MOTION PALPATION GUIDE

C1

**Flexion:**
- What’s happening – C1 is moving anterior and superior on the occipital condyles causing a **Superior atlas.**
- What you feel - The t.p.’s will move, bilaterally in the anterior direction, away from the mastoids.

**Extension:**
- What’s happening – C1 is moving posterior and inferior on the occipital condyles, creating an **Inferior atlas.**
- What you feel - The t.p.’s will move in the posterior direction toward the mastoids.

It is normal to find some restriction in flexion due to the fact that
1. Most listings are **Superior.**
2. The normal position of the atlas is **Superior.**

**Lateral Flexion:**
- What’s happening – The atlas moves laterally on the occipital condyles toward the side of lateral flexion. Due to the slope of the occipital condyles, this lateral motion is coupled with a rocking up of the t.p. on the side of lateral flexion and a dropping down of the t.p. opposite the side of lateral flexion. Note: Right lateral flexion simulates a **Right laterality, atlas subluxation.**
- What you feel – On the side of lateral flexion you will feel the t.p. tuck up towards the mastoid, at the same time, on the side opposite lateral flexion you will feel the t.p. drop inferiorly, away from the mastoid.
If the atlas is restricted from moving in a certain direction it probably has already moved that way. An atlas that is not tucking up well (restricted), on the left, at the same time will not be dropping down well on the right. This finding would indicate a **Left atlas**.

**Rotation:**
- **What’s happening** – At the end of *head* rotation the occiput continues to move while the atlas does not, creating a relative motion between C1 and occiput. On the side of head rotation the atlas will move **Anteriorly** on the occipital condyle, at the same time, opposite the side of head rotation the atlas will be moving **Posteriorly** on the occipital condyle. Note: an atlas that is rotated **Anterior** on one side is rotated **Posterior** on the other.
- **What you feel** – The t.p. on the side of head rotation will move in the anterior direction, away from the mastoid, at the same time the t.p. opposite the side of head rotation will move in the posterior direction, toward the mastoid.

If the atlas is restricted from moving in a certain direction it probably has already moved that way.

**Example** – Right posterior restriction of C1 can be observed during left head rotation. This would indicate an atlas that is misaligned posterior on the right and anterior on the left.

![Image of atlas in rotation](image)

**C2-C7**

**Flexion:**
- **What’s happening** – Zygapophyseal joints close down superiorly & discs wedge closed anteriorly.
- **What you feel** – Spinious processes flare apart.

**Extension:**
- **What’s happening** – Zygapophyseal joints close down inferiorly & discs wedge closed posteriorly.
- **What you feel** – Spinious processes close down on each other.

![Image of atlas in flexion and extension](image)
Restriction in either of these motions should be a cause for further investigation of a segment.

**Lateral Flexion:**
- What’s happening – The inferior articulating surface of the segment above, rides down on the superior articulating surface of the segment below on the side of lateral flexion. At the same time, opposite the side of lateral flexion, the inferior articulating surface of the segment above rides up the superior articulating surface of the segment below. The vertebral bodies rotate toward and drop slightly inferior on the side of lateral flexion. At the same time the spinous processes will rotate away from the side of lateral flexion.
- What you feel - On a segmental basis – The inferior articulating surface of the segment above, rides down on the superior articulating surface of the segment below on the side of lateral flexion, at the same time, opposite the side of lateral flexion, the inferior articulating surface of the segment above rides up the superior articulating surface of the segment below.

Most often restriction will be noted on the side of lateral flexion and rarely on the side opposite lateral flexion. Restriction on the side of lateral flexion will indicate the side, which the vertebral body has moved toward.

Example – Left lateral flexion restriction of C4 on C5 would indicate that the C4 is body left and the spinous is right, or more formally a PR listing.

**Rotation:**
- What’s happening – Each cervical segment’s body rotates toward the side of rotation, with the greatest degree of rotation taking place at C2 and diminishing as you move down to C7 with the least. This motion will cause the spinous processes to rotate opposite the side of head rotation.
- What you feel – The s.p. will rotate opposite the side of head rotation.
The side, which the spinous shows restriction towards, is the side it will be listed towards. Example – Spinous restricted to the left during right head rotation would indicate a PL listing.

**T1-T12**

All motion analysis is performed preferably from the side of the patient with the patient in the seated position. Patient’s arms are crossed over their chest and patient’s head rests on their forearms. The elbows and shoulders can be used as a lever arm to create motion throughout the thoracic spine.

