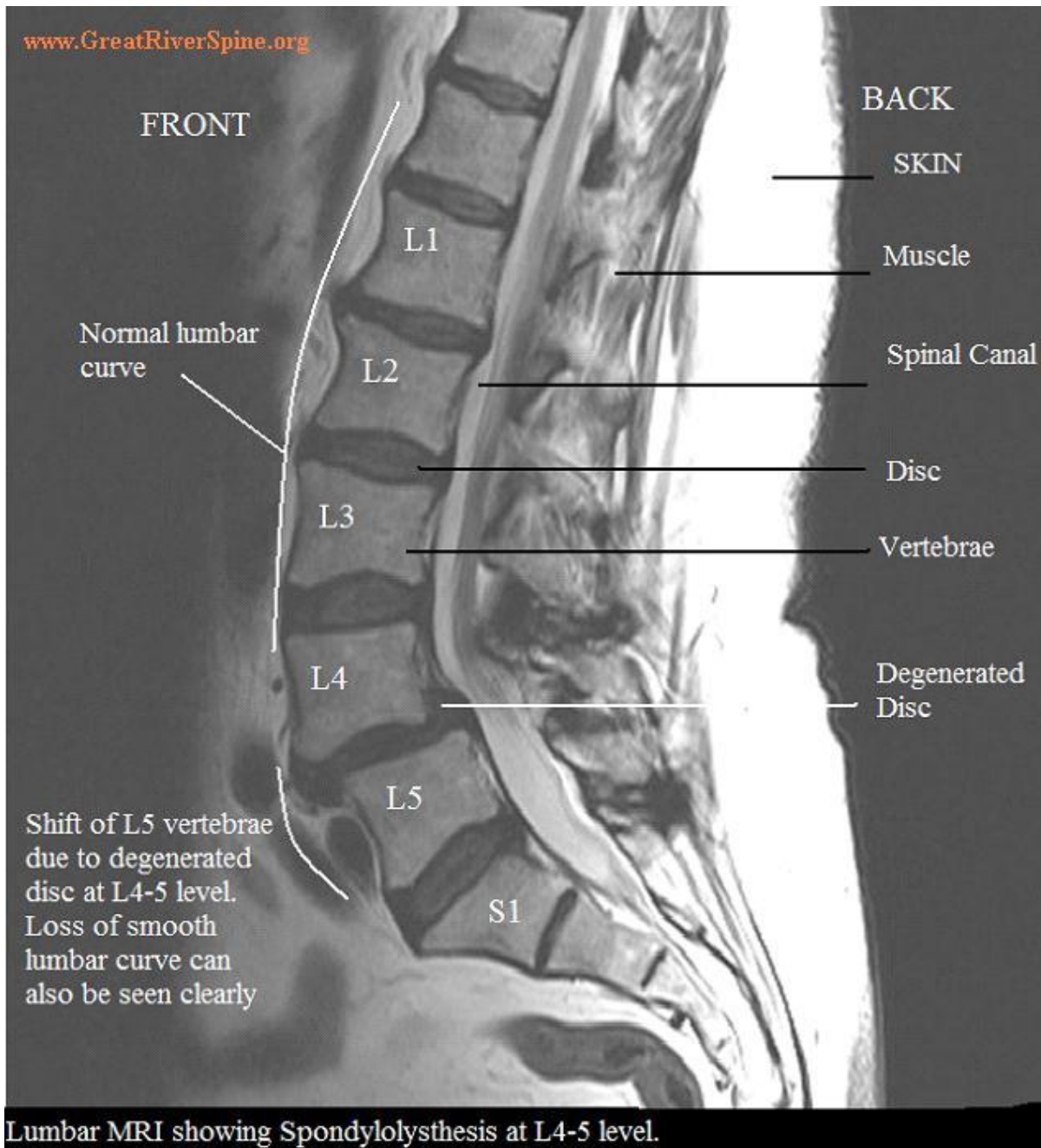
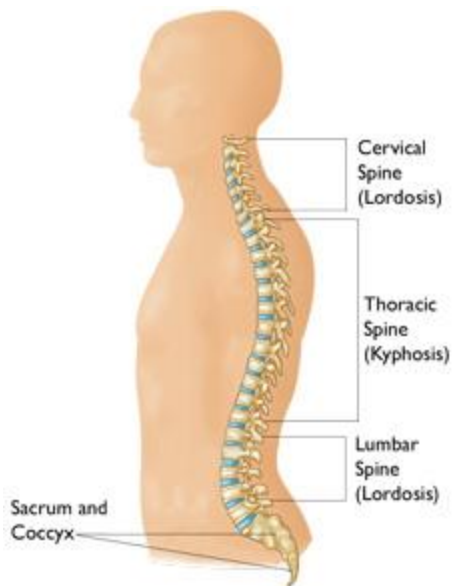


