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Introduction

Accurate assessment is essential for quality treatment of any condition including lordosis. As a teacher of massage therapists at both basic and advanced levels I find most massage therapists can benefit from more information about how to assess the spine. This article addresses common errors.

Here are essential ingredients to assessing the degree of lumbar curve, and principals which apply to assessing other features of body alignment. Future articles will address additional areas of the spine, spinal dynamics and treatment strategies.

The normal spine presents a double S curve, viewed from the back the normal neck is concave, the thorax convex, the lumbar again concave, and the sacrum and coccyx convex. An appropriate amount of curve gives the spine springiness. Either too much or too little curve results in poor shock absorption with each footfall.

The lumbar portion of the spine can have excessive curve, normal curve, insufficient curve, no curve or curve in the wrong direction. (see *Figure 1* below.)

Assessing Lordosis

The degree of lumbar curve is most accurately expressed by the relationship between the bodies of the vertebrae, and is most accurately visualized on X-ray. However it is rarely advisable to undergo radiation exposure for the sole purpose of assessing degree of lordosis. As massage therapists the spinous processes of the lumbar vertebrae are our best access for palpating the lumbar curve. However, the curve expressed by the tips of the spinous processes is not identical to that of the bodies of the vertebrae in one and often two ways. *Figure 2* demonstrates how the degree of curve expressed by the tips of the spinous processes is less than the curve expressed by the anterior surfaces of the lumbar vertebrae.

Within a given person's spine individual spinous processes also vary in length. *Figure 2* show variations in spinous process length which make the curve expressed by the tips of the spinous process differ between individuals from the curve expressed by the bodies of the vertebrae. While the tips of the spinous processes are our best palpatory indicator of lumbar curve, keep in mind that they usually express less than the actual curve, and the amount of difference from the actual curve varies from person to person depending on the relative lengths of each person's spinous processes.

This brings us to functional considerations. Assessing lordosis or any feature of alignment is at most half the story. The greater questions "are "how well does it move?", and "how comfortable is it?".

Returning to alignment, the next problem is the relationship of the lumbar curve to neighboring structures. Above the lumbar spine is the thorax and below the lumbar spine is the sacrum and pelvis. Let us begin with the pelvis.

Figure 1 – Lumbar curve can be excessive, normal, insufficient, or in the wrong direction.

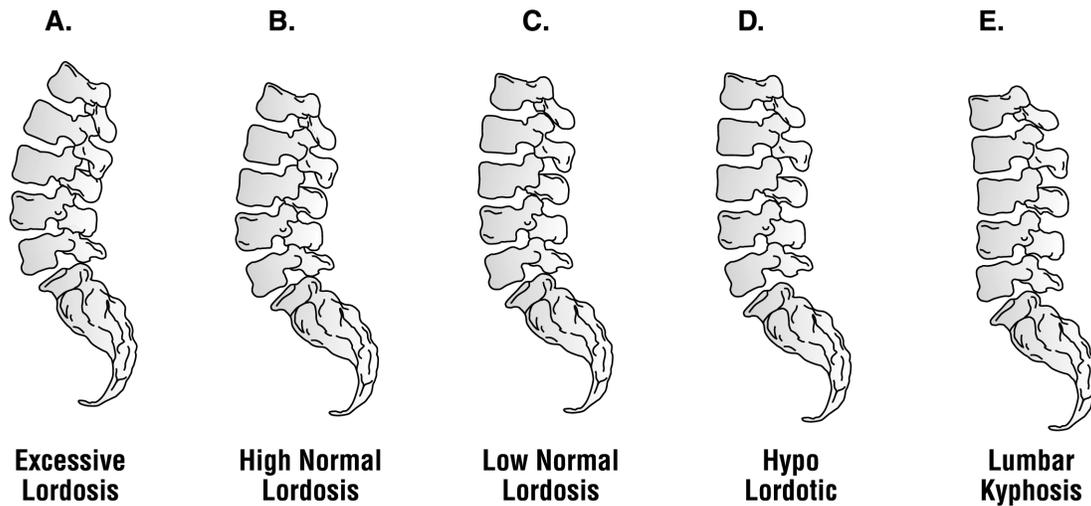
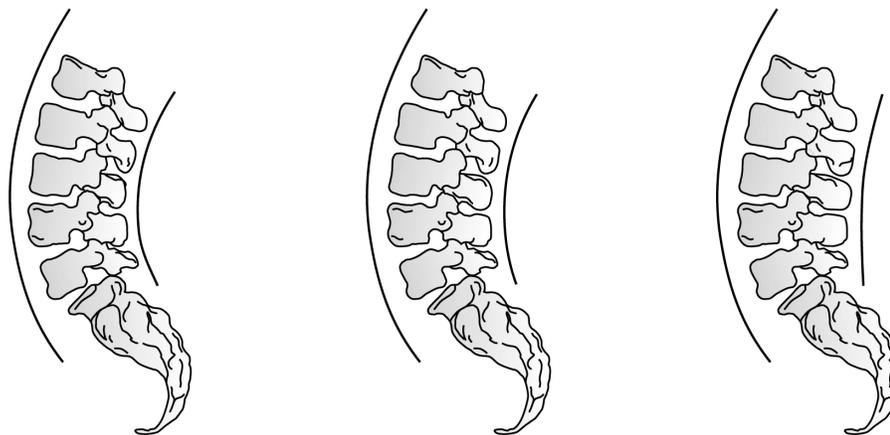


