



The Foot Blog



October 8, 2006

Asymmetrical Pronation Patterns linked to Thoracic Curves

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October 8, 2006 at 8:55 am

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by *Professor Brian A Rothbart*



The **purpose** of this study was to determine if a correlation exists between abnormal foot motion (in this case abnormal foot pronation) and the development of scoliotic curves. In this study I only included those subjects that abnormally pronated, positive for the Adams test and only had a single C-shaped scoliotic curve. I ran a t-test on the clinical data to determine if a positive correlation existed between the prominence of the scapula wing, the direction of the thoracic curve and the abnormal pronation pattern. A positive correlation was identified in all three variables.

In a preliminary study of 25 Mexican Aztec Indians with asymmetrical abnormal pronation patterns and a positive Adams Test, a positive statistical correlation was found between the pronation pattern and: **(1)** the pelvic distortion pattern, **(2)** the pattern of frontal plane deviation within the thoracic spine. Here is a link to view the [raw data](#).

In the pronation pattern of **right > left**, the pelvis was rotated counterclockwise and tilted downwards towards the right side. The left shoulder was rotated forward and downward with a protruding right scapula wing. The thoracic curve was on the right side. To view an [animated model](#).

In the pronation pattern of **left > right**, the pelvis was rotated clockwise and tilted downwards towards the left side. The right shoulder was rotated forward and downward with a protruding left scapula wing. The thoracic curve was on the left side.

From clinical experience, we know that many abnormal pronators do not develop significant scoliotic curves (Cobb angle greater than 20 degrees). I believe the development of scoliotic curves is a multifactorial issue. There are other factors that still need to be identified if we wish to understand why only a few patients end up with significant scoliosis. But this study suggests that asymmetrical pronation patterns may be a critical factor in the development of scoliotic curves. Interesting enough, in the screening process, I found no patients with significant scoliotic curves that did not abnormally pronate.



All 25 patients in this study had a sundry of chronic musculoskeletal complaints. Many of these symptoms were contributed more to the abnormal pronation than directly to the scoliosis. In this preliminary study I made no attempt to separate the cases into functional or structural scoliosis. I believe that a rotated and unlevelled pelvis is one of the biomechanical determinants that make an individual **more prone to develop scoliosis**. In young children, possibly by stabilizing the foot lesion responsible for the asymmetrical abnormal pronation pattern, we can prevent the development of some of these spinal lesions. To view a [correction of a functional right thoracic curve using a proprioceptive insole](#).

Interesting enough, other researchers have also linked biomechanics to scoliosis (Giakas, 1996; Raso, 2003).