# Thesis on Lumbar Spondylolisthesis



## Thesis on Lumbar Spondylolisthesis

### The Spine - Introduction



The spine consists of 24 individual bones called vertebrae which are stacked on top of each other. In between each vertebra there are protective, circular pads of cartilage (connective tissue) called discs. They have a tough, fibrous case that contains a softer, gel-like substance. The discs help to cushion the vertebrae during movement. The spine is divided into three sections, cervical, thoracic and lumbar. The spinal cord is highly sensitive and passes through the middle of the vertebral column. It contains nerve cells and bundles of nerve fibres that connect all parts of the body to the brain.

### Yoga- A science of the Spine

While the overall goal of yoga practices is to facilitate and awaken spiritual awareness, there are also many physical benefits. These include improved functioning of all bodily systems, in particular the immune system is strengthened and so yoga is beneficial to all kinds of dis-ease in the body. Other benefits include the slowing of the biological aging process as well as an overall reduction of stress factors. Clearer thinking processes, improved intellectual skills, enhanced creativity, and an overall increased appreciation for living are also some of the many benefits of yoga practice.

It is well known that Hatha Yoga practices place great emphasis on the spine. A great Indian Master asserted that the brain and spine (spinal cord) are the altars of God. He also stated that we worship God in the temple of the spine. The question then arises as to why the brain and spine are of such paramount importance to the overall purpose of yoga practices. That is to say, what is the physiological basis of this focus of attention in terms of the ultimate goal, and the above-mentioned physical benefits of yoga. In my research i have found the answer on a physical level, lies in the communication of the brain through the spinal column and the flow of cerebrospinal fluid (CSF) which flows around and within the brain and spine, and in neuropeptides, whose greatest concentration is in the CSF.

Cerebrospinal fluid is a clear, colorless body fluid similar in chemical composition to blood plasma and seawater. It flows primarily within and around the central nervous system (brain and spinal cord), supplying it with nutrients and eliminating waste products. It also physically protects the brain and spinal cord, serves as a medium for the flow of energy and information, and is the most conductive fluid in the body.

Neuropeptides (nerve-proteins) are informational substances that are produced mostly in the brain, and are found primarily in the cerebrospinal fluid, and secondarily in the blood. They are called "messenger" molecules, (molecules are the smallest entity that retain the characteristics of a substance) because they distribute information throughout the body, and coordinate practically all life processes on a cellular level.

All the systems of the body (digestion, respiration, elimination etc.) are made up of glands (adrenal, mammary etc.), and organs (heart, liver, lungs, etc.). Glands and organs are comprised of tissues, (fat, bone, muscle etc.), and tissues are composed of cells. Cells, therefore, are the fundamental functional (physiological) and structural (anatomical) parts of the human body as well as all other living organisms.

Neuropeptides not only coordinate almost all body functions on a physical level, but also on an emotional level. These powerful biochemicals are concentrated in the limbic system, the seat of the emotions, and play an important role in governing our emotions as well. Later in this thesis we will discuss metaphysical conditions.

I believe that it is through yoga practice that a balance between body and mind can be achieved through the positive impact Yoga has on the flow of cerebrospinal fluid and general alignment and strengthening of the spine.

It is suggested that the way yoga works is directly related to CSF flow, and the role neuropeptides play as the notes that orchestrate the symphony of all mind-body activities.

Asanas (physical postures) help to tone and strengthen the spinal musculature, enhance the flexibility of the spine, and improve overall spinal alignment. The body movements associated with the various postures benefit the spine and enhance the flow of the largest volume of CSF within the cranial and spinal bones. Theoretical flow of CSF within the connective tissue of the nervous system (neurological cells) would also be augmented as the yoga practitioner performs asana stretches involving the arms, legs and torso.

Pranayamas (breathing techniques) are procedures used to enhance the flow of "Prana" in the body, usually through regulation of the breathing pattern or rhythm. "Prana", or life force, is said to enter the body through food, sunlight and breath. It energizes and vitalizes the vital fluids in the body called "ojas", which include the blood, lymph, extracellular, sexual and cerebrospinal fluid.

So with all this in mind it becomes obvious that a practice of Yoga is essential for any person with spinal disability in order to live a joyful life in body and mind. Over the next few chapters I will be explaining, specifically, Lumbar Spondylolisthesis and referring to various other ailments of the spine.