Figure 2 – Variations in the length of lumbar spinous processes can give false impressions of lordosis



Variable spinous process length can give false lumbar lordosis assessment. Curve expressed by the spinous processes will usually be less than the true curve.

Pelvic Tilt

The orientation of the pelvis can vary in any plane. Lordosis varies in the sagittal or anterior-posterior plane. We will also consider sagittal plane variation in pelvic

orientation. Rotation around the hip joints in the sagittal plane yields anterior and posterior tilt of the pelvis. We name the top of the pelvis sitting forward or anterior of the bottom of the pelvis as "anterior tilt". Similarly, the top of the pelvis sitting back of, or posterior to the bottom of the pelvis is "posterior tilt".

Occasionally a client will come in and say s/he has an anterior tilt, but mean that the bottom of the pelvis is forward of the top. It is essential to explore what each client means by their terminology.

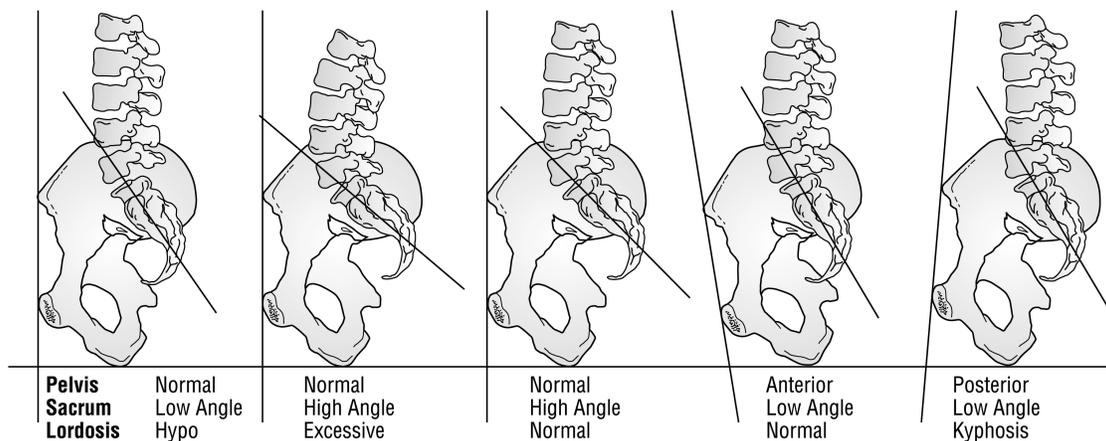
Sacral Angle

In the minds of therapists, anterior pelvic tilt is often associated with excessive lumbar lordosis. The logic of this is straightforward: if the pelvis is tilted forward the lumbar start out forward and must gradually curve back in order for the thorax to be above the pelvis instead of forward of the pelvis. Logical as this may seem, this correlation is not very strong. The reason is that there is also variability in the orientation of the sacrum between the iliac portions of the two halves of the pelvis.

