Orthopaedic Manual Physical Therapy Techniques for the Lumbo-Pelvic Region

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MT1- Lumbar Prone Central Posterior- Anterior (PA) Mobilization
MT2- Lumbar Prone Unilateral PA Mobilization
MT3- Lumbo-Pelvic Supine Regional Manipulation
MT4- Lumbo-Pelvic Supine Regional Manipulation Alternate Method
MT5- Lumbar Side Lying Flexion Biased Hold Relax Technique
MT6- Lumbar Side Lying Rotational Manipulation
MT7- Lumbar Side Lying Rotational Manipulation Alternate Method
MT8- Lumbar Side Lying Grade I-II Rotational Mobilization
MT9- Lumbar Side Lying Extension Biased Hold Relax Technique
MT10- Lumbar Side Lying Extension Biased Manipulation
MT11- Thoraco-Lumbar Junction Seated Rotational Manipulation
MT12- Thoraco-Lumbar Supine Manipulation With Bolster (Floor)
MT13- Thoraco-Lumbar Supine Manipulation With Bolster (Plinth)
MT14- Lumbo-Pelvic Hip Complex Supine Long Axis Distraction Manipulation
Lumbar Prone Central PA Mobilization

- Place the ulnar aspect of your right hypothenar eminence (just distal to your pisiform) over the spinous process (SP)
- Support your right hand with your opposite hand
- Keep your elbows stiff and use your body to deliver an oscillatory mobilization force to the vertebra
- Reassess symptoms and impairments

Tips:
- Your chest should be directly over your hands to ensure a direct PA force
- For maximal patient comfort, *progressively* oscillate in and out of the desired depth of mobilization.
- It is important to optimize the intervention by adjusting the direction of the mobilization force or by changing the patient position
Prone Lumbar Unilateral PA Mobilization

- Stand on the side to be treated
- Place your thumbs just lateral to the spinous process (SP) of the segments to be treated. You should be directly over the articular pillar and NOT the transverse process
- Support your thumbs by stacking them or placing them adjacent to each other. Using the pads of your thumbs and not the tips, may be more comfortable to the patient
- Keep your wrists and elbows stiff and use your body to deliver an oscillatory mobilization force to the segments
- Reassess symptoms and impairments

Tips:
- Your chest should be directly over your hands to ensure a direct PA force
- For maximal patient comfort, progressively oscillate in and out of the desired depth of mobilization.
- Optimize the intervention by adjusting the direction of the mobilization force or by changing the patient position
Lumbo-Pelvic Supine Regional Manipulation

- Translate the pelvis towards you and maximally side-bend the patient’s lower extremities and trunk away from you.
- Without losing the side-bending, lift & rotate the trunk so the patient rests on the shoulder nearest you.
- Contact the patient’s ASIS with your caudal hand.
- Grasp the top (opposite) shoulder and scapula with your cephalad hand and rotate the trunk towards you while maintaining the side-bending.
- Once the ASIS starts to elevate, perform a smooth thrust in an anterior to posterior direction.
- Reassess symptoms and impairments.
Lumbo-Pelvic Supine Regional Manipulation
Alternate Operator Arm Position

- Translate pelvis toward you and maximally side-bend the patient’s lower extremities and trunk away from you

- Thread your cephalad forearm through the patient’s arms. Rest your fingertips on the patient’s sternum or the table

- Stand upright and rotate the trunk to the towards you (maintain the side-bending)

- Contact the patient’s ASIS with your caudal hand. When the ASIS rises from the table, perform a smooth thrust in an anterior to posterior direction

- Reassess symptoms and impairments
Lumbar Side Lying Flexion Biased Hold Relax Technique

- Place patient side lying, with painful side down

- Flex the both hips until you first begin to palpate motion at desired lumbar interspinous space

- Have patient cross their arms and grasp their elbows. Weave your caudal arm through the patient's. Maintain contact with the segment

- While maintaining your set up, lift the feet/lower legs while keeping the knees stable until you feel lumbar segmental movement

- Instruct patient to gentle push feet towards the floor, creating an isometric contraction

- Hold 5 sec. Have patient relax, take up new motion by lifting feet towards ceiling