## Thesis on Lumbar Spondylolisthesis

“At one time or another the misery of lower back pain is felt by everyone, which is no surprise. Our upright spine is as unique to being human as having an opposable thumb. But where anyone can see that using our hands involves every aspect of life, we don’t say the same about our backs. But it’s just as true. You can read a great deal standing behind someone, reading victory or defeat, success and failure, pride or shame, and every degree of self-esteem. More hidden are the stresses that shape the back. On the day that you feel that first twinge of back pain, an entire personal history has already unfolded.” Deepak Chopra.

### Spondylolisthesis Definition

Spondylolisthesis occurs when one vertebra slips forward in relation to an adjacent vertebra, usually in the lumbar spine. In about 5 percent of the adult population, there is a developmental crack in one of the vertebrae, usually at the point at which the lower (lumbar) part of the spine joins the tailbone (sacrum). Sometimes this cracked vertebra does slip forward over the vertebra below it. This is known as Spondylolisthesis.

Spondylolisthesis can be congenital (present at birth) or develop during childhood or later in life. The disorder may result from the physical stresses to the spine from carrying heavy things, weightlifting, football, gymnastics, trauma, to general wear and tear. As the vertebral components degenerate the spine's integrity is compromised, this may lower quality of life and contribute to the development of psychological problems such as anxiety through fear, or depression.

### Symptoms of Spondylolisthesis

The symptoms that accompany spondylolisthesis include pain in:

- Lower back pain
- Pain in thighs and /or legs – neck and shoulders if nerves are pressed
- Muscle spasms
- Weakness and /or tightness in hamstrings and legs

Some people are symptom free and only discover the disorder exists when revealed on X-ray.

In advanced cases this may lead to spinal cord or nerve root compression, creating the pain and numbness in legs. The patient may appear swayback with a protruding abdomen, perhaps a shortened torso, and may present with a ‘waddle’ walk.

### Diagnosis

A routine lateral (side) radiograph taken while standing confirms a diagnosis of a spondylolisthesis. The x-ray will show the translation (slip) of one vertebra over the adjacent level, usually the one below.

Using the lateral (side) x-ray, the slip is graded according to its degree of severity.

Another type of spondylolisthesis is degenerative spondylolisthesis, occurring usually after age 50.

This may create a narrowing of the spinal canal referred to as spinal stenosis.

## **Related Spinal injuries**

### **Cervical Spondylosis**

Also referred to as Cervical spondylitis. This is described as degeneration of posterior intervertebral joints in the cervical spine, and results in narrowing of spinal column and general "wear and tear" of the vertebrae and discs in the neck. It is a normal part of ageing and does not cause symptoms in many people. However, it is sometimes a cause of neck pain. Symptoms tend to come and go. In severe cases, the degeneration may cause irritation or pressure on the spinal nerve roots or spinal cord. This can cause arm or leg symptoms. In these severe cases, surgery may be an option.

### **Disc Prolapse (slipped disc)**

A slipped disc, also known as a prolapsed or herniated disc, is where one of the discs in the spine ruptures and the gel inside leaks out. This can cause back pain as well as pain in other areas of the body. The sciatic nerve is often affected in cases of slipped disc. It is the longest nerve in the body and runs from the back of the pelvis, through the buttocks, down both legs to the feet. If pressure is placed on the sciatic nerve it can cause: a lasting aching pain, numbness, a tingling sensation in one or both legs.

### **Osteoarthritis**

Osteoarthritis is a condition of the joints. Symptoms can vary from patient to patient but the common characteristics of osteoarthritis are: mild inflammation of the tissues in and around the joints damage to cartilage, (the strong, smooth surface that lines the bones and allows joints to move easily and without friction) bony growths that develop around the edge of the joints

Although osteoarthritis occurs commonly in all of the major joints, (knees, hips, shoulders and spine) I chose to mention this condition in relation to the spine specifically, as it commonly occurs along in the spine at the affected area, usually due to the lack of fluid and maneuverability of the disabled area.

### **Scoliosis**

### **Yoga for Spondylolisthesis**

It is popular belief that back bending is good for back pain and forward bending is bad, however in the case of Spondylolisthesis it is the reverse of such belief.

## Lumbar Spondylolisthesis

As there is already excessive backward bending in the compromised position of the standing spine especially in the waist region, it is important to avoid acute back bending such as Ardha Chakrasana, Chakrasana, Dhanurasana & Ustrasana.

Supported and more gentle back bending such as Bhujangasana & Setubhandasana can be practiced carefully.

Emphasis should be placed on carefully warming the body before starting a sequence of Asanas. The main aim of Yoga for Spondylolisthesis should be to create space in the vertebrae, strengthen the back muscles and strengthen the abdominal muscles so the lumbar region is supported front and back. Teaching the patient to engage these muscles in every action so the lumbar is supported and used in a correct and safe way, not only on the mat but off the Yoga mat also.

