PRI Polyclinic Rehabilitation Institute

2 Champagne Drive, Unit B11
Toronto, Ontario
M3J 2C5

Tel (416) 477-1101
Fax (416) 981-3005
priclinic.com

Lumbar Facet Joint Pain: Orthopedic & Regenerative Medicine Approach

By Michael N. Brown, DC, MD, DABPMR-PAIN. Reprinted with permission.

We are going to be introducing the topic of low back pain arising from the "facet joints". Before we begin our discussion there are a few simple introductory facts that are important to know. The first is the concept of a spinal "tri-joint complex." If you take a look at 2 spinal segments there are actually 3 joints involved:

1. Facet joints right and left
2. Lumbar disc

The lumbar disc is a topic we have covered in other articles on this website. The facet joints are paired joints colored in lavender on the picture to the right. The facet joints are capable of gliding movement. When you bend backwards the facet joints close. When you bend forward the facet joints open. When you sidebend one of the facets joints open and the other closes and there is a combine and movement of side bending and rotation right and left. The facet joints are sometimes referred to as the zygapophyseal joints. These joints are housed in a fibrous ligamentous capsule.

THE ARTICULAR CAPSULE OF THE FACET JOINT:
The ligament of the facet joint is called the facet joint capsule. This is seen in the picture to the left. The facet joint capsule is also capable of secreting a fluid in order to lubricate the joint and nourish the articular cartilage.

The facet joint capsule can on occasion produce too much fluid within the joint when the joint is irritated and can be on occasion noted on MRI. The majority of weight bearing is actually more directed to the lumbar disc. The facet joint
capsule (ligament) is a potential pain generator.

FACET JOINT REFERRED PAIN:

When an individual presents with low back pain and leg pain it's commonly assumed by the patient that the leg pain is "sciatica" caused by irritation or compression of a nerve from the spine. Actually the truth is it is much more common to have pain referred from other structures of the lower back rather than the nerve. One of the structures that can cause a "sciatic-like" pain or what we call pseudo-sciatica is the facet joints.

Noted in the pictures to the right are typical referred pain patterns emanating from cervical and lumbar facet joints. To make this more complicated the muscles also have referred pain patterns. Many of these muscles in the neck and shoulder for example can refer pain into the arm simulating "nerve pain". The same is true in the lumbar spine. We have already discussed in other articles the fact that the disc also has its own referred pain pattern. This points out just how complicated it is sort out the source of pain in an individual case and why it requires special expertise.

To further complicate things a patient who presents with pain referred into the lower legs or arms from the facet joints may have degenerative changes in the spine which includes bulging discs which have absolutely nothing to do with the referred pain and can be misconstrued as the source of the problem. In other

words, a patient with low back and leg pain can see a physician specialist and have an MRI obtained demonstrating degenerative disc disease, bulging discs, spinal stenosis, etc. The physician can make the mistake of misdiagnosing where the arm or leg pain is coming from. The pain may be misconstrued as having pain from the nerve secondary to the bulging disc noted on MRI. In fact, this individual may actually have the source of the pain from referred pain from the soft tissue such as the facet joints and associated ligaments and soft tissues. A patient may undergo an epidural injection and they will commonly report no improvement from the epidural. The fact of the matter is the epidural should not have been performed in the first place!

WHAT CAUSES FACET JOINT PAIN?

It is important to understand there are complex ligamentous structures that provide segmental and spinal stability which includes the facet joint capsule.[1] Early degenerative changes in the disc which includes changes in the nucleus of the disc, tearing of the annulus of the disc leads to early destabilization of spinal segmental movement and ultimately leads to ligamentous laxity and spinal segmental instability.[2-4] It is this early degeneration of the disc that is probably the most important change in the spine that leads to an overload of weight bearing stress applied to the facet joints.[5]

With gradual early degenerative changes in the disc the load shifts onto the facet joints causing early arthritic changes, attenuation of the ligamentous capsule, persistent mechanical dysfunction and pain. In the early phases of back pain segmental dysfunction can occur where the facet joints can become restricted in a specific movement pattern. This restricted movement pattern can be maintained by contraction of the small intrinsic muscles of the spine shown in the picture to the right. Sustained muscle tension in these intrinsic muscles can cause the segment to remain restricted in specific movement patterns such as rotated side bent and flexed or extended.