- Repeat 3-5 times
- Reassess symptoms and impairments

Targeting the right side
Lumbar Side Lying Rotational Manipulation

- Place patient side lying, with painful or restricted side up
- Flex the top leg until you first begin to palpate motion at desired lumbar interspinous space; place the patient’s top foot in the popliteal fossa of their opposite LE
- Grasp the patient’s bottom arm and shoulder and gently pull towards you to induce side bending & rotation until you begin to palpate motion at the interspinous space
- Have patient cross their arms and grasp their elbows. Weave your caudal arm through the patient's. Maintain contact with the segment
- While maintaining your setup log roll the patient towards you. Place your caudal forearm across the pelvis
- Stabilize thorax and Impart a high velocity low amplitude thrust through the pelvis in a rotational direction towards the floor
- Reassess symptoms and impairments

Targeting the right L4-L5
Place patient side lying, with painful &/or restricted side up
Flex the top leg until you first begin to palpate motion at desired lumbar interspinous space; place the patient’s top foot in the opposite popliteal fossa
Grasp the patient’s bottom arm and shoulder and gently pull in a cephalad direction, induce side bending & rotation until you begin to palpate motion at the interspinous space
Have patient cross their arms and grasp their elbows. Weave your caudal arm through the patient's. Maintain contact with the segment
While maintaining your setup log roll the patient towards you. Place your caudal forearm across the pelvis
Stabilize thorax and Impart a high velocity low amplitude thrust through the pelvis in a rotational direction towards the floor
Reassess symptoms and impairments

Targeting the right side
Lumbar Side Lying Grade I-II Rotational Mobilization

- Place patient side lying, painful &/or restricted side up, with additional pillow(s) between LEs
- For lower lumbar:
  - Palpate low lumbar interspinous space, flex both legs until lumbar motion felt at the lower lumbar segment
  - Stand behind patient, contact posterior ilium w both hands, elbows locked
  - Impart gentle rotational motion through the pelvis in a direction 90° to the femurs
- For mid lumbar:
  - Flex hips to motion of mid lumbar spine
  - Impart gentle rotational motion through the pelvis in a direction 45° to the femurs
- For upper lumbar
  - Flex hips to motion of mid lumbar spine
  - Impart gentle rotational motion through the pelvis in a direction parallel to the femurs
- Reassess symptoms and impairments

Targeting the right side

* To increase mobilization to Grade II, have patient place their top hand on their side as above*
Lumbar Side Lying Extension
Biased Hold Relax Technique

- Place the patient side lying with painful &/or restricted side up
- Grasp the trunk and translate towards you until you localize the extension to the segment to be treated
- Rotate the patient’s thorax away from you until you begin to palpate motion at the desired segment
- Have patient cross their arms and grasp their elbows. Weave your caudal arm through the patient's. Maintain contact with the segment
- Log roll the patient towards you
- With your caudal arm on the pelvis induce a high velocity, low amplitude thrust in anterior and cephalward direction
- Stabilize thorax and have patient gently contract into your caudal forearm through the pelvis
- Hold 5 sec. Have patient relax, take up new motion through the forearm on the pelvis
- Repeat 3-5 times
- Reassess symptoms and impairments

Targeting the left L4-L5
**Lumbar Side Lying Extension Biased Manipulation**

- Place the patient side lying with painful &/or restricted side up
- Grasp the trunk and translate towards you until you localize the extension to the segment to be treated
- Rotate the patient’s thorax away from you until you begin to palpate motion at the desired segment
- Have patient cross their arms and grasp their elbows. Weave your caudal arm through the patient’s. Maintain contact with the segment
- Log roll the patient towards you
- With your caudal arm on the pelvis induce a high velocity, low amplitude thrust in anterior and cephalward direction
- Reassess symptoms and impairments
- TIP: Place the patient’s left foot in the popliteal fossa

**Targeting the left L4-L5**
Thoraco-Lumbar Junction Seated Rotational Manipulation

- The patient seated, straddling the plinth, with arms folded grasping elbows
- Stand to the side of the patient with pillow on your shoulders
- Ask patient to rest forearms on your shoulder/pillow. This causes rotation towards you
- Keep patient partially flexed in the spine while you place your anterior hand up and under the pillow and grasp the patient’s opposite side TL junction area or scapular region as shown here
- Apply skin lock with posterior hand’s hypothenar eminence at the level to be treated
- Further rotate the patient to near end range
- Apply high velocity low amplitude thrust with posterior hand in a rotational direction
- Reassess symptoms and impairments
Thoraco-Lumbar Supine Manipulation (Bolster)

