



X-ray evaluation: A Clinical Huddle.

Rick Elbert

Abstract: Practice Wisdom is applied to the clinical interpretation of full spine radiographs in the chiropractic clinical situation. A systematic approach is described noting key landmarks and measurements. Notation is made of the clinical findings to guide optimal care of the patient.

Indexing Terms: chiropractic; X-ray; radiograph; full-spine radiograph, radiographic interpretation.

Introduction

When doing an X-ray of the patient, Dr. Gonstead recommended taking a full spine Anterior to Posterior [A-P] x-ray and a full spine lateral view to better evaluate how the entire spine works as a unit.

Lateral scan

Clinically the human spine should have a smooth lordotic cervical curve, a smooth kyphotic thoracic curve and a smooth lordotic lumbar curve on the lateral full spine x-ray. The intervertebral discs should be parallel to slightly open at the anterior in the cervical and lumbar spine and parallel to slightly open at the posterior in the thoracic curve. The vertebral bodies should be rectangular in shape on the A-P and Lateral x-rays.

The lumbar vertebrae should be slightly larger than the thoracic vertebrae and the thoracic vertebrae should be slightly larger than the cervical vertebrae.

The AP views

The pelvis should appear symmetrical on the A-P x-ray. Most pelvic

... the beauty of over 40 years of practice is having the ability to call it like it is. Here is a new landmark for you, the COB, or 'Crack of Butt'. Its relevance is that your Nervoscope scan must always include the sacrum, to the COB.'



asymmetries are due to pelvic misalignment as shown in the *Gonstead Chiropractic Science and Art book*. Dr. Gonstead said that the human body can accommodate up to 6mm of leg length deficiency on the A-P x-ray. Similar the cervical, thoracic and lumbar vertebrae should have symmetrical facets on the A-P x-ray and no lateral disc wedging between the vertebrae on the A-P x-ray. When looking at the A-P cervical open mouth view, the lateral masses of C1 should be the same size with no lateral wedging between occiput, C1 and C2.

First, the Nervoscope and BBs

When I do my examination of a patient, I first run a Delta T or Nervoscope on the patient to see if there are any temperature differences from one side of the patient's spine to the other and if so, I mark them on the patient with a large BB.

[Ed note: 'BB' = ball bearing. Read more at *Elbert R. Some clinical pearls to enhance your X-ray practice: A Clinical Huddle. Asia-Pac Chiropr J. 2021;12.2. URL <https://www.apcj.net/papers-issue-2-2/> #ElbertHuddle*

Full spine evaluation

When evaluating the full spine x-rays, first check for any obvious pathology, malformed vertebra, vertebral body fractures, areas of radiolucency or radiopaquicity, rib fractures, osteoporosis, exostosis, etc. on the A-P and lateral x-rays. I have my lateral X-ray on the left on the view box and the A-P x-ray on the right because I read from left to right and I need to evaluate the lateral x-ray first to understand the patient's posture. I first look at the lateral lumbar spine first and measure the L5 disc angle, Ferguson's sacral base angle and Ferguson's gravitational weight line. These three areas show me how the lumbar spine and the sacrum are working together to form the patient's posture. Is the lumbar spine hyperlordotic, hypolordotic, or straight?

When evaluating the lateral lumbar spine, I first look for the BB denoting temperature differences location and where it is relative to the patient's spinous processes. Is it at a tubercle, L5 or which lumbar vertebra? A common mistake doctors make is to look at the lumbar spine and disregard the location of the BB and list and adjust the one that may look the worst. This is WRONG. Dr. Gonstead said and I echo him '*find the subluxation on the patient, ACCEPT it where you find it and adjust it [until the nerve pressure is gone {my addition}] and leave it alone.*'

How do the lumbar discs appear, especially the L5 disc? Is it parallel, open at the posterior, slightly open at the anterior, or significantly open at the anterior. Clinically, the L5 disc angle should be 3-5 Degrees. Ferguson's gravitational weight line should pass through the anterior $\frac{1}{3}$ of the sacrum for optimal weight bearing of the lumbar spine. Clinically the lumbosacral angle/ Ferguson's angle should be 35 to 40 or 45 degrees. If the lumbosacral angle is less than 35 degrees I note it as being hypolordotic. If the lumbosacral angle is greater than 40 to 45 degrees I note it as being hyperlordotic .