Figure three shows five of the many possible relationships between the sacrum and the pelvis. Four of the five lumbar curves shown are inconsistent with the pelvic tilt from a purely pelvic tilt = lumbar curve model.

As an exercise assemble six or more colleagues. Assess pelvic tilt by a method described below and assign each person a sequential number with #1 having the most anteriorly tilted pelvis and the highest number the most posteriorly tilted pelvis. Then reassess this same group for degree of lumbar curve, by the method described below, assigning #1 to the greatest lumbar curve and the highest number to the least lumbar curve, or hopefully not the greatest lumbar kyphosis in the group. In most groups there will be poor correlation between the two sets of numbers. The two features, lumbar curve, and pelvic tilt, must be assessed and recorded separately.

Figure 3



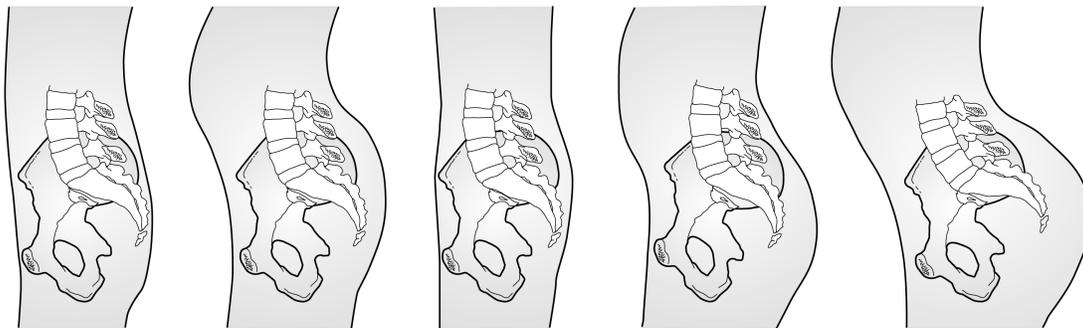
Assessing Pelvic Tilt

A number of methods are used to assess pelvic tilt. The first distinction to make is that we wish to assess the degree of tilt of the bony pelvis. As you will see soft tissue adds complexity to this assessment. Soft tissue is important to assess, but for pelvis orientation it is imperative to assess the bony structure.

Surrounding the pelvis are two primary types of soft tissue; muscle and adipose. The amount and distribution of each type of tissue varies widely from person to person. Figure four shows how soft tissue structures affected by genetics, exercise and diet usually give inaccurate perceptions of bony pelvis orientation.

Bony pelvis orientation cannot be reliably assessed from observation of skin contour even in the thinnest persons. Bony palpation is essential. The pelvis has several bony landmarks which have potential value for assessing orientation.

Figure 4



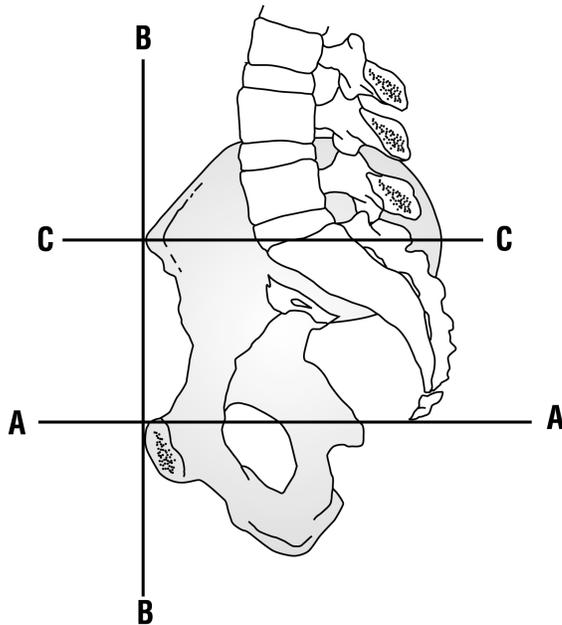
Soft tissue often disguises bony position