It is these very restricted movement patterns that chiropractors, osteopathic physicians and some physical therapists are trained to detect an correct using various manipulation and manual medicine strategies. Chiropractors tend to focus on the joint restriction using manipulation where osteopathic physicians tend to focus on the small intrinsic tight muscles. Correcting the segmental position and muscle tension results in correction and restoration of spinal segmental motion. In the early phases of facet joint dysfunction manipulation and manual therapy is probably the best method of treatment. There are countless methods that can be used to correct these simple dysfunctions. Even insertion of an acupuncture needle using a technique known as Gunn IMS into the small intrinsic muscles such as the multifidus can release the tension on the muscle and restore segmental movement and reduce the stress on the facet joint. These strategies are used around the world to treat simple facet dysfunction.

Over time with persistent dysfunction and progressive degenerative changes the translational and torsional stability created by the disc and ligaments eventually become compromised and the facet joints begin to take the brunt of the problem. The facet joints then become progressively arthritic and can enlarge secondary to the bony proliferation and spurring which is a reactive change related to the excessive stress these joints are taking. This is perpetuated by a gradual disruption inside the disc.[5]

In conclusion early changes in the disc creates an excessive load on the facet joints producing early arthritic changes, ligamentous laxity and ultimately mechanical dysfunction and pain.4 There is a point of no return where the instability becomes the predominant problem rather than restricted movement of the facet joint. At that point in time patients typically do not respond well to manipulation or are provided only transient symptomatic relief from manipulation only to have the pain rapidly recur. It is at this point where spinal manipulation and manual medicine procedures should be deemphasized as a method of treatment and strategies to correct spinal

segmental instability should be sought after. In addition, the excessive translational movement ultimately leads to spinal canal and neural foramen stenosis which compromises the nerves exiting the spine leading to pain that can radiate down the legs or altered neurologic function.

WHAT ARE THE COMPLICATIONS ASSOCIATED WITH CHRONIC INSTABILITY?
Unfortunately progressive instability and its associated stress on the facet joints is not the only complication that can occur. This will not be a comprehensive discussion on that subject but there are a number of important factors that we will address. For example the degenerative changes and annular tearing within the disc that puts so much stress on the facet joints also can leak inflammatory chemicals into the nerve and create nerve root pain that can radiate into your buttocks and back.

There is a ligament within the spinal canal called the ligamentum flavum. It lines the inside of the spinal canal and is a elastic ligament. Unfortunately it somehow has the ability to sense excessive movement and begins to enlarge as a result of chronic spinal segmental instability. As it enlarges it narrows the spinal canal where the spinal cord and nerves travel creating gradual compression on the nerves.

Individuals with one or more levels of segmental instability which have problems associated with chronic back pain and spinal stenosis may have read in their MRI reports that they have “ligamentum flavum hypertrophy”. This just means exactly what we have just stated that the ligamentum flavum has enlarged secondary to its reaction to segmental instability. This can narrow the spinal canal and nerve passageways leading to neurologic dysfunction.

HOW IS LUMBAR FACET JOINT PAIN DIAGNOSED?
A well seasoned spine physician can typically diagnose facet joint pain clinically by examination. But this is a clinical diagnosis and cannot be confirmed without diagnostic local anesthetic blocks. Despite countless orthopedic tests and extensive literature published on the method to diagnose facet pain and dysfunction it is amazing in my practice how many patients end up in my office misdiagnosed. There are 2 methods to confirm the diagnosis of facet syndrome or facet joint pain. The first is simply to direct a needle to the joint and inject a local anesthetic into the joint. Since facet joint pain can come from multiple levels a pain specialist may be required to inject multiple levels to ultimately detect the number of facet joints involved in a particular chronic pain syndrome.

It is also important to see a physician who is patient enough and persistent enough to inject and block all potential pain sources if needed in a single visit to make a definitive diagnosis about the pain generator or source of the pain. It is common that multiple levels and multiple target tissues have to be injected in a single session to accomplish this. It is also incredibly important that the needle be accurately placed at the location of the facet joint. For this reason we typically use a special x- ray device called fluoroscopy to ensure precision placement of the needle for diagnostic confirmation.

The medial branch block:

The facet joints and capsular ligaments are innervated by a small nerve called the medial branch of the posterior primary rami. This small branch has a consistent location which can be localized under fluoroscopy and injected. Injection of this small branch innervating can numb the facet joints under the effect of the local anesthetic. If pain arises from the facet joint a block of this nerve will confirm relief of pain. This is probably the most common method of diagnosing lumbar facet joint pain. The reason why most pain physicians used a nerve block rather than the facet block is because if confirmation is made of complete symptomatic relief on 2 sequential blocks they typically perform a denervation procedure described below.