It is also important to remember that in most patients suffering from Spondylolisthesis have usually led an active lifestyle. Adjustments to the mobility of the patient can be difficult to accept psychologically, as many activities become dangerous or painful, especially in the beginning they experience restrictions throughout their daily routine. Even simple tasks like walking or sitting for long periods can be of discomfort causing a direct affect on the mental and therefore emotional stability of the patient. The health of Body Mind becomes parallel importance in the management of this misalignment.

### **Conventional treatment and Risk Factors**

Conventional treatment can mean surgery. The operation involves fusing the vertebrae together. There is a 50% chance of success and like any spinal surgery there are severe risk factors. As operation is close to the spinal column there is a chance surgery can go wrong and complete mobility is lost.

### **The Sequence**

Warm Up: Sit in a comfortable seated cross leg position and assess the current condition of the spine today.

<p><b>NECK BREATHING:</b></p> <p>Important to release the neck area as this is a sensitive area of the spine.</p> <p>No strain should ever be placed on the</p>	<p>Remaining seated inhale and centre head exhale look right inhale centre, exhale look left. Repeat left to right moving with breath 5X</p>
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<p>neck.</p>	<p>Repeat up and down moving with breath 5X</p> <p>Take right ear to right shoulder and hold for 5 long breaths, repeat left side (only take as far as comfortable)</p>
<p><b>SIDE STRETCH (SEATED)</b></p> <p>(Legs crossed)</p> <p>Good to loosen waist region as Fascia tissue becomes congested and stiff when injury limits movement the muscle solidifies to support injury, thus further restricting movement.</p>	<p>Take hands either side of hips inhale right arm up beside the ear and gently lean to left, with left hand supporting firmly on ground. Hold for 5 long breaths. Rotate right wrist joint in circle whilst arm is raised. Then rotate shoulder joint by making circles in clockwise &amp; anticlockwise direction X5</p> <p>Repeat left side.</p>
<p><b>Adho Muka Virasana</b></p> <p>Gently creating space in vertebrae by lengthening in different directions.</p>	<p>Feet behind, toes touching, hips sink towards heels. Stretch arms out ahead. Lengthen spine in different directions by reaching with arms and lowering hips towards heels.</p>
<p><b>Tiger Breathing</b></p> <p>Bringing movement slowly to the vertebrae, warms up the spine slowly before advanced asanas.</p>	<p>Push onto all fours. Inhale curve the spine. Exhale round spine. Move with breath and slowly, maximum awareness onto the spine and injured vertebrae.</p>
<p><b>Adho muka swanasana</b></p> <p>Allowing spine to lengthen. Releases tension built up in hamstrings.</p>	<p>Pushup from all 4's. Hold for 5 long breaths, engage stomach muscles and slowly stretch out hamstrings; might like to peddle the feet slowly to release hamstrings.</p>
<p><b>Uttanasana</b></p> <p>Lengthening of spine</p>	<p>With knees slightly bent and abdomen pulled in, slowly walk feet to hands from Adhomuka swanasana to uttanasana; if pain in lower back bend knees deeply,</p>

	<p>always keeping abdomen engaged. Allow neck to be free and head to hang heavy.</p>
<p>Tadasana Allow connection to pelvic floor and feel the alignment of the spine</p>	<p>Slowly inhale and curl spine up from Uttanasana engaging abdomen and slight bend in knees, deep bend if in pain. In tadasana, engage breath and connect again with abdomen.</p>
<p>Surya Namaskar (classical 6-9 rounds)</p>	<p>Important to remember to avoid leaning back too far or dipping the back too much in sapta namaskarasana. Take it slow use the breath and engage abdomen</p> <p>After completing rounds of Surya Namaskar come to Padottanasana to stretch hamstrings and relieve lower back, remember to bend knees if necessary and engage abdomen when folding forward with body.</p>
<p>Malasana Good asana for relieving lower back pain</p>	<p>From padottanasana gently bend knees and come in Yogi squat, Malasana. . Feel the stretch across the sacrum and keep engaging abdomen and pushing arms against inside &amp; legs to deepen the stretching sensation.</p>
<p>Pascimottanasana Lengthening hamstrings &amp; spine.</p>	<p>Engage abdomen and keep feet flexed engage inner thighs to draw energy up from legs through the core.</p>
<p>Janu Sirshasana Increase hip mobility</p>	<p>Dandasana, bend right knee so sole of foot rest on inside of left groin, square naval over straight leg and exhale fold forward taking hold of foot. Bending</p>



