

# Scoliosis

## Assessment

### Postural assessment

#### C-curve – Right thoracolumbar functional curve

##### Posterior view

- With the plumb line as reference, the occiput is checked to see if it is centered above a point midway between the calcanei
- The level of the occiput is assessed
- There may be a left cervical compensatory curve
- The right acromioclavicular joint is higher
- Humeral lengths are assessed bilaterally
- The right scapula is higher and possibly winged
- The distance between the medial borders of both scapulae and the spine is checked.
- Right rib humping is present
- There may be asymmetrical skin folds on the torso, with more folds on the concave side.
- Iliac crest levels are higher on the left
- There is an asymmetrical negative space between the torso and the arms.
- PSIS levels are checked
- with lateral pelvic tilt only, the PSIS is low on the dropped side
- with pelvic torsion, the PSIS is high on the anteriorly rotated, short leg side
- knee valgus is possible
- heights of the malleoli, fibular heads and greater trochanters are checked  
any of these on the right may be lower with a short right leg as the scoliosis source
- right foot pronation is possible

##### Lateral View

- knee hyperextension is possible
- increased anterior pelvic tilt is seen on the short limb side (females 5- 10 degrees, males 0-5 degrees are normal limits- the pelvis should be compared bilaterally for torsion)

##### Anterior view

- the right ASIS is lower than the left with a short right limb or pelvic torsion
- the left ribs are prominent
- fascial bones are frequently smaller on the same side as a small hemipelvis

##### Superior view

- It is possible that the ASIS and acromioclavicular joint on one side are anterior, giving a unilateral torsion, or that one ASIS and the other acromioclavicular joint are anterior, giving an opposing torsion.

#### S-curve – Right thoracic left lumbar functional curve

##### Posterior view

- With the plumb line as reference, the occiput is checked to see if it is centered above a point midway between the calcanei
- The level of the occiput is assessed
- There may be a left cervical compensatory curve
- The right acromioclavicular joint is higher
- Humeral lengths are bilaterally assessed
- The right scapula is higher and possibly winged

- The distance between the medial borders of both scapulae and the spine is checked
- Right rib humping is present
- There may be asymmetrical skin folds on the torso, with more folds on the concave side
- Iliac crest levels are higher on the right
- There is a symmetrical negative space between the torso and the arms
- PSIS levels are checked
- With lateral pelvic tilt only, the PSIS is low on the dropped side
- With pelvic torsion, the PSIS is high on the anteriorly rotated, short leg side
- Knee valgus is possible
- Heights of the malleoli, fibular heads and greater trochanters are checked – any of these on the left may be lower with short left leg as the scoliosis source
- Left foot pronation is possible

#### Lateral view

- knee hyperextension is possible
- increased anterior pelvic tilt is seen on the short limb side

#### Anterior view

- the left ASIS is lower than the right with a short left limb or pelvic torsion
- the left ribs are prominent

#### Superior view

- it is possible that the ASIS and acromioclavicular joint on one side are anterior, giving a unilateral torsion, or that one ASIS and the other acromioclavicular joint are anterior, giving an opposing torsion.

#### Palpation

- depending on the shape of the curve, the therapist palpates the erector spinae, quadratus lumborum, intercostals, trapezius and gluteus medius for hypertonicity and trigger points.
- the therapist palpates for fibrosing in the concave side of the curve

#### Testing

- AF ROM of the spine in lateral bending abd flexion reveals decreased range toward the Convex side
- PR POM of the hip reveals decreased range in extension with an anterior pelvic tilt.
- PR ROM of the protracted shoulder is decreased in external rotation.
- PR ROM of the cervical spine may also be decreased
- AR strength testing reveals weakness in the abdominals and in the muscles on the concave side of the curve. With an anterior pelvic tilt, gluteus maximus is weak on the side with the anterior tilt. With a lateral pelvic tilt, gluteus medius is weak on the high side.
- A functional or structural scoliosis test is positive
- Scoliosis small hemipelvis is positive
- Scoliosis short leg test is positive
- Functional leg length is assessed with the supine to sit test
- True tibia and femur length are assessed with the client supine
- Sacroiliac joint motion is assessed with the sacroiliac joint motion test and Gillet's test
- Anterior spinous challenge, lateral spinous challenge, motion palpation and static palpation of the spine may reveal areas of hypo and hyper mobility in functional and structural curves. In addition rib motion is asymmetrical and hypomobile

- Length tests for muscles attaching to the pelvis and shoulder girdle should be performed this includes-
  - Thomas
  - Ely's
  - Adductor length
  - Piriformis length
  - Ober's
  - Quadratus lumborum length
  - Shoulder adductors length
  - Pectoralis major length
  - Pectoralis minor length

The results will vary depending on the type of curve and amount of torsion present in the Pelvis

- the therapist is advised to bilaterally compare and record the lengths of the involved muscles and lengthen the ones that are short
- Valsalva's, Kernig's and straight leg tests are positive with space occupying lesions.
- Kemp's is also positive with space occupying lesions or facet joint irritation

#### General treatment

- Positioning can be started prone, supine or sidelying depending on the area to be worked.
- Heat is applied to the tight muscles and rotated from one area to another before being treated. Cool can be applied to the weak muscle after treating
- Treatment is performed in a relaxation context