In figure 5 line A-A between the superior surface of the pubic symphysis and the tip of the coccyx is not useful for assessment since the coccyx is variable in both length and orientation. Line C-C between the Anterior Superior Iliac Spine ASIS and the Posterior Superior Iliac Spine (PSIS) is frequently used for assessing pelvic orientation. There are two problems with this line. First, because the PSIS is a broad prominence, judging its highest point is subjective. Second, the PSIS is often under considerable soft tissue making finding its exact apex even more challenging.

Line B-B between the ASIS and the anterior superior margin of the pubic symphysis is easier to locate. Both of these landmarks are sharper points than the PSIS. Even in fairly obese persons both these landmarks can be reliably palpated. All three points, the two PSIS and the anterior superior margin of the pubic symphysis should lie in a coronal or frontal plane. Assuming the person is standing, this plane should

be perpendicular to the floor. Angular deviation from a vertical plane represents forward or backward tilt. This is the classic description of appropriate pelvic orientation. Newer thought suggests that 5 ÷ 10 degrees of anterior tilt may be a better functional orientation particularly in women.

Figure 5 – Landmarks for assessing pelvic tilt are shown.

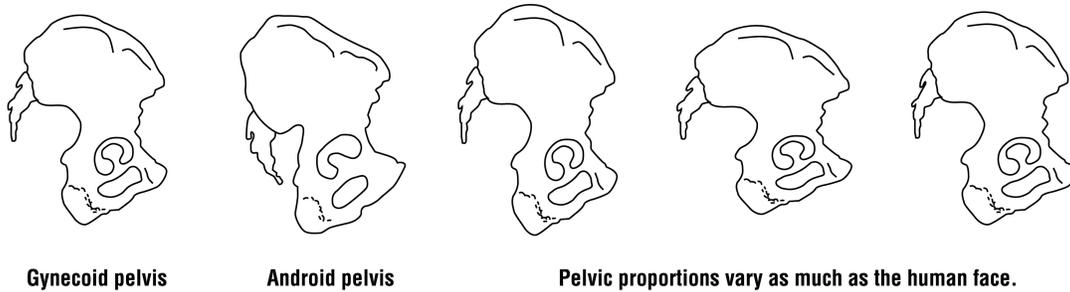


ASIS and anterior superior margin of the pubic symphysis are the best landmarks for assessing pelvic tilt.

When the pelvis is straight up much of the weight of the pelvic and abdominal organs rests on the pelvic floor. If the pelvis is tilted slightly anterior more of this weight is borne on the pubic bone relieving pressure on the pelvic floor. Advantages of this slight forward tilt include better bladder function.

The next assessment problem is variability in pelvic proportions which vary as much as facial proportions. The three lines AA, BB, CC in Figure 5 are rarely all perpendicular to each other as they are in this idealized diagram. One of several features is gender variation. In females the ASIS tend to be farther forward than in males. However within each gender there is considerable variability. Some women have pelvises whose features are more "male like" than most males, and visa versa (see *Figure 6*). The best plan is to assess both lines AA & BB, and also consider functionality - does the pelvis move in its several joints and how comfortable is the person. If it does not move well and /or is not comfortable, does the apparent tilt of the pelvis make sense in terms of the symptoms?

