



## The Interrelationship between Excessive Pronation of the foot and Chronic Spinal complaints

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When manual therapists such as chiropractors, osteopaths or physiotherapists are examining a patient with chronic spinal complaints it can be a mistake for anything below the hips to be not considered as playing a major role in the pathogenesis of such a problem. Conversely when a podiatrist examines a patient with excessive pronation he or she might rarely consider the assortment of chronic spinal complaints that may be associated with or are accentuating this condition. This article looks at the interrelationship between pronation and a number of the chronic spinal complaints and the mechanisms through which these conditions can affect, cause and propagate each other through their detrimental effects on the body's musculo-skeletal alignment, tone and posture.

As with many chronic musculo-skeletal complaints which have more than one component it can at times be difficult to know exactly what the first or initial component was that lead to the current pattern to arise. Many of these complaints can show a puzzling "chicken and egg" interrelationship where the two conditions now act to propagate each other and it thereby being difficult to know exactly which complaint originated first. This is very much the case when excessive pronation is present in the feet as it immediately through its effect on whole of the body's posture imposes the possibility and probability of other interrelated musculo-skeletal complaints that may have come about, due to

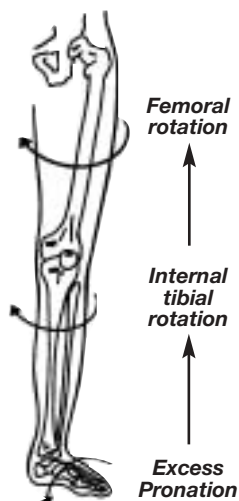


Diagram 1.

the excessive pronation or were already present themselves and actually acted to cause it.

Excessive pronation, as it is known, acts to internally rotate the legs and increase the knee's Q-angle (see *Diag. 1*). Internal rotation of the femur and hip joints results in the lower pelvis along with the acetabulum being pushed rearwards which in turn causes an anterior shift in weight bearing. This forces the pelvis to tilt forwards increasing the sacral base angle (see *Diag. 2*), often to greater than the 40 degrees recommended upper limit (normal range 24-40 degrees). This then results in the triad of;

i) mechanically disadvantaged abdominal muscles through their lengthened state weakening more and

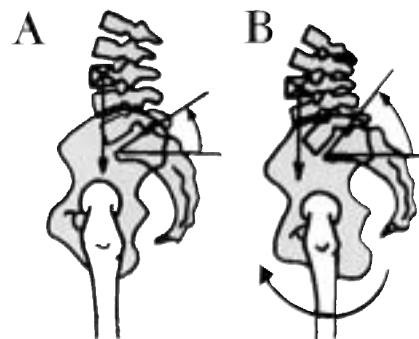


Diagram 2.

more over time, losing their tone and allowing increased lumbar lordosis and pelvic tilt.

ii) the shortening of the erector spinae and quadratus lumborum muscle groups and the shortening of the iliopsoas muscle. These shortened muscles then become hypertonic which again acts to accentuate the lumbar lordosis and pelvic tilt.

iii) increased lumbar lordosis which imbricates the lower lumbar facet joints and thereby places them under increased mechanical stress.

The lumbar hyperlordosis then forces the upper spine to compensate which sees the shoulders round, the neck poke with the upper cervical and mid-thoracic spines being exposed to an increase in postural stress.

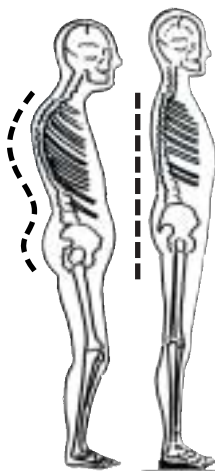
These postural changes once present place the spine and musculo-skeletal system at risk from a myriad of different complaints which can then become



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symptomatic at any time causing pain. The most commonly seen symptomatic conditions include low back pain (with or without leg pain) in the guise of a facet syndrome where the imbricating lower lumbar facet joints become dysfunctional and irritated due to locking and compensatory intrinsic muscle spasm. Noting that any leg pain experienced in this situation is not true sciatica but referred pain from the irritated facet joint(s), commonly felt in the posterior, lateral thigh or groin areas in a quite variable sclerotomal distribution pattern.

Sacroiliac joint locking and dysfunction is very common and can also refer pain into the lower leg and calf. True sciatica, though not as likely is still possible via the



*Diagram 3.*

increased sacral base angle placing the lower intervertebral discs under increased stress posteriorly which can further damage the posterior annulus fibres and increase any posterior disc lesion present thereby placing added pressure on the related nerve root or can also arise via the forward and downward rotation of the sacroiliac joint entrapping the sciatic nerve between the piriformis muscle and the sacrospinus ligament or conversely by a partial stenosis in the area of the sciatic notch causing pressure on the sciatic nerve in this area. Headaches, TMJ, neck and upper thoracic pain are also possible due to the compensatory rounding of the shoulders and poking of the neck which then (*see Diag. 3*) places the upper cervical spine and mid thoracic spine under considerable postural stress which then presents as a dysfunctional spinal complaint in these areas.

Some special consideration needs to be given to the situation where only one foot is noted to be excessively pronating, the most common cause of this unique situation is when the body is compensating for an anatomically or functionally long leg on that side of the body. In the case of the anatomically long leg a heel lift may be required under the heel of the short leg & prescribed orthotic to remove the postural compensation from the long leg or in the case of a functionally short leg then the pelvic torsion (or other functional cause) requires correction and orthotics prescribed to re-train the sub-talar joint to neutral.

Furthermore, the abdominal muscles deserve an important mention here because the correction of the pronation and spinal dysfunction in many cases merely gives the now low-tone abdominals the opportunity to be toned-up and as such an actual abdominal strengthening exercise program is necessary.

In all these situations to complete our "chicken or egg" approach to this problem it is possible for these types of spinal complaints to alter the bodies posture in such a way as to place increased stress upon the leg in such a way as to produce or increase the degree of pronation within the feet.

It is therefore necessary in any patient presenting with either excessive pronation or chronic spinal complaints for the practitioner to consider the possibility of an inter-related foot or spinal complaint and thereby- by addressing both complaints at once - gain an accelerated, more complete and longer lasting improvement in their patient's holistic health.#