	straight leg if cannot reach foot.
Marichyasana A Hip opener, spine lengthening	Bend right knee place sole of foot flat to earth, take right arm inside of right knee and reach around towards back to interlock with left hand.
Ardha Parsvottanasana Lengthen hamstrings	After marichyasana bend right knee to ground with foot behind keep left leg long in front and fold forward. keep hips towards back heel and hands either side of straight front leg. Work on this and when comfortable and stronger in spine can do full parsvottanasana.
Come to Standing Prasaritta Padottanasana	Final pose to stretch hamstrings & spine. Now move onto spine lengthening poses.
Ardha Pavana Mukttanasana Allowing the spine to lengthen with the support of the earth.	Push coccyx away from head and keep chin tucked in to lengthen spine. Open hips by pulling hard on knee, as the spine will compensate for the curvature in the lumbar the upper vertebrae tend to move forward, pushing chest out and making neck muscles wide.
Ananda Balasana Spine lengthening and hip opener, whilst lengthening across sacrum and massaging back muscles	Pulling on the insides of the feet to widen and relieve serene, again lengthen spine by keeping chin tucked into chest and rolling coccyx away towards earth.
Virasana Lengthens spine, stretches quads	Poses to strengthen abdominal & back muscles essentially, if working correctly all asanas will strengthen abdomen, however to work deeply on this area the following asanas are advised.

Navasana Strengthens abdominal muscles	Essential to pull naval in so abdomen supports spine, bent knees if pressure is too much.
Single & double leg raising Strengthens abdominal muscles	Move with breath, engage abdomen – repeat 15x or more  Avoid double leg raising if painful, practice single to build strength first.
Setu Bandasana Releases back pain and strengthens legs	Lift and lower to build strength hold for 9x long breaths
Bhujangasana Strengthens back muscles	Allow back muscles to work and keep feet together and flat with baby toes touching earth. Do not tighten glutes as this will compress lower back region. If its to much to hold can lift and lower with inhalation and exhalation. When strong in posture can interlace fingers behind back.
Salabasana Strengthens back muscles	First working individual legs to build strength and keeping palms under thighs until back is strong.
Ananda Balasana	Roll on back after salabasana and repeat as before.
Jhatara Parivartanasana Gentle spine twist for realignment of spine, and increased flexibility in upper back.	Lie onback hug knees to chest stretch left arm out to shoulder height and drop knees to right side, repeat other side. Hold for 5 long breaths
Savasana	Can be done with bent knees, feet on earth if experiences pain or discomfort in lower back region.

### **Yoga Asanas for immediate pain relief.**

If pain is being experienced in lower back region can rest in Balasana or pascimottanasana. Malasana is good for relief of lower back pain. Crossed leg lumber stretch- cross feet over and fold forward.

