

## June 2024

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## Down the Sacrum Rabbit Hole

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The sacrum is a “bone of contention”. The contention perhaps arises from the fact that the basic Gonstead technique does not seem to deeply address the sacrum misalignments. In the “Chapters”, the sacral misalignments are limited to P-R, PI-R, P-L, PI-L and Base Posterior. They also highly restrict sacrum adjusting (see page 42 and 43 of “The Chapters”).

### Basic rules of Sacral Analysis (with respect to SI misalignment)

1. Always evaluate for MALFORMATION especially when detecting inferiority.
2. Measured difference on full spine x-ray should be 7mm or above with misaligned ilia and 4-6 mm without ilia misalignment.
3. The rotation of the sacrum should not be adjusted if it is on the side of the PIEX, PI or EX ilium.
4. Vertebral body rotation due to sacral rotation all the way up to and include C2.
5. No scoliosis is involved.

(Chiropractic Science & Art Roger Herbst, DC)

In this series of articles, I hope to clarify what we know and what we don’t know about the sacrum. Some of this will be a review, but much will likely be new and hopefully get us thinking in ways that lead us to even better results for our patients.

***It ain’t what you don’t know that gets you into trouble. It’s what you know for sure that just ain’t so. (anon)***

Dr. Gonstead was a genius at conceptualizing the biomechanics of the spine. Probably his first and most important contribution to the chiropractic profession along with his level disc concept was his conceptualization of the Pelvis, primarily his elucidation of ilium misalignments. He was the first to understand that the ilium can misalign not only along the X axis (PI or AS) but also the Y axis (IN or EX). Ted Markham, Lee Vogel and Albert Grove did some x-ray experiments to confirm Gonstead’s insight. Perhaps because of this great leap in understanding how the ilia subluxate, the sacral misalignments were subsequently downplayed or at least simplified. Perhaps the sacrum was

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avoided because of the high prevalence of malformation. Whatever the reason, later in Dr Gonstead's life, he did feel the need to expand sacrum adjusting and taught an addition to the basic sacral misalignments i.e. S-ASIN.

In the last several years, there have been additional proposals for Sacral misalignments by several very experienced clinicians. Dr. Tom Sherman and Dr. Richard Thornton (Founders of GCSS) found through their clinical practice that the sacral base can subluxate anteriorly. Dr Sherman proposed to name this “*Base Anterior*”. Dr Thornton proposed “*Apex Posterior*”.

I prefer the later term because “*Apex Posterior*” names the contact point for the corrective adjustment. The actual contact point is usually considered to be the S-4 tubercle. Line of drive: P to A and inferior to superior.

I have suggested some additional refinements:

S-3 Posterior-Left and S-3 Posterior-Right.

Base Posterior-Left and Base Posterior-Right. (contact at S-1 lateral to the tubercle)

Apex Posterior-Left and Apex Posterior-Right (contact at S-4 lateral to the tubercle)

These are *NOT* segmental listings. They are merely additional contact point listings for unusual sacral subluxations (torsion misalignments) which I will describe in a later installment of this series.

There have been further suggestions of adjusting individual sacral segments beyond the age when the sacrum is typically fused. In my opinion, unless there is an anomaly such as a lumbarization of the first sacral segment, S1 through S5 cannot be adjusted segmentally beyond the age of about 10-12 years old. And perhaps very rarely and very gently in an elderly osteoporotic demineralized spine. This may also be possible in quadrupeds which don't require a fused sacrum for upright ambulation.

To give context to these issues, let's start from “First Principles” and then work up from there!

### **Formation of the sacroiliac joints**

The sacrum is formed by five sacral vertebral segments which fuse at various ages depending on the individual. This usually begins at about the age of 7 and is complete depending on the individual between the ages of 10 and occasionally up to 30 years of age. (textbook of clinical chiropractic)

The first segment of the sacrum forms the wide lateral wings called the alae of the sacrum. The second and third segments fuse together with S1 and form the sacral side of the sacroiliac joints. S4 and S5 fuse to S3- usually forming a single bone by the age of 10.

In the human, with its unique upright posture and bipedal locomotion, the sacrum must become a very strong foundation to tolerate the tremendous forces which are transmitted by the individual's mass and various activities including running, lifting, and jumping. It seems likely that a more active and strenuous childhood will usually result in stronger and strongly fused sacrum bone. This solid foundation is less necessary in quadrupeds which may maintain some segmental motion in the sacrum during its entire life.

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### Sexual Dimorphism

The most notable physiological variant of the sacrum is represented by its sexual dimorphism.

In females the sacrum tends to be wider and shorter than their male counterparts. Females have a smaller sacral promontory allowing for easier childbirth. The sacroiliac joint in females **often has little or no contribution from S-3**. This likely makes the female pelvis more mobile and less stable which also allows for easier childbirth. This reduces stability however likely makes females more susceptible to pelvic subluxations compared to their male counterparts. This also eliminates the possible S3 P-R or S3 P-L listings for these individuals. It likely makes an Apex Posterior Sacrum more prevalent in women.

### Sacral morphologic variation is common

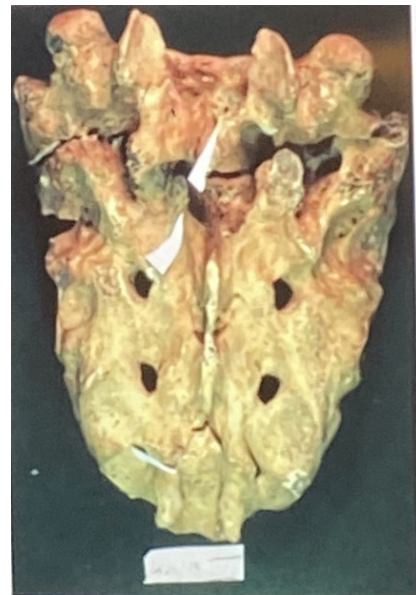
Lumbosacral transitional vertebrae (LSTV) are common. An LSTV may arise when either the L5 vertebrae undergoes sacralization and fuses with the sacrum (resulting in 6 sacral segments) or when the S1 sacral segment fails to fuse with the sacrum (lumbarization) and becomes a 6th lumbar segment. **This results in S2 becoming the sacral base**. In this case the sacrum proper is constituted of just 4 segments. In these cases, S1 often does retain articulations with the ilia via the alae.

