



The Costo-Vertebral Joint Sprain: A misdiagnosed & misunderstood cause of chronic mid-back pain.

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

INTRODUCTION TO COSTOVERTEBRAL / COSTOTRANSVERSE JOINT PAIN:

Our practice typically sees patients who have had persistent pain in the spine or joints that have failed all conservative care. So it is not uncommon for us to see patients that complain of persistent pain in the mid-back which is felt just off to one side of the spine. They have often sought care from physical therapist and have had continued pain. They may have tried chiropractic or osteopathic manipulation. They may or may not have had transient relief of pain with this treatment but the pain returns quickly.

Sometimes this condition can actually be irritated by manipulation and thus patients may have given up on manipulation treatment because it temporarily worsens the complaint. This article addresses this particular syndrome which is quite frequently misdiagnosed and misunderstood and therefore individuals can go on for years having persistent pain and never having realized they actually have a treatable condition.

WHAT IS THE COSTOTRANSVERSE JOINT?

The costotransverse joint is a junction between the rib and the transverse process of your thoracic vertebra. You can see that junction at the red arrow noted on the picture to the right. There is a second "rib and vertebra" joint as well. That is called the costovertebral joint noted at the Green arrow to the right.

There are actually different types of rib and vertebral joints in the body at different regions of the mid back but that is for anatomy "buffs" and we will not be going into that much anatomical detail. These joints are held together by ligaments

which are made of connective tissue that can be sprained. On occasion the rib and junction to the vertebra can become arthritic and become a source of pain from the osteoarthritic changes of the joint. Other times, gradual postural changes such as a gradual increase in the curve of the back as noted in the picture to the right can place stress on the rib and spine joints and become another reason patients develop pain in this area.

WHAT MAKES US VULNERABLE TO DEVELOPING THIS?

When patients are overweight there is a significant increased stress placed on these joints and make an individual vulnerable to injury. Once injured an individual may have persistent pain that does not respond to any care provided which may include physical and manual therapies.

The increased weight causes extra stress on the rib joints because of the amount of body weight carried in the front of the body as well as the increased curve in the mid back. Slip and fall accidents may cause this. It is relatively common place for me to see injuries in the costotransverse joints and costovertebral joints in motor vehicle accidents especially rear end collisions. The reason for this is that even with a normal spinal curvature and normal body weight the seat back contacts the mid back area and during a rear end collision the seat

pressure on the rib cage can cause sprained to these joints. This can be much worse if you're overweight. When you are stuck from the rear and you have an increase spinal curve the pressure applied by the seat back can be significant depending on the speed of impact and pre-existing arthritic changes and other factors that may make your spine more vulnerable to injury.

WHAT SYMPTOMS DOES THIS CONDITION CAUSE?

Typically pain from the costotransverse joint causes pain just inside your shoulder blade over the rib. Thus, pain is typically in the location in the red zone noted in the picture to the left. But this is not all that can occur with pain arising from these joints. Pain from the joint will also cause the muscles around the area to become sore and tender and therefore often be mistaken for muscular pain and treated as such. Pain from this joint can refer into the front of your chest and the best diagnosed as chest pain from other sources or as a costochondritis a condition of the rib in the front of your chest. The most common complaint however is typically pain over the rib joint itself which is

often described by patient's as pain just inside the shoulder blade. The pain from these joints can become much more intense than typically experienced by simple muscular pain and the pain intensity may be the first clinical to look closer for this potential source of pain.

The source of pain from the costotransverse joint is typically the ligament that supports the joint shown in red on the pictures to the left. Has a previous practicing chiropractor I can recall being very frustrated with this particular syndrome because I was very aware of the source of the pain but felt helpless to be able to solve the problem. Even exercise, strengthening, change in posture, and medications were not helping my patients. As I advanced my education and expanded my clinical abilities I directed attention to this problematic area that had been so frustrating in my previous career.

In years past I utilized x-rays in the form of fluoroscopy seen in the picture to the right. The problem with this was the exposure to x-ray. Over the years as I began to become trained in musculoskeletal ultrasonography and having an opportunity to work in an ultrasound research lab in the pain medicine Department at the University of Washington I began to learn how to access these joints using ultrasound. Ultrasound provides a distinct advantage because not only continue see the complexity of soft tissue structures noted in the picture to the left but you can also see the lung field below the rib.

As you can see from the ultrasound picture to the left you can clearly see that a needle can be easily visualized and directed to a specific target. Because an ultrasound image of the rib can also show the lung field and the covering over the lung call the "pleura" you can perform these injections with ultrasonography with much less risk than doing these procedures blind.

HOW ARE THESE JOINT PROBLEMS TREATED?

For the most part as I have stated before the pain origin is the ligaments that support the joint. Typically we perform a diagnostic injection with a local anti-inflammatory medication to confirm that the costotransverse or costovertebral joints are the source of pain. About 4 out of 10 patient's have long-lasting relief from this simple injection and do not need to go on to have additional treatment. Depending on the severity of injury and/or severity of the condition sometimes we have to strengthen the ligament attachment to the rib. This is performed by using "prolotherapy" or an injection of platelet rich plasma. This is a special injection that is performed by using cells from your blood as a means of healing the injury. The injection is performed under ultrasound guidance the same way the diagnostic injection is performed. We typically have excellent success treating patients with this particular syndrome utilizing these injection techniques. Although we have a separate article on regenerative injection therapy and I refer you to that article for a complete discussion of the topic I will cover a review of the use of platelet rich plasma injection below.