Figure 6 – Pelvic proportions vary as much as fascial proportions



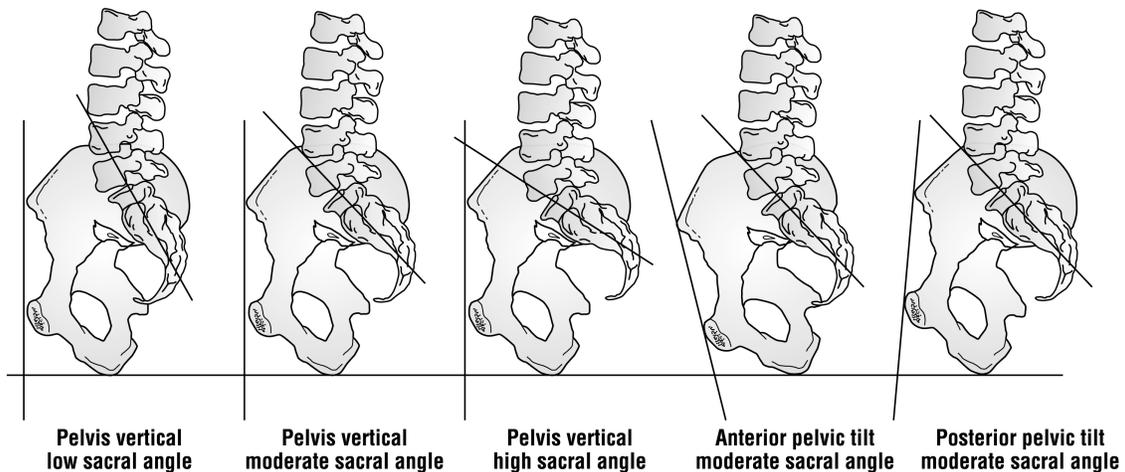
To assess Line B-B first describe to the client what you are doing and why. Sit on a stool in front of the standing client. Palpate both anterior superior iliac spines. Then press into the soft tissue about 3 inches below the navel. Shift a finger width lower and press again. continue inferior a finger width at a time until the superior border of the pubic symphysis is contacted. Place both thumbs on the anterior superior corner of the pubic symphysis, and the tips of the fifth digits on the ASISs. Compare the plane defined by these three points with a plane vertical to the floor. Ignore for this portion of the analysis any apparent displacements of the pelvis other than a-p tilt. Additional information is needed to assess torsions, shears etc.

If you are not comfortable palpating the pubic symphysis with a particular client, have that client palpate his or her own pubic symphysis by the same process of exploring inferior from the navel.

Sacral Angle

Figure 7 – Pelvis and sacrum can relate in many different orientations

All lumbar curves are the same and normal

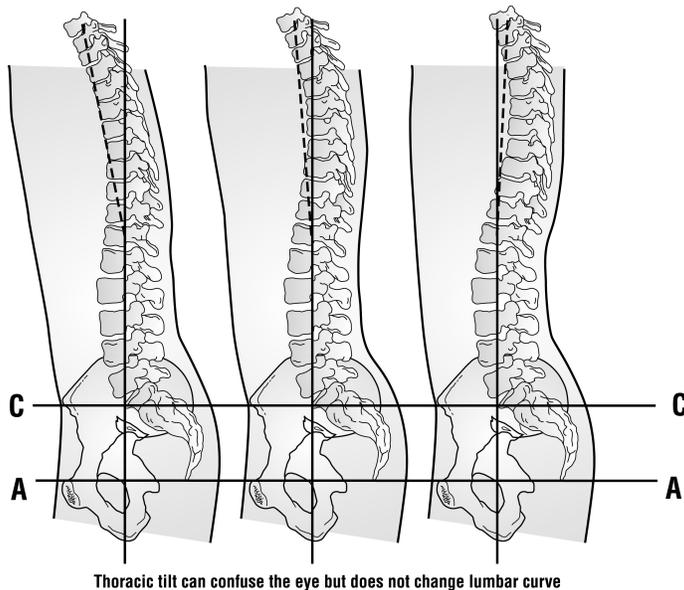


The next problem has to do with sacral angle. The sacroiliac joints have several directions of mobility. In addition to normal physiologic motion in walking, breathing and craniosacral rhythm, various placements and displacements of the sacroiliac joints give a wide range of sacroiliac relationships. One dimension of sacroiliac positional variability is anterior - posterior tilt with respect to the ilia (see *Figure 7* above).