Ultrasound-guided facet block:

As many of my patients know I utilize a great deal of ultrasound-guided procedures in our practice. Although ultrasound can be used to do image guided facet joint injections it is much more preferred when trying to do a diagnostic confirmation to use the x-ray or fluoroscopy for precision diagnosis.

So if a patient who has facet joint pain undergoes a local anesthetic injection
and the pain is relieved while the anesthetic is still in effect this confirms that the pain is indeed coming from the facet joint. It is imperative however that a patient experiences substantial relief from these diagnostic injections. A patient receiving for example only 50% relief in our practice is considered a negative block and we have failed to confirm a diagnosis. A minimum of 80% of relief is required however our preference is 100% relief to confirm the diagnosis.

WHAT DO MOST PAIN PHYSICIANS DO WITH CHRONIC PAIN FROM FACET JOINTS?
Most pain physicians require a series of 2 diagnostic blocks directed to the nerves that innervate the facet joints as previously described.
These “medial branch blocks” confirm the diagnosis of lumbar facet joint pain. The problem is what do you do with a patient who has chronic pain from the facet joints?

Most interventional pain physicians following confirmation using diagnostic blocks proceed with a procedure called “radiofrequency neural lysis” of the nerves that innervate the facet joint. A small probe can be directed to the nerve under fluoroscopic guidance. Once the nerve is isolated by special positioning of the probe and electrical stimulation techniques the nerve can be ablated by thermal energy. Depending on how thorough the nerve is destroyed will govern how long the patient will experience symptomatic relief from this procedure. Thermal distruction of the medial branch that innervates the facet joint destroys the nerve that innervates the small multifidus muscles noted in the picture to the right. It is the opinion of most spine specialist that distruction of this nerve that innervates the muscle is inconsequential. However, there are other rehabilitation experts who feel this muscle is important in stabilizing spinal segmental motion and is a focus of exercise, conditioning, and part of the target for stabilization training which we describe in another article on this website on exercise and physical therapy for low back pain. In addition, when you destroy the nerves (medial branch) innervation to the facet joint there is a gradual reinnervation.

When tissues are denervated complex neurophysiologic processes occur and surrounding nerves that are not damaged by the thermal energy begin to sprout branches directed to the denervated tissues. The nerve distructive procedure is therefore temporary and reinnervation occurs. The problem with that is that what ever nerves survive will reinnervate the facet joint. It may not even be sensory nerves and can even be autonomic nerves that will sprout to reinnervate the ligaments and soft tissues. Therefore the procedure has to be repeated. Therefore the pain relief that is obtained can range from 6 months to 10 months and then must be repeated. Each time it is repeated the “reinnervation pattern” becomes more complex and denervation procedures become less effective. I have for the most part abandoned the use of denervation procedures. I do possess the technology and occasionally will use this in certain circumstances but its use in our practice is rare.

IF DENERVATION PROCEDURES ARE NOT RECOMMENDED THEN WHAT TYPE OF TREATMENT IS AVAILABLE FOR CHRONIC PAIN OF FACET JOINT ORIGIN?
I have presented a rather simplistic and cursory view of spinal pathology specifically as it relates to the development of subtle degenerative instability leading to chronic facet joint pain and chronic back pain. The concepts of spinal instability are actually much more complex, but in dealing with chronic frequent recurrent back pain or chronic daily back pain there is almost always a component of spinal instability. Denervation procedures as I have previously described is a procedure that may kill the pain for a short period of time but does not deal with the actual pathology which is the underlying spinal instability. If one has an in-depth understanding of

pathology one may not be so eager to relieve pain by doing denervation procedures but rather focus on the
pathology of spinal instability. Panjabi defined segmental instability as a decrease in the capacity of the stabilizing system of the spine to maintain intravertebral neutral position zones within the physiologic limits.[6] As one can see in the picture above there is an obvious translational instability of one segment to the other. This is typically not the degree and amount of instability that we are talking about. Typically the subtle translational and excessive movement patterns appreciated that can lead to chronic back pain are much more subtle. It is difficult to diagnose using MRI, and x-ray. The diagnosis of spinal segmental instability is just not that easy. If there is a way to target ligaments and supportive connective tissue and to stiffen or improve segmental instability would that not be the more favored therapeutic intervention for chronic facet joint pain? Of course it would. So the question is whether or not there is a method of targeting spinal intervention that can improve segmental instability, proliferate connective tissue, reduce pain and increase function? The answer to that question is yes!