- The patient is sitting, knees flexed, hands clasped at the base of the neck, elbows together anterior to sternum
- Position bolster behind patient and at the level of the lower vertebral segment being targeted

Floor technique
- Stand over and straddle patient
- Grasp elbows and lower the patient over the bolster with lower vertebral segment resting on bolster
- Take up slack in an AP direction
- Apply high velocity low amplitude thrust in an AP direction

Plinth technique
- Stand to the patient’s side
- Reach both arms around patient and grasp shoulders, and lower the patient over the bolster with lower vertebral segment resting on bolster
- Take up slack in an AP direction
- Apply high velocity low amplitude thrust in an AP direction

- Reassess symptoms and impairments
Lumbo-Pelvic Hip Complex Supine
Long Axis Distraction Manipulation

- Abduct and flex the hip of the involved side to maximum relaxation (typically about 15 degrees of abd and flex). Allow comfortable amount of ER.
- Optional: Block the opposite foot with your thigh
- Apply a high velocity, low amplitude thrust in a caudal direction through the involved lower extremity
- Reassess symptoms and impairments
- Progress to positions of greater hip limitation (often into greater IR)
- Notes:
  - This technique may be contraindicated with certain hip and knee pathologies
  - Your cephalad hand can support the knee to prevent hyperextension
  - In very mobile individuals, you may need to internally rotate the hip to increase the motion that is generated through the pelvis

Treating the right side
Therapeutic Exercises (TE)

TE1- Piriformis Stretch above 90°
TE2- Piriformis Stretch below 90°
TE3- Hamstring Stretching
TE4- Iliopsoas, Rectus Femoris, Tensor Fascia Latae Stretch- Supine
TE5- Iliopsoas Stretch- Prone
TE5- Rectus Femoris Stretch- Prone
TE6- TFL stretch
TE7- Lumbar side-lying rotation self mobilization
TE8- Lumbar flexion self mobilization
Patient supine on the plinth

Externally rotate and flex the hip

Add to the stretch by adducting the LE toward the opposite shoulder, and adjusting the amount of hip flexion & rotation into perceived restriction

Once the restrictive barrier is engaged, use a sustained stretch or hold relax technique

Reassess symptoms and impairments after stretching
Position the lower extremity with the hip in a position of flexion, adduction, internal rotation with the patient’s foot stabilized on the opposite side of the opposite lower extremity if possible.

Manually stabilize the ipsilateral innominate with one hand and use the other hand to impart more adduction / internal rotation.

Progress the technique by adding more adduction / internal rotation.

Once the restrictive barrier is engaged, use a sustained stretch or hold relax technique.

Reassess symptoms and impairments after stretching.
Medial and Lateral Hamstrings Stretching

- Passively flex the hip to 90 degrees
- Extend the knee to the onset of resistance
- Internally or externally rotate the femur to stretch the lateral or medial hamstring, respectively
- If symptoms are felt behind or distal to the knee, this may be due to adverse neural dynamics. If so, this may respond best to 1) plantar flexion of the ankle, 2) adding hip abduction &/or ER, or 3) using on / off stretching instead of static stretching

- **MANUAL CONTACTS** - Try active stretching using manual contacts on the H/S and active contraction of the patients quadriceps
Iliopsoas Stretch

- Patient sitting on edge of the plinth, flex opposite hip. Have the patient help by holding his knee in place lower into supine until the lumbar spine is stabilized against the plinth.

- Bring the lower extremity into extension while maintaining pressure against the patient’s ASIS (and keeping the opposite hip flexed with patient’s foot stabilized on operator’s trunk).

- Place a hand over the distal femur and guide the hip slowly into extension until the restrictive barrier is engaged. Either sustain a stretch or use a muscle energy technique to increase hip extension.

- Do not allow hip abduction, adduction, or internal / external rotation.

