulate a motor response which will make a small muscle in your back fire intermittently. The physician will closely watch your leg or arm to confirm that the needle is not near the spinal nerve. Once the doctor has adequately confirmed placement, he will inject a small amount of local anesthetic to deaden so there is no pain when the needle tip is heated. The physician will then reconnect the needle to the generator and ablate the nerve. It takes approximately 90 seconds to ablate each nerve. He will repeat this process for each nerve to be ablated. Your physician may inject steroid around the nerve after the injection to reduce inflammation after the burn, this may help reduce discomfort after the procedure. It can take up to 3-4 weeks to notice results following radiofrequency ablation.

### **What are the risks of these procedures?**

With any operation or injection procedure there are risks. In the case of these procedures, the risks are small. These procedures are performed on the posterior spine and are thus away from the neuroaxis (spinal cord, etc.). This dramatically reduces the risk of serious problems.

With Z-joint injections, the most common side-effect is a temporary increase in pain. It occurs in about less than one percent of patients undergoing this procedure and appears to be related to the volume of substance injected into the joint. On occasion, the joint can be over-filled and this can cause a rupture of the joint capsule. This will normally heal with time. Your physician will take care to inject the appropriate amount of solution.

With medial branch blocks there are no specific side-effects or complications, only the general ones listed below.

With radiofrequency ablation, there are inherently more risks because your physician is creating permanent tissue damage. It is theoretically possible to have the needle too close to the spinal nerve. If the probe ablated the spinal nerve could result in weakness and numbness in the arm or leg. If at any point during the procedure you feel pain shooting into your arm or leg, please notify your doctor. This is a very rare complication and can usually be avoided with proper technique. Also on very rare occasions, the nerve that has been burned responds poorly to the

procedure, becomes inflamed (neuritis) and produces increased pain. As mentioned above, your physician may inject corticosteroid following the ablation to help reduce the risk of this.

If you are allergic to one of the additives in the steroid solution you may experience a hot flush or develop a rash. However, this should get better with a few hours or days.

As with any injection through the skin, it is possible for bacteria to gain entry causing an infection. Your physician will use sterile technique and the risk of infection with these procedures is very small.

Sometimes a patient's blood pressure falls at the time of injection. If so, the doctor will use the venous canula inserted before the epidural procedure commenced so that intravenous fluids or medication, if necessary, can rapidly control the blood pressure.

Some side-effects may occur as a result of the corticosteroid administered. If you have diabetes you may notice that your blood sugars are elevated for 2-3 days following the procedure. If they are, usually only monitoring is required. However, if you are concerned, call your physician. Corticosteroids may also cause fluid retention, weight gain, alterations in skin pigmentation at the site of injection, fluid and electrolyte alterations and/or gastrointestinal upset. These side-effects are usually not serious.

### **How long does it take?**

These procedures take 10 minutes to one hour depending on the procedure and number of levels involved. On occasion radiofrequency ablation can take longer if the nerves are difficult to localize. The patient will usually be in the recover room for 5-10 minutes after the procedure.

### **Repetitions**

Any of these procedures may be repeated. In general, however, if the effect of a Z-joint injection wears off and the patient has adequately participated in a physical therapy program after the procedure, it is more reasonable to proceed with medial branch blocks and ultimately radiofrequency ablation.

Medial branch blocks may be repeated with a different local anesthetic to absolutely confirm that blocking the medial branch nerves will be effective. Repeating this procedure is at the doctor's discretion.

Radiofrequency ablation is frequently permanent and does not need to be repeated. On rare occasions, the medial branch nerves will regenerate and the procedure will have to be repeated. Your doctor will usually not do this until 6 months have passed.

IF YOU HAVE ANY QUESTIONS ABOUT THE PROCEDURE OR ANY OF THE INFORMATION YOU HAVE JUST READ, PLEASE ASK THE STAFF OR YOUR DOCTOR. THEY WILL BE MORE THAN HAPPY TO ANSWER ANY QUESTIONS YOU MAY HAVE.