For many years physician specializing in non- operative orthopedics or “orthopedic medicine" have been using injection techniques that create collagen proliferation thereby healing tendon attachments to bone and ligamentous instability of joints. Since the 1930s we have seen a steady and progressively emerging field of techniques and methods utilizing connective tissue proliferation techniques. Early on most individuals settled on utilizing injections of natural substances such as dextrose sugar.

Although other substances were utilized dextrose was the most popular method utilized. Over the years other substances such as sodium morrhuate, hormones and eventually the use of platelets concentrated from your own blood was developed to assist in connective tissue proliferation. Today these techniques have been refined and incorporated into a host of regenerative medicine technologies which can be imaged guided using fluoroscopy x-ray and ultrasound to targeted joints and ligaments to stimulate proliferation of connective tissue and stabilization of both traumatic and degenerative instability. I have even used stem cells on occasion directed over the facet joints and ligaments, but that is typically not necessary.

Prolotherapy or now more popularity called regenerative injection therapy is a technique using injections that can be directed to the facet joint ligaments and other supportive connective tissues to stimulate collagen in connective tissue proliferation to improve segmental instability. This reduces the excess micro-movements that are at the heart of mechanical dysfunction of facet joints that cause mechanical pain. These injections stimulate the release of growth factors that activate local cells that lie within connective tissue called “fibroblasts.” Fibroblasts are specialized cells whose predominant role in the connective tissue is to produce collagen when stimulated to do so by chemical messengers signaled often by tissue injury. Moderately regenerative injection therapy utilizes this simple principal by releasing these local tissue growth factors that stimulate the tissue fibroblasts to proliferate or produce collagen within the existing matrix of connective tissue.

We have long since known that the use of tissue growth factors is part of the secretive regenerative medicine. I discussed this in detail in the article on regenerative injection therapy on this website. The release of growth factors is basically at the heart of how prolotherapy or regenerative injection therapy works. The utilization of tissue growth factors are still at the heart of modern day stem cell therapy in other regenerative injection technologies.
For example, a common technique that we utilize is to take a sample of your own blood and put it into special certification tubes. We centrifuge your blood separating your blood into cell layers and extract your platelets from your blood. We concentrate these platelets and some of your own plasma (the fluid that your cells float in) which then can be concentrated into a syringe to be used therapeutically.

Injection of this platelet concentrate obtained from your blood can be used therapeutically. The cells that we concentrate from your blood contain significant numbers of tissue growth factors that

can be used as a regenerative technology to help treat and heal ligament and tendon pathology. This technique is called “platelet rich plasma” which I have also addressed in the article on regenerative injection therapy.

Platelet rich plasma can be directed to the facet joints and ligaments of the spine as well to stimulate connective tissue proliferation. These injections are targeted to key ligaments of the spine by skilled injection specialists. I refer you to the article entitled “Regenerative Injection Therapy in Pain Medicine” on this website for further details.

Our practice for the last 30 years has been specifically in the area of regenerative orthopedic medicine. We have been doing this for a very long time and have been working very diligently to advance the science and technology of regenerative medicine. The regenerative medicine approach to facet joint pain is to restore segmental instability, proliferate connective tissues and ligaments that stabilize unstable joints that have led to chronic segmental and facet joint dysfunction. It is our belief that it is more important to stabilize segmental instability and joint instability as a method of “common sense” treatment of chronic back pain in selected patients with pain caused from the lumbar facet joint than it is to simply “burn the nerves” to temporarily improved pain. In appropriately selected patients this treatment can be significantly helpful. It can also be repeated when necessarily and is very safe in the hands of an expert.

What type of physician and who should be utilizing these injection techniques around your spine is a matter of opinion. I suggest that patients look carefully at the educational background of the practitioners who you are seeking care from for these procedures. Do they have foundational training in orthopedics, and interventional spine procedures by way of residency and fellowship training or have they entered the field from other disciplines that may not have the same foundational background. This is an age-old problem that has been present throughout the history of medicine. All I suggest is the patients investigate, collect information and make informed decisions about who they see and what treatment they receive.

COMBINED PAIN SYNDROMES:
Patients with chronic back pain typically have multiple pain generators. As you begin to develop degenerative changes in the disc, facet joints, ligaments, sacroiliac joints, etc. multiple segmental levels often become involved. It is not uncommon for a patient with low back pain to have complex combinations of pain generators that have to be sorted out by advanced interventional orthopedic medicine practitioners. By isolating and making specific diagnoses and identifying specific pain generators advanced pain physicians can direct regenerative injection and regenerative medicine procedures to targeted tissue that may be the source of pain and dysfunction. I have addressed many of these syndromes individually in various articles on this website for your further information.

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