PLATELET RICH PLASMA INJECTION (PRP):

We utilize cells that we obtain from your blood for this procedure. The platelets and your blood have a high concentration of growth factors that are used to affect tissue repair, regeneration and healing.

WHY PLATELETS?

Platelets are very complicated and dynamic cells involved in a myriad of biologic processes in your body. Platelets are responsible for sticking to each other and stopping initial bleeding after injury. Once activated they also initiate the clotting cascade as well as release numerous growth factors which stimulate the proliferation of collagen connective tissue, new blood vessels and tissue regeneration and healing. The growth factors contained within platelets provide a powerful stimulus for tissue healing and regeneration. It is your platelets that are often responsible for initiating a healing cascade in soft tissue injuries such as abrasions and lacerations.

The rationale therefore for utilizing platelets is to take advantage of the myriad of growth factors derived from platelets that alter healing response and tissue regeneration. These growth factors include TGF- β , platelet derived growth factor (IGF), vascular endothelial growth factors (VEGF), epidermal growth factor (EGF), fibroblastic growth factor -2 (FGF-2), which have the potential to enhance healing, grafting and connective tissue repair. The specific attributes of these growth factors are not as important as the basic understanding that these growth factors can dramatically influence the way connective tissues heal and proliferate. The use of these growth factors to influence regulatory function for healing has sparked significant interest in orthopedics.¹ What are platelets capable of doing?

The growth factors derived from your platelets have been shown to promote the migration of small blood vessels into the tissue and pluripotent (autogenous stem cells) into an area to promote the release of additional growth factors. This has been used for example to accomplish the following:

1. Stimulating articular chondrocyte proliferation and healing cartilage defects in joints^{2,3}
Thus is currently being used to influence proliferation of cartilage in arthritic joints.
2. Healing of chronic wounds^{4,6}
3. Enhancing healing and pain reduction in shoulder arthroscopic surgery^{7,8} Surgeons wanting to take advantage of the healing power of platelets are injecting platelet rich plasma into the shoulder after surgery to enhance healing
4. Fibroblasts and collagen proliferation. Because I have been working with previous treatment methods utilized to proliferate connective tissue and heal tendons and ligaments, I became extremely interested in the potential of this treatment as another option for my chronic pain patients who suffer from tendon and ligamentous pathology. The use of a patient's platelets has now had become a powerful biologic tool for the orthopedic and musculoskeletal clinician to affect tissue healing^{9,11}

WHAT EXACTLY IS PLATELET RICH PLASMA?

Platelet rich plasma is typically prepared by obtaining the patient's own blood via an IV. Their blood sample is then transferred into a special sterile bag and the cells are "fractionated" or separated various cells. This is performed utilizing special equipment that I personally use from One of the most attractive parts of this treatment is that you are utilizing the patient's own blood. At no time is there any other individual's blood, blood elements or cells utilized during this process. This eliminates any worry or risk for spread of infectious disease such as hepatitis, HIV, et cetra. Utilizing the patient's own blood is the beauty of this therapy. Therefore, the only things being injected into your body are elements of your own blood! This represents one of the most natural therapies I have ever encountered.

WHAT IS PLATELET RICH PLASMA USED FOR?

The use of platelet rich plasma injection for the purpose of wound healing and treatment of tendinopathy has become more commonplace in orthopedics and sports medicine. 4,8-11,12-16 This form of treatment has been shown to be highly effective in treating tendinitis/tendinopathy, which is what sparked my interest in this treatment. Now, tendinitis/tendinopathy is a rather complex subject. This method of treatment is not a panacea or cure for all joint and soft tissue pain syndromes. It is unfortunately far from that. However, in carefully selected individuals it is a powerful biologic tool. There is a subset of individuals who develop persistent pain despite well-accepted treatment methods. These individuals often have temporary relief with corticosteroid injections but unfortunately have recurrent pain. Mirisha et al. an orthopedic surgeon at Stanford University popularized this technique when he published a linear study on the effect of platelet rich plasma injection on chronic tendinosis for lateral epicondylitis (tennis elbow)¹⁷. He was able to demonstrate in patients who have failed conservative treatment (including injection treatment) at 81% success rate utilizing platelet rich plasma injection. Following his publication I personally began to use this method of treatment more frequently and noted my success was much better than I had experienced with standard prolotherapy techniques in the past. Over the years and began to treat spine complaints including sacroiliac joints, cervical, thoracic and lumbar spine joints with relatively dramatic success. That is how I began to treat costovertebral joints as described in this article. I also frequently switch to PRP as a method of treatment when the patient reaches a symptomatic plateau with prolotherapy techniques.

HOW WAS PRP PREPARED?

I have used many of the commercial technologies available in the US including Harvest®, Cytometrics Angel®, Arthrix® and other systems. I have now using EmCyte technology and I have finally found the technology that I have been looking for. We take a sample of your blood and use a series of centrifuge techniques to separate out your white blood cells, red blood cells, your platelets and your plasma (fluid your blood circulation). He was anticoagulated prior to preparation. We obtain a syringe a concentration of your plasma and pure platelets. We can concentrate those platelets customized to whatever I want which can be 5x to 15-20x normal concentrations.

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