Thoracic spine diagnosis - T1 – T12 vertebrae

**Possible diagnoses**

<table>
<thead>
<tr>
<th>Type I dysfunction (3 or more vertebrae, group curve)</th>
<th>Rotation findings</th>
<th>Sidebending findings</th>
<th>Findings with flexion and extension</th>
</tr>
</thead>
<tbody>
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<td>NR₆S₃</td>
<td>Right TPs are more posterior</td>
<td>Sidebent left</td>
<td>Rotation and sidebending findings are unchanged with flexion and extension</td>
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<tr>
<td>NRₛ₃</td>
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<td>Sidebent right</td>
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**Figure 1** - Testing of thoracic spine in flexion

**Figure 2** - Testing of thoracic spine in extension

**Figure 3** - Child's pose to induce flexion

**Figure 4** - Patient up on forearms to induce extension

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Related Anatomy:
**Brief description:** When diagnosing the thoracic spine, gross and segmental motion testing is important. Gross motion testing can help narrow down the area of dysfunction while segmental motion testing will localize the specific vertebrae in the dysfunction. When using segmental motion testing flexion, extension, rotation and sidebending are tested. The thoracic spine may either have a Type I dysfunction (group curve, three or more vertebrae involved) or a Type II dysfunction (two or fewer vertebrae involved).

**Look (observation):** Observe the thoracic spine from all 4 sides of the patient (patient’s front, back, left and right) by having the patient turn. Look for differences in shoulder height (can indicate sidebending), rotation of the shoulders (can indicate rotation of the thoracic spine) and any forward or backward bending of the torso (can indicate flexion and extension, respectively, of the spine). Also, look for any scars, marks or trauma to the area.

**Feel (palpation):**

**Physician position:** Stand or sit to either side of the patient

**Patient position:** Prone or seated

**Hand positioning:** Use the pads of your thumbs to palpate the spinous processes (SPs) and transverse processes (TPs).

**Technique:**

1. With the patient either prone or seated, run your index finger over the SPs from T1 – T12. Feel for any curve in the spine that may indicate sidebending.
2. Now use your index and middle fingers and run your hand down the TPs from T1 – T12. Feel for any posterior TPs that may indicate rotation.
3. To test for individual vertebra start by finding T1. In order to find T1, palpate the SP of C7 and have the patient flex their head. If your fingers are over the C7 and T1 SPs, the C7 SP will move while the T1 SP stays relatively fixed.

4. After confirming you are on the T1 SP, move your fingers 1-2 cm laterally from the SP. You will be on the TPs for T1.

5. To determine the dysfunction, feel for which TP is posterior (this is the direction of rotation). If it is a group curve the rotation will be opposite to the direction of sidebending, if it is a Type II dysfunction then the direction of rotation and sidebending will be the same.

6. Testing for flexion and extension may be done multiple ways. If the patient is seated place the hand that is not on the TPs along the back of the neck. Gently flex the patient with this hand and then extend while checking for which direction makes the TPs more even. If the patient is prone, you can check flexion by having the patient go into child’s pose and check extension by having the patient come up on to their forearms (as if watching tv). Finally, the more advanced method can be used in either the prone or seated position. Simply roll your thumbs over the top of the TPs and press upward to induce flexion; you’re your thumbs under the TPs and press down to induce extension.

7. To name Type I dysfunctions, the TPs for 3 or more vertebrae will be rotated in the same direction and upon flexion/extension there will be no improvement. (Ex. T5-T9 TPs are all posterior on the right and do not improve with flexion/extension. Sidebending is opposite of rotation with Type I dysfunctions so the diagnosis is T5-T9 Neutral R_RSL.)

8. To name Type II dysfunctions, the TP will be posterior on one side (direction of rotation). Rotation will be in the same direction as sidebending. The TPs will feel more even in either flexion or extension. (Ex. T4 TP feels more posterior on the left and the TPs feel more even in flexion. The diagnosis will be T4 FRSL.)

Move (motion testing):

Active motion testing:

1. Ask the patient to extend backwards as far as possible. Observe how far the patient can move as well as fluidity of motion.

2. Ask the patient to bend forward (flexion) as far as possible. Observe how far the patient can move as well as fluidity of motion.

3. Ask the patient to bend towards the right and left (sidebending) as far as possible. Observe how far the patient can move as well as fluidity of motion.

4. Ask the patient to turn towards the right and left (rotation) as far as possible. Use the shoulders as a reference. Observe how far the patient can move as well as fluidity of motion.

Passive motion testing:

1. With the patient seated, test the regions of the thoracic spine by placing your hands on the acromion bilaterally (to test T1-T12), midway on the clavicle bilaterally (to test T1-T8) and at the nape of the neck bilaterally (to test T1-T4).
2. Sidebend the patient with your hands and test each region. For T1-T12 20 degrees is normal, T1-T8 10 degrees is normal and for T1-T4 5 degrees is normal.

3. To test for rotation, have the patient straddle the table. Now rotate the patient using their shoulders, 40 degrees is normal motion of the thoracic spine.

Other notes: It is important to remember that when motion testing, most of the motion testing will not only engage the thoracic spine, but also the lumbar spine. Therefore, it is thoracolumbar motion testing. Also, in a Type I dysfunction, rotation and sidebending are in opposite directions while in a Type II dysfunction, rotation and sidebending are coupled to the same side. Remember to use the “Rule of 3s” to find the TPs in relation to the SPs. (T1-T3, SP is at same level of TPs; T4-T6, SP is half a level lower than TPs; T7-T9, SP is one full level below TPs; T10 is like T1-T3, T11 is like T4-T6, T12 is like T7-T9)