#### Specific treatment

- This treatment addresses a right thoracic , left lumbar functional S-curve.
- Treatment is started prone with pillows under the abdomen and ankles. A small towel folded or rolled up can be placed under the ASIS of the anteriorly rotated left pelvis to encourage a posterior rotation.
- Following the pre-heated areas, the fascial work to the short and tight muscles on the concave sides zigzags across the clients body, inferior to superior.
- Heat is applied to the left lateral hip while petrissage is used on the short right adductors.
- Heat is moved to the right quadratus lomborum while fascial spreading and connective tissue cutting techniques are used on the left gluteus medius.
- Heat is next moved to the left thoracic erector spinae and intercostals while the muscles in the concavity of the lumbar curve are treated
- Skin rolling and crossed hand spreading are used over the entire lower right quadrant
- The right erector spinae are treated with longitudinal and transverse spreading
- The attachments of quadratus lumborum at the iliac crest, lumbar vertebrae and twelfth rib are outlined using connective tissue cutting and fascial spreading
- Heat is moved to the right upper trapezius while fascial techniques are used on the left latissimus dorsi left erector spinae and left intercostals.
- One group of intercostals is systematically treated with fingertip fascial stroking laterally to medially. This is repeated three to four times, with the pressure tolerably increased each time. The technique is repeated on the next intercostals. A group of three or four intercostals may be the maximum treated in a single appointment.
- If necessary fascial techniques are used on the right upper trapezius and levator scapula
- A variety of Swedish techniques is used on the tight structures, working inferiorly to superiorly, including effleurage, ulnar border stripping and muscle stripping

- Trigger points in gluteus medius and quadratus lumborum refer into the sacroiliac joint and lateral hip.
- Trigger points in multifidi refer locally
- Trigger points in iliocostalis and longissimus refer along these muscle groups and occasionally down into gluteals.
- Hypomobile vertebrae are treated with posterior- anterior and lateral joint play.
- Rib springing is used to mobilize the ribs on the concave side.
- The stretched, weak and tight intercostals and paraspinal muscles on the convex sides of the curves are now treated.
- Any stimulating petrissage or tapotement techniques may be used, providing the work is transverse to the muscle fibers. Treat the left adductors, right gluteus medius, left upper trapezius and levator scapulae.
- Trigger points in the rhomboids on the convex side, which are activated by scapular winging, are treated with ischemic compression
- Active resisted exercise is used to strengthen the intercostals on the convex side. The therapist compresses the ribs with both hands while the client inhales against this resistance.
- Cool washes are applied to the stretched muscles
- PIR rectus femoris - the clients knee is flexed, bringing the heel toward the gluteals until the client feels a stretch on rectus femoris. The client submaximally extends the knee against the therapists resistance
- With the client sidelying on the left side, a small towel roll is placed under the left waist, between the ribs and pelvis. The client is asked to position the right lower limb on the table so the right hip is extended, while the left hip and knee are flexed. The right arm is placed in full flexion in front of the head. This allows the pelvis to be pulled away from the rib cage, stretching the tight right quadratus lumborum
- Skin rolling and fascial stroking
- are used on the tight right external abdominal obliques, following the attachments at the iliac crest and costal margins. This is followed by petrissage to these muscles.
- PIR for quadratus lumborum proceeds from the sidelying position described above. The client allows the lower limb to drop off the table. Both the therapists arms are crossed, stabilizing the inferior ribs with one hand and the iliac crest with the other. The client minimally contracts the quadratus lumborum against the therapists resistance for 10 seconds and then relaxes, allowing the lower limb to drop farther off the table. Repeat at least 3 times.
- Turn to supine
- For the pelvis, both fascial and Swedish techniques and PIR are used for the tight and short left iliopsoas, rectus femoris and right adductors
- PIR iliopsoas – the client slides to the side of the table so the limb to be treated can hang freely over the side of the table. The hip and knee of the untreated knee are flexed with the foot flat on the table. Further stabilization is applied at the ASIS of the untreated side with the proximal hand. The thigh of the treated side is moved into extension with the distal hand, until the iliopsoas is beginning to be stretched. The client submaximally flexes the hip against the therapists resistance.
- PIR right adductors – the client has their hip and knee flexed so their feet are on the table. The hip drops into abduction and the client resists pressure downward on the leg
- A hypomobile sacroiliac joint is mobilized with joint play
- The left anterior pelvic tilt may also be treated with P ROM and AR ROM

- The tight left latissimus dorsi and right pectoralis minor are also treated with fascial and Swedish techniques
- PIR latissimus dorsi – arm in 180 degrees of abduction. Flex the clients hips and knees so their feet are flat on the table. Therapist places pressure on the distal humerus and the client horizontally flexes the humerus against the therapists resistance.
- PIR pectoralis minor- the arm is at the clients side with the hand on the abdomen. The client slides to the side of the table so the scapulae is free to hang over the side of the table. The heel of the therapists hand is placed on the coracoid process and the client submaximally protracts and depresses the scapulae against the therapists resistance.
- The flattened right anterior ribs are treated with fascial and Swedish techniques and rib springing as outlined in the prone section above
- The diaphragm, if tight, is treated using ischemic thumb pressure inferior to the costal margins. Working with the clients breathing, the therapist applies pressure with exhalation and the thumbs are held in place with inhalation. Cross fibre thumb kneading is used on the diaphragm attachments. The thumbs are drawn out slowly on completion of this technique
- The tight right scalenes, right sternocleidomastoid and left suboccipitals are treated with muscle stripping