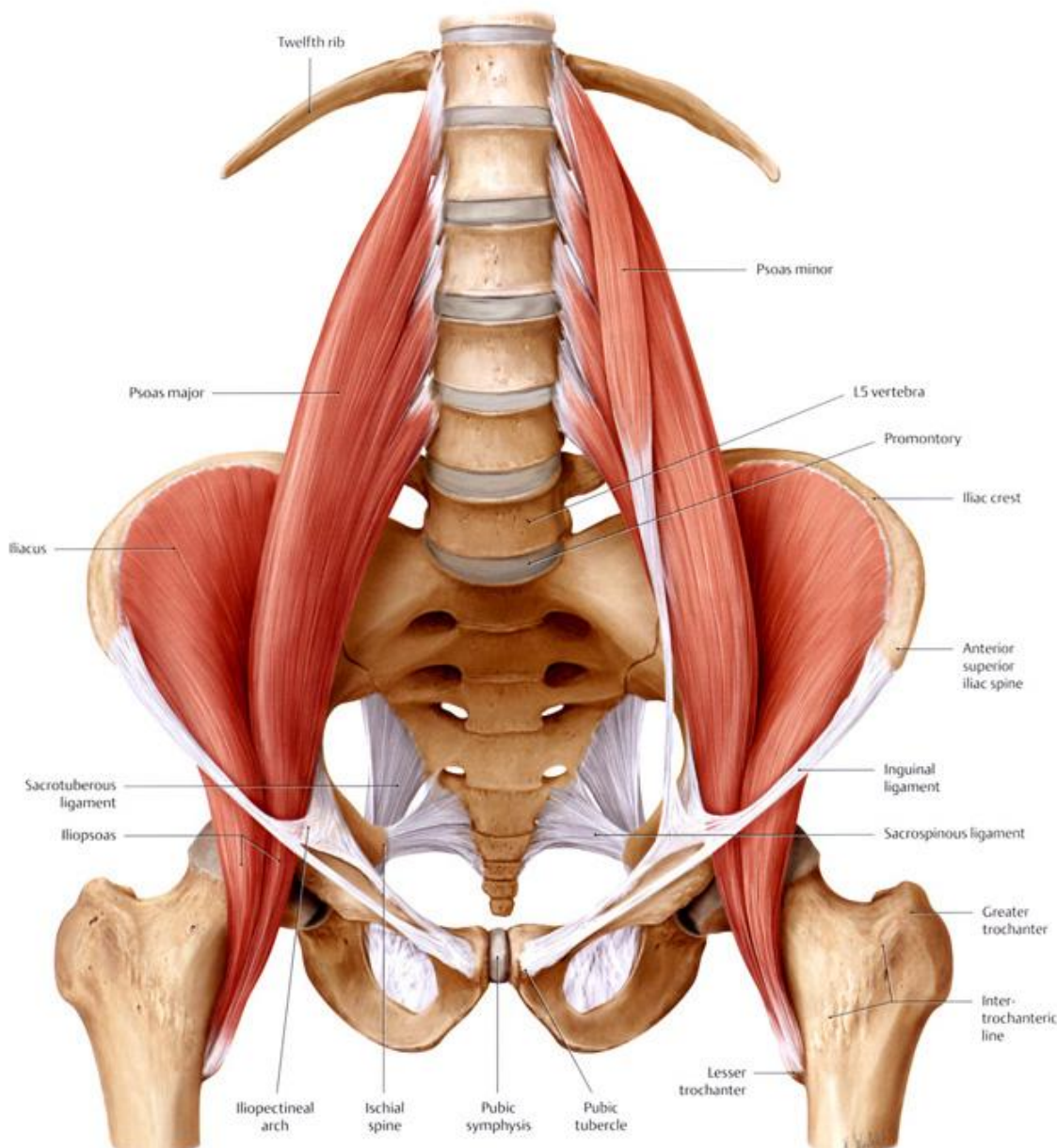
### **Management of Injury**

It is important to not further the misalignment of the spine as this will increase the risk of the vertebra shifting further forward. So along with Yoga Practice, continual awareness of alignment is essential. Changes to lifestyle and general movement is necessary until muscles in back and abdomen are strengthened there is a risk of putting spine under conditions of strain.

- Do not allow truck to move forward of pelvis

## Lumbar Spondylolisthesis

- Do not allow arch in lumbar to increase
- Avoid high heels, heavy lifting, sitting or standing for long periods.
- Avoid weightlifting, running & cycling
- Remain mindful in action using abdominals at all times,
- strengthen back muscles (please refer to diagram)
- Increase flexibility elsewhere to avoid excessive demands for motion in lumbar, for example – shoulder girdle arms, hamstrings and hips should all be increased in flexibility.
- Obesity. Avoid severe weight gain.
- Sleeping with support between knees, pillow or bolster.
- Sleeping on front body