**Flexion:**
- What’s happening – Thoracic IVD’s close down to anterior and posterior articulations close down superiorly.
- What you feel – Spinous processes will flare apart.

**Extension:**
- What’s happening – Thoracic IVD’s close down to posterior and posterior articulations close down inferiorly.
- What you feel – Spinous processes will close down on each other. They may veer off to left or right when sliding inferiorly on spinous process below.

Any segmental restriction in flexion or extension is cause to further investigate the restricted segment.

**Lateral Flexion:**
- What’s happening – Thoracic IVD’s close down laterally and vertebral bodies rotate toward the side of lateral flexion (into the cave), at the same time the spinous process will rotate away from the side of lateral flexion (out of the cave).
- What you feel – Spinous processes will rotate and flare away from each other, opposite the side of lateral flexion.

**Rotation:**
- What’s happening – The vertebral bodies rotate toward the side of rotation at the same time, the spinous processes rotate away from the side of rotation.
- What you feel – Spinous processes will rotate away from the side of rotation.

It is difficult to gather accurate information from this motion exam due to the fact that thoracic rotation is primarily restricted buy the ribs articulating with the sternum.

**L1-L5**

**Flexion:**
• What’s happening – Lumbar IVD’s close down anteriorly and the posterior joints open up inferiorly, allowing the spinouses to flare apart.
• What you feel – Spinous processes will flare away from each other.

Extension:
• What’s happening – Lumbar IVD’s close down posteriorly and the posterior joints open up superiorly, causing the spinouses to close down on each other.
• What you feel – Spinous processes will close down each other.

Lateral Flexion:
• What’s happening – Lumbar IVD’s close down on the side of lateral flexion and the shape of the posterior articulations cause the spinouses to rotate slightly toward the side of lateral flexion (into the cave). At the same time the lumbar vertebral bodies will rotate away from the side of lateral flexion.
• What you feel – You should be capable of palpating the rotational motion of the spinous processes in this region during lateral flexion. Also, you can palpate the mammillary process, which will rotate toward the side of lateral flexion at the same time they will close down on each other. Both of these motions can be assessed.

Rotation:
• What’s happening – The vertebral bodies rotate toward the side of rotation, at the same time the spinous processes rotate away from the side of rotation.
• What you feel – The spinous processes will move away from the side of rotation

NOTE: Rotation is least accurate of these motions.

L5/S1

Lateral Flexion:
• What’s happening – Lumbar IVD’s close down on the side of lateral flexion and the shape of the posterior articulations cause the spinouses to rotate slightly toward the side of lateral flexion (into the cave). At the same time the lumbar vertebral bodies will rotate away from the side of lateral flexion.
• What you feel – You should be capable of palpating the rotational motion of the spinous processes in this region during lateral flexion. Also, you can palpate the mammillary process, which will rotate toward the side of lateral flexion at the same time they will close down on each other. Both of these motions can be assessed.
Sacrum

Lateral Flexion:
• What’s happening – The base of the sacrum will tilt inferior on the side of lateral flexion
• What you feel – With all six palpation fingers laid across the base of sacrum you will feel a slight anterior/inferior motion take place on the side of lateral flexion.

SI joints/Ilium

IN/EX Rotation:
• What’s happening – When the ilium rotates in the INternal direction, this causes the SI joint to close down as the medial edge of the ilium and the PSS move INternally.
  - When the ilium moves in the EXternal direction the SI joint opens up as the medial edge of the ilium and the PSS move EXternally.
• What you feel – When the ilium rotates in the INternal direction, this causes the SI joint to close down as the medial edge of the ilium and the PSS move INternally.
  - When the ilium moves in the EXternal direction the SI joint opens up as the medial edge of the ilium and the PSS move EXternally.

PI Motion:
• What’s happening – In the standing position, the patient is instructed to raise one knee at a time as high as they can. When the knee is raised to 90 degrees and beyond, this causes the ipsilateral ilium to rotate on the surface of the sacral articular surface in the counter-clockwise direction. This counterclockwise motion causes the PSS to move in a Posterior and Inferior direction relative to the sacrum.
• What you feel – The PSS and the sacro-iliac joint on the ipsilateral side is palpated and the amount of Posterior/Inferior motion is noted. This is compared to the range of motion on the opposite side.