Assessing sacral angle by palpation is challenging since at least the base of the Sacrum may be under two or more inches of soft tissue. Unlike the lumbar vertebrae the sacrum lacks prominent spinous processes to help us assess orientation. The point for our present considerations is that the sacrum is not part of the lumbar curve and may vary in any direction from the orientation of the lumbar curve. When assessing lumbar curve assess only the lumbar curve not the sacrum.

Thorax

Figure 8 – The thorax can sit in many possible ways over the same lumbar curve



Having considered the area below the lumbar curve we will now consider the area above the lumbar curve: the thorax. The pelvis has a left and a right innominate bone, a sacrum and a coccyx. Externally these few bones articulate with three other bones, the femurs and the fifth lumbar. The Thorax is more complicated both internally and externally, containing 12 vertebrae, 24 ribs, a sternum and a manubrium. It articulates with the 1st lumbar vertebra, 7th cervical vertebra, 2 clavicles and 2 scapulae. The shoulder girdle is mobile over the rib cage and can give false visual

impressions of the orientation of the thorax. In all the Thorax has about 150 articulations.

Within this complexity, one feature of the thorax is that as a whole it can lean forward or backward in a sagittal plane.

In all three of the drawings in figure 8, above, the Pelvis has near normal orientation and the lumbar curve does not vary. Notice that in the figure on the right skin contour gives an impression of greater lordosis. In assessing lumbar curve the orientation of the thorax is not to be considered. The orientation of the sacrum and the orientation of the thorax are of considerable interest, but neither of these orientations are to be considered in assessing degree of lumbar lordosis. Just as lumbar curve, sacral angle, and pelvic tilt must all be assessed separately, lumbar curve and thoracic tilt must also be assessed separately. Any combination of these four factors can occur together.

Assess with the client standing

A final consideration in assessing lordosis is client position. Lumbar curve and any other feature of posture will usually be different when a person is standing compared to when that same person is supine. In these two positions the large force of gravity is acting on the body in two different directions at 90 degrees to each other. The interaction of gravity with the internal tensions in the body will produce different, and sometimes radically different posture in these two situations. To demonstrate this difference assess both pelvic tilt and lumbar curve in each of your clients this week. Assess both features standing, and then make the same assessments supine. You will find that with most clients there are significant differences between the two assessments. The direction and amount of difference between these two assessments will be different for each person, depending on the extent and nature of internal tensions in the body.

Lumbar lordosis like all other features of alignment must be assessed with the client standing, on a level surface, in bare feet. Additional information may be gained by examining posture supine, but supine assessment may never be substituted for standing assessment.

Summary:

Here are the essentials of lumbar curve assessment distilled down to a few words.

Assessment

Postural assessment must be done with the client standing, in bare feet, on a level surface. To assess lumbar curve, or any other feature of alignment, bony palpation is necessary. Both soft tissue contour and visual assessment are highly misleading. Bony landmarks to locate the lumbar vertebrae are, the spinous process of L5 sits at

or below the level of the iliac crests, and the 12th ribs connect to the 12th Thoracic vertebra.

For massage therapists lumbar curve is best assessed by palpation of the spinous processes of the lumbar vertebrae. Palpate these bony points, and connect the dots to see the curve.

Perspective

Remember, the spinous processes of the lumbar vertebrae will usually express less than the actual lumbar curve. The amount of apparent difference between these two curves will vary from person to person.

To assess the lumbar, assess only the lumbar. Sacral angle, thoracic tilt, and pelvic tilt are not features of the lumbar. Assess and note these other features separately. Assess functional aspects along with static alignment. Functional considerations take precedence over static alignment. Proportions vary from person to person, there is no 'one size fits all' perfect alignment.

Future articles will address additional areas of the spine, movement analysis and treatment strategies, or this information can be found in the references below.

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