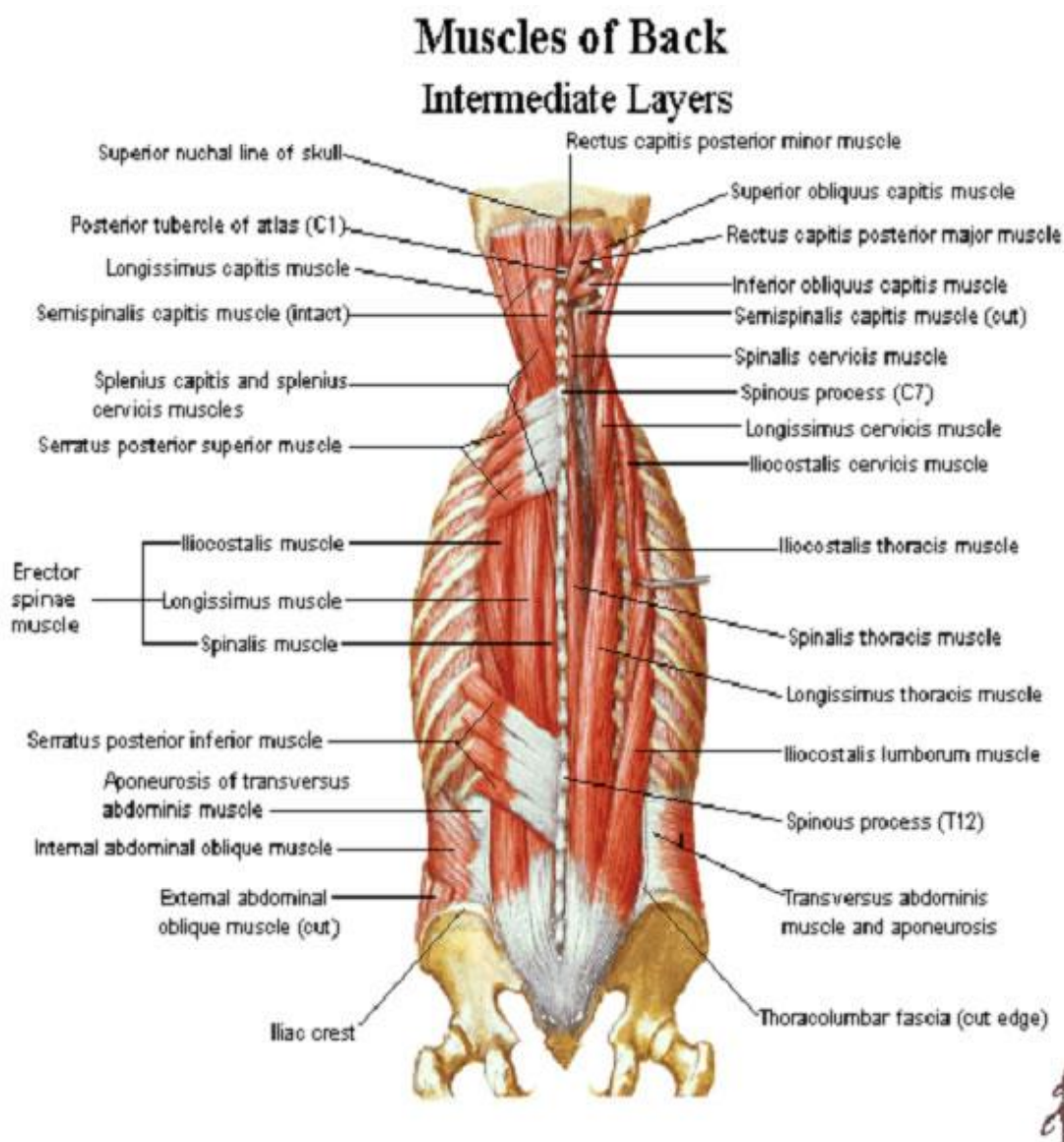


## Muscles of Lumbar Spine

In the above diagram we can see how the psoas muscle connects the spine to the

pelvis. This muscle is referred to as “the muscle of the soul”. It is an area of our body that stores much of our emotional history consequently becomes a tightened area for most people. Yoga practice enables us to open and release this muscle, freeing our bodies from stress we “carry” in this area. In strengthening the psoas we give great support to our spine and pelvic region, much more so than the abdominal muscles do. Remembering the pelvic region, if not used correctly becomes a ‘dead weight’ to the rest of the vertebrae and other muscle groups of the spine and so strengthening and using this area correctly is of great importance.

In the diagram below we can see the muscles we need to strengthen to support the lumbar region.



## **Pranayama**

Pranayama practice can be used as a daily practice to help with the coping mechanism of pain.

Pranayamas (breathing techniques) are procedures used to enhance the flow of "Prana" in the body, usually through regulation of the breathing pattern or rhythm. "Prana", or life force, is said to enter the body through food, sunlight and breath. It energizes and vitalizes the vital fluids in the body called "ojas", which include the blood, lymph, extracellular, sexual and cerebrospinal fluid.

## **Nadi Suddi**

Technique-. Sit in comfortable crossed leg position, spine uplifted. Begin Exhale all breath through the nose. Take thumb of right hand and close right nostril. First and middle finger are closed, ring and little finger control left nostril. Inhale through left nostril with right nostril closed, retain breath for as long as comfortable, exhale through right nostril, then repeat this time leading with right nostril.

Once the technique is comfortable managed can shorten inhale, increase retention of breath and double exhale to inhalation count. For example inhale 4 counts retention 16 counts exhalation 8 counts.

Benefits include mind calming and increased lung capacity.

Can be practiced daily.

## **Kalpabati**

Technique

Sit in comfortable crossed leg position, spine uplifted.

Begin by deeply inhaling through both nostrils and exhalation is short and sharp, with contraction of abdominal muscles, use the abdomen to push the air out. This method requires concentration on exhalation only, inhalation happens naturally. Continue for as long as comfortable.

Lumbar Spondylolisthesis

### Benefits

Strengthens core muscles and builds awareness in abdominal region. Good for depression and firing up internal systems.

### Caution

Avoid Kalpabati when experiencing back pain as, contraction of abdominal muscles may cause pressure of nerves against the slipped vertebrae.

### Bhandas

#### Moolabhanda

To be practiced throughout asana practice. This is basically described as mild contraction of pelvic floor.