A meta-analysis from 1987 to 2007 revealed that the prevalence of LSTV might be as high as 12.3%. Another source puts the estimate as high as 20%. **The implications of S2 becoming the SACRAL BASE is very significant in that this puts S2 in the role of a potential adjustable segment as in a Base Posterior.**

In the picture on right, the left ala has been retained but not the right ala.

In the radiograph below, both alae are present and appear to retain articulations with the ilia as well as perhaps with the S2 lateral mass.

### Lumbarization



Just because this anomaly is present does not mean there is a subluxation present!



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This sacralization of L5 interestingly results in an additional pair of sacral foramen.

There are many more sacral anatomical variations and malformations such as a variation of the number of sacral foramina, sacral agenesis, sacral spina bifida, asymmetry, Bertollotti's syndrome, and the presence of a "sacral rib".

The primary malformation that we are warned about in the Gonstead "Chapters" has to do with sacral base insufficiency. According to the "Chapters", we are advised to use the full spine radiographs AP view and compare homologous structures of the sacrum.

Barge proposed taking a "Ferguson's View" to determine the condition of the sacral base. This can be performed either from the anterior with a superior tube tilt or P to A with an inferior tube tilt.

First consult the lateral lumbar radiograph to determine the appropriate angle of tube-tilt.

### History of our conceptualization of the sacroiliac joints

Von Luschka (1864) described the sacroiliac joints as a real diarthrosis, that is a mobile joint with a joint cavity between two surfaces. Albee (1909) validated this assertion using a specific staining technique. This was strengthened by Sashin (1930) who after investigating 257 young adult specimens agreed.

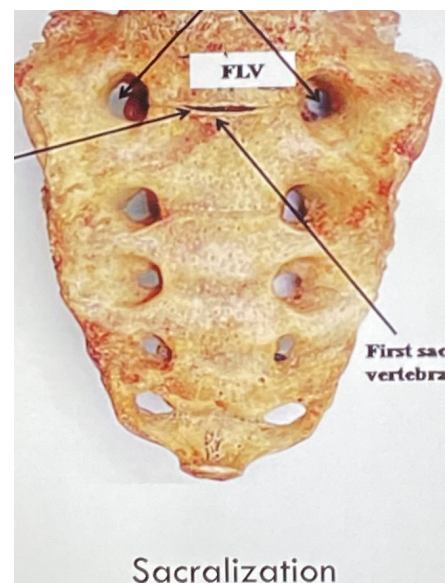
The medical view of the SI joints began to change in 1940 when Kopsch and Gray proposed the term "amphiarthrosis", implying that there is minimal movement in the sacroiliac joints.

From the mid-1930's, following the study of Mixer and Barr, until approximately the 1980's, aberrant SI joint movement fell out of favor as a medical explanation of lumbopelvic pain, the sacroiliac joints were mainly considered immobile joints." (Vleeming)

Most chiropractic doctors recognize the error of this medical conceptualization, however there are some that still conceptualize the SI joints as essentially immobile.

Fred Illi, DC in 1940, wrote the monograph entitled The Sacro-iliac Mechanism: The Keystone of Spinal balance. Illi came to his conclusion of the SI joint having significant movement on the X axis (anterior to and posterior ward)

Clarence Gonstead graduated from Palmer chiropractic college in 1923 and at that time the sacroiliac joints were still understood to be mobile and moveable. Over the course of his early career, he examined and studied patients using the Nervo-Scope heat readings, motion and static palpation, visualization, and finding pain and edema over the specific sites of the SIJs. He then correlated his observations with x-ray findings. By doing this, he discovered the second axis of rotation (Y axis) and from there developed his concept of pelvic listings with quantified numeric values. ("Gonstead—The Adjustor" Mathew Amman) He also developed the system of



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adjustments to correct them. “Gonstead was the first to describe pelvic listings and the adjustments for their correction.” (*Clinical Chiropractic-chapter 6 Peter J Walters*)

“Gonstead’s novel two axis sacroiliac subluxation model attracted a great deal of interest.” ... His x-ray measurement system of the pelvis applied numeric values to the amount of ilium or sacrum misalignment. (*Gonstead—The Adjustor*” Mathew Amman).

Ted Markham was the first to recognize that Dr. Gonstead’s system was superior and could be taught to other chiropractors via seminars.

“On a Sunday in April 1954, the Markhams organized seven people in a basement of Gonstead’s clinic for the first of many classes on the Gonstead method.” (Amman)

It has been said that the **main concept that initially** popularized the Gonstead Seminars was Gonstead’s breakthrough understanding and teaching of the Pelvis analysis and adjusting. This was a major missing piece of the chiropractic puzzle at that time.

In the next article, I will discuss the anatomy of the Sacroiliac joint and its unusual “Propeller-shaped” architecture. (Vleeming)

Based on that architecture, we can propose some additional possible misalignments to the more common ones that are explained in the Gonstead chapters. This is not to invalidate or take anything away from the listings which are taught in the “Chapters” but to suggest some additional, albeit uncommon misalignments and how to correct them. ✱