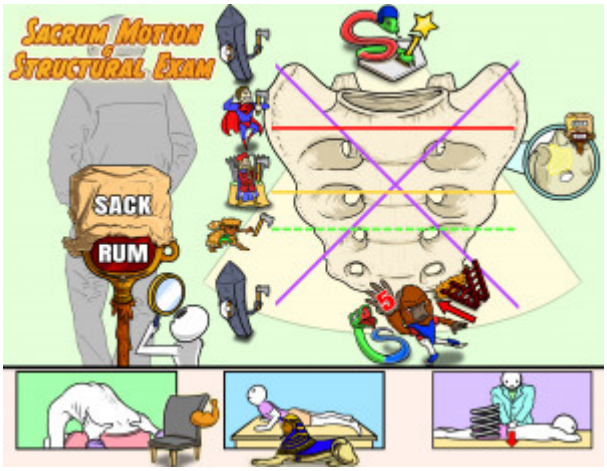
Sacrum: Motion and Structural Exam

The sacrum is made up of 5 fused vertebrae and is inferior to the lumbar spine. Its superior articulation is with the lumbar spine and its inferior articulation is with the coccyx. The sacrum articulates laterally with the innominates at the SI joints. This joint looks similar to an inverted L when viewed from the side (in the sagittal plane). The top, S1, is called the base and the bottom, S2, is called the apex with the top being wider than the bottom. It is shaped similar to an inverted pyramid. The sacrum has sulci superolaterally and ILAs inferior and laterally; these are landmarks that aid in diagnosis of sacral somatic dysfunctions. The sacrum has 5 axes for motion: superior, middle, and inferior transverse axes and two oblique axes. The superior transverse axis is associated with the primary respiratory mechanism and lung respiration. The middle transverse axis is associated with postural motion. The inferior transverse axis is associated with innominate motion and somatic dysfunction. The two oblique axes are associated with the movement of the sacrum during the walking cycle. When identifying a sacral somatic dysfunction, a practitioner should first perform a seated flexion test to determine if one exists and its laterality. Then, the practitioner will palpate the landmarks in relation to each other. Lastly, the examiner performs a spring and/or sphinx test to determine if any part of the sacrum is stuck posterior. With these findings, she may diagnose the sacral somatic dysfunction.



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Anatomy

5 Fused Vertebrae

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S1 Base

(S) Snake (1) Wand Base

The sacral base is the top (superior-most) part of the sacrum and is part of S1. The anterior part of this same vertebrae is called the sacral promontory. In somatic dysfunctions the sacral base may be recorded as anterior or posterior.

S5 Apex

(S) Snake (5) Hand Ape

The sacral apex is the bottom (inferior-most) part of the sacrum and articulates with the coccyx.

Sacral Sulci

Sack-rum Groove

The sacral sulci are located on the lateral aspect of the sacrum at the level of S1 and S2. The sacral sulci are palpated on the low back, just medial to the PSIS. They are recorded as posterior (shallow) or anterior (deep) in somatic dysfunctions and aid in the diagnosis of sacral somatic dysfunctions.

Inferior Lateral Angles (ILAs)

In-fur Ladder Angles

The inferior lateral angles (ILA) of the sacrum are located at the inferior, lateral part of the sacrum at the level of S5. They are recorded as posterior/inferior or anterior/superior and aid in the diagnosis of sacral somatic dysfunctions.

Motion

Superior Transverse Axis

Super Transverse Axe

The superior transverse axis is a theoretical axis in the coronal plane (left to right) located at the level of S2 and slightly posterior to the SI joint. Lung respiration causes movement around the superior transverse axis. During inhalation, the sacral base moves posteriorly, whereas during exhalation the sacral base moves anteriorly. The superior transverse axis is also the axis around which inherent (craniosacral) motion occurs. During craniosacral flexion (inhalation) the sacral base rotates posteriorly or counternutates, and during craniosacral extension (exhalation) the sacral base moves anteriorly or nutates.

Middle Transverse Axis

Middle-ages Transverse Axe

The middle transverse axis is located at the anterior convexity of the two limbs of the SI joint. The middle transverse axis is for postural motion. Postural motion is also called anatomic motion and occurs when a person bends forward or backward.

Inferior Transverse Axis

In-fur Transverse Axe

The inferior transverse axis is at the posterior, inferior aspect of the inferior limb of the SI joint. This is the axis around which innominate motion occurs. Innominate motion includes anterior and posterior rotation. Abnormal innominate motion around this axis may also become a somatic dysfunction.

Oblique Axes

Obelisk Axes

The oblique axes are two physiologic axes that run from one side of the sacral base to the opposite inferior sacrum, near the ILA. The oblique axes are named for the side of the superior aspect of the axis (e.g. the left oblique axis runs from left sacral base to right, inferior sacrum). Oblique axes are associated with dynamic motion. During the walking cycle, sacral motion alternates around left and right oblique axes. Somatic dysfunctions associated with the oblique axes are called sacral torsions.

Exam

Seated Flexion Test

Seated and Flexing

The seated flexion test is used to detect the presence and side of sacroiliac dysfunction. The patient sits while the examiner places their thumbs under the patient's PSISs. The patient bends forward slowly. The side that moves most superiorly is the side of dysfunction. A negative test may indicate that there is no SI dysfunction or that the dysfunction is bilateral and symmetric.

Sphinx Test

Sphinx

This test involves the patient lying prone with the examiner's thumbs palpating the patient's salcal sulci and/or ILAs. The patient then props themselves up on their elbows without moving their legs. Colloquially this is called the "tv watching position" because it resembles a child watching tv on the floor. This test is positive if asymmetry or sacral findings increase (for example, a sacral sulcus becomes more posterior or an ILA becomes more inferior). A positive sphinx test indicates that the dysfunction is posterior or extended (for example, backward sacral torsion or sacral extension). A negative test, when the findings become symmetric, indicates a flexion or forward torsion.

Spring Test

Spring

The spring test has the same function as the sphinx test, to determine anterior/flexed from posterior/extended dysfunctions. With the patient prone, the examiner pushes down (anteriorly) on the patient's lumbosacral junction with the heel of their hand. If there is little to no movement this is considered a positive test (lack of "spring") indicating that the side of dysfunction is stuck posterior. A negative test occurs when the sacral base moves anteriorly freely or "springs".