It is important for patient to concentrate on holding in abdominals to support spine in all actions, on and off the mat.

## **Diet**

A vegan diet is ideal.

Meat is packed with saturated fat and cholesterol with no fibre, making it difficult for the body to digest. As a result the body has to produce a large amount of acid to digest the meat, thus producing an acidic environment inside our bodies. Most diseases thrive in acidic conditions and therefore it is paramount that we strive to keep our bodies alkaline as possible.

Meat consumption also increases phosphorus content in our body. While some phosphorus is good and a small amount necessary to utilize calcium in our body, excess phosphorus actually causes depletion of calcium. The sulphur present in meat also limits calcium absorption in the body.

The high concentration of saturated fat is not good for our bones either. Saturated fat combines with the calcium in our body and forms a soap like substance which is then discarded by our systems, in short calcium is just wasted due to our meat consumption and we are actually depriving the body of calcium content.

Though a plant based diet has in general about half the amount of calcium intake it is less susceptible to calcium deficiency than meat eaters.

Therefore the occurrence of bone deficiency and arthritis is much lower. This is important when the structure of the vertebra is misaligned as the bones require to be stronger.

## **Metaphysical**



I want to include metaphysical conditions in my presentation to you, as to me this is the most important aspect of any injury. Metaphysical means to go beyond the physical and having in mind that we are all here to experience beyond our physical body, I believe there is no more relevant element to discuss when talking about injuries in yoga.

So to go beyond the physical we start to acknowledge the subtle energies that are the driving forces of our existence. How the suppression of our emotions can lead to certain blockages, pain and even injury. How simple life would be if we could disregard our grief or trauma and have no consequences from it, unfortunately this is not the way in which human existence functions. It is apparent that our mental attitudes affect our physical body, long after we perhaps think we have dealt with the emotional issue. The silent negative thoughts we allow ourselves to attach to have repercussions throughout our physical bodies as well as manifesting in our daily lives. When suppression of such emotions takes place the body stores these emotions, traumas or stress in corresponding areas of the physical body. If we do not intentionally release these emotions then the body has an intelligence to release without your conscious contribution.

You may be thinking that an accident happens and injury occurs and that that! Now is not the time to get into the governing powers of the Universe, but let's think of this; if an area of your body is injured, it draws a large amount of attention to that area, we can acknowledge the pain, sometimes ignore it and other times we dwell in it – too keen to tell others about how much suffering we are experiencing. Either way our attention has been directed to that area and if we are of the level of consciousness to take a more in depth view and start to ask, why? We can discover that our body-mind has a stronger relationship than we realize.

This is when we may come to the idea that our bodies are super intelligent and it is our mind which prevents us from progression. With this acknowledgement we can then start to see the truth in, “what happens in life happens for a reason!” Perhaps the accident was to direct your attention to a part of your body that is storing trauma you may have forgotten about, which needs releasing. Maybe the area of our body in pain reflects an aspect of your personality, mental conditioning that is preventing you spiritual progress.

According to the field of Metaphysics this is exactly what is going on in your body. In researching this area, I found some very accurate correlations between my own body, injury and emotions.

The spine is perhaps the most crucial part of the skeletal structure, like the trunk of a tree is needed to hold the branches high to bloom and receive energy for its existence, and as yoga practitioners only too well the emphasis and importance that is placed as good spinal alignment.

Consequently when referring to metaphysical conditions of the spine the information available, is vast. Focusing on lumbar spondylolisthesis, we see the lumbar spine has 5 vertebrae before we reach the sacrum and coccyx, according to metaphysics each of these bones has a different cause and effect.

Looking at L5 vertebrae, for example, this represents insecurity, difficulty in communication, anger and inability to accept pleasure. Whereas L2 vertebrae represents, being stuck in childhood pain, unable to see a way out. Both very different emotions, but the vertebrae are not so far apart. As we continue to look at the vertebrae, each one has very different implications; however common a occurring factor is evident, fear.

The debilitating action of fear is so strong and commonly evident in todays society that it is not surprising that so many people suffer with back pain. Our spine is the strength and core of our existence, without its continual support we become disabled and unable to function in the simplest of tasks resulting in further depression, which ironically is the fundamental reason the problem first occurred. Body is communicating strongly with mind, to change its thought patterns. Our bodies are super intelligent, and if listened to carefully it is communicating its needs continuously

Metaphysics allows us to become the listener to an intelligent vessel of wisdom and strength and to have an awareness of what it is to experience life in this physical body with all its intricate non physical attributes. It is my belief that injury can be our biggest teacher and if we are able to listen carefully and absorb all that our bodies are communicating with us and in response take good care of inside and out, then I passionately believe we can be lead gently on the path to enlightenment.