If I noted the lumbar spine as being hypolordotic I look for the cause to be a rotated L5 vertebra, a rotated sacrum, an ASIN ilium listing or an ilium with an AS or IN major for the ilium listing. With a hyperlordotic lumbar spine, I look for a sacral tubercle, base posterior sacrum, a PIEX ilium or a PI or EX major ilium listing as the cause. I base my notation of hypolordosis and hyperlordosis on the sacral angle, not necessarily on the presentation of the lumbar spine.

It is possible to have a hyperlordosis measurement and have the lumbar spine appear to be quite straight in an acute patient. Is there any malformation of the lumbar vertebrae indicating prior injuries. Is there any exostosis of the vertebral bodies? Is there noticeable posteriority of the vertebral bodies indicating possible misalignment? Are there any BB's visible on the lateral x-ray indicating potential subluxation location? If so which vertebrae are involved? I will list the vertebra above the disc that is at the level of the BB on the lateral x-ray on the A-P x-ray.

When I evaluate the thoracic spine I look for a smooth kyphotic lateral thoracic curve with good alignment of the posterior aspects of the thoracic vertebrae. Are the thoracic discs parallel, slightly open at the anterior, or slightly open at the posterior with similar disc heights? Is there any noticeable vertebral body malformation from prior trauma on either x-ray? Is there any exostosis of the vertebral bodies? Is there any visible posteriority of the vertebral bodies indicating potential misalignment? Are there any BBs noted on the lateral x-ray indicating potential subluxation. I will list any vertebra at the disc level of the BB seen on the lateral on the A-P x-ray.

When I evaluate the cervical spine, I look to see if lateral curve is hypolordotic, lordotic, straight, hyperlordotic, or kyphotic. Are the discs parallel to slightly open at the anterior and are the discs the same thickness? Are the cervical vertebrae in alignment along the posterior aspect of the vertebral bodies? Is there any evidence of vertebral body malformation seen on the A-P or lateral x-ray? Is there damage to the facet joints visible on the lateral x-ray indicating prior injury. Is there any noticeable inferiority of a vertebrae on a disc on the lateral x-ray?

Reflection of what is observed

When looking at the vertebral discs on the lateral x-ray, are the disc heights similar. Dr. Gonstead said that if you see a disc that appears thicker on the lateral x-ray, that disc has probably sustained an acute injury. Similarly, if you see several degenerated discs and a disc that appears to have normal height, the disc that appears to be normal may in fact be swollen from an acute subluxation.

When I evaluate the A-P x-ray I first look at the pelvis. I place dots on the top and bottom of the ilia, at the sacral dips, on the lateral aspects of the sacrum and on the center of the 2nd sacral tubercle, on the tops of the femurs and in the center of the pubic symphysis. I first draw a line connecting the femur head lines. Then I roll up from the femur head line and draw a line at the top of each ilium and turn the parallel over and roll down to the bottom of the ilium and draw corresponding lines at the bottom of each ilium. Then I draw the sacral line connecting the two dots in the sacral dips.

I then set the center of the parallel on the sacral line and roll sideways to the lateral aspect of the sacrum and draw lines two inches long from the sacral line to the inferior. Then I measure the height of each innominate in millimeters and put the numbers in the femur heads. Dr. Gonstead said the innominate height measurement is the most accurate of all measurements of the pelvis.

Then I put my parallel on the sacrum and measure the width of each side of the sacrum and put the numbers at the upper corners of the sacrum. I put the parallel perpendicular to the femur head line and roll over so the parallel lines up with the dot in the center of the 2nd sacral tubercle and strike a one inch line (2.54cm) at the pubic symphysis.

Conclusion

Lastly I put my parallel horizontally on the x-ray at the level of the lower femur head. I roll up to the level of the higher femur head and strike a two inch line over the lower femur head and note the measurement over the lower femur head as the measured leg length deficiency. When I have finished marking the pelvis, I step back and look at the pelvis and sacrum.

Do the ilia and sacrum look the way they should or do they appear different? If so why do they appear the way they do? By convention, I list the ilium on the side of the L5 vertebral body rotation. When I list the ilium I list it by the way it appears not necessarily how it measures. Anatomically the sacrum is the most malformed bone in the body.



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In July 24 2021, the Gonstead Clinical Studies Society and Gonstead Methodology presented Dr. Rick Elbert the C.S. Gonstead Lifetime Achievement award for his work promoting Chiropractic and the Gonstead method of Chiropractic adjusting. Dr. Elbert has been in Chiropractic practice for 43 years, the last 9 in Ogden.

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