- Reassess symptoms and impairments after stretching.
Patient sitting on edge of the plinth, flex opposite hip. Have the patient help by holding his knee in place lower into supine until the lumbar spine is stabilized against the plinth.

Bring the lower extremity into extension while maintaining pressure against the patient’s ASIS (and keeping the opposite hip flexed with patient’s foot stabilized on operator’s trunk).

Place a hand over the distal femur and lateral patellar region to guide the hip slowly into extension (guiding patella medially may prevent ant knee pain).

Use your foot to induce knee flexion and engage the restrictive barrier.

Use either a sustained stretch or muscle energy technique.

MANUAL CONTACTS- Try active stretching using manual contacts on the quadriceps and active contraction of the patients hamstrings.
Tensor Fascia Latae Stretch

- Patient sitting on edge of the plinth, flex opposite hip. Have the patient help by holding his knee in place lower into supine until the lumbar spine is stabilized against the plinth.
- Bring the lower extremity into extension while maintaining pressure against the patient’s ASIS (and keeping the opposite hip flexed with patient’s foot stabilized on operator’s trunk).
- Place a hand over the distal femur and lateral patellar region & guide the hip slowly into extension (medial directed pressure on patella may prevent ant knee pain with technique).
- While maintaining stabilizing pressure over the patient’s ASIS, induce tibial adduction & internal rotation and hip adduction and external rotation until a stretch is felt over the TFL or Iliotibial Band.
- Reassess symptoms and impairments after stretching.
Iliopsoas

- Patient prone on the plinth
- Place proximal hand posterior to the hip joint (inferior to the ischial tuberosity or just post to the greater trochanter)
- Stabilize the proximal femur/hip as you passively extend the hip to bring on tension
- May use a belt to assist in holding/lifting the LE
- Hold for 30 seconds, or use a hold relax technique

Rectus Femoris

- Patient prone on plinth
- Place proximal hand posterior to the hip joint (inferior to the ischial tuberosity or just post to the greater trochanter)
- Stabilize the proximal femur/hip, then passively flex the knee to muscle tension
- Hold for 30 seconds, or use contract relax technique
Self-Mobilization: Lumbar Rotation in Side-lying

- Place the patient side-lying with painful &/or restricted treatment side up
- Flex both hip and knees to comfort position, and to position that maximizes motion at the targeted region of the spine
- Position top leg so foot is behind popliteal fossa of the bottom leg
- Have patient actively rotate towards treatment side to onset of stiffness, tension or symptoms
- Perform rotational mobilizations for up to 30 second bouts
- Depending on treatment area, patient can facilitate mobilization by:
  - Placing hand behind head
  - Placing hand across upper ribs
  - Placing hand across lower ribs
- Patient's bottom hand can hold onto top knee or pelvis to keep pelvis from rotating
Self-Mobilization: Lumbar Flexion

- Flex the hip(s) until a stretch is felt in the lower lumbar region and perform the mobilization in an on/off manner.

**Note**
- If pain is felt in the anterior hip or groin region with this mobilization exercise, the patient should try abducting the hip enough to abolish this sensation while still stretching the lower back.
- Performance of a posterior pelvic tilt before the mobilization exercise or placing a small pillow or towel roll under the distal buttock may be used to bias the pelvis/spine into greater flexion.
Self-Mobilization: Lumbar Flexion

- Posteriorly tilt the pelvis to flex the spine
- Reassess symptoms and painful or restricted activities or movements after performing the self mobilization

Note

- The therapist may use verbal or tactile cues to train the patient to mobilize the appropriate region
- Placing a small pillow or towel roll under the distal buttock may be used to bias the pelvis/spine into more flexion
Self-Mobilization: Lumbar Flexion

- In quadruped, bring the buttocks back towards the heels until a stretch is felt in the lumbar region.
- Pre-position the body into left or right side-bending to bias the “opening” or flexion more on the right or left side, respectively.
- Reassess symptoms and painful or restricted activities or movements after performing the self mobilization.

Note

- Various amounts of posterior pelvic tilt may help to localize the stretch to different regions of the spine.
Lumbar Extension Principle (EP) Exercises

EP1- Lumbar Shift Correction
EP2- Lumbar Shift Self-Correction
EP3- Repeated Extensions in Standing
EP4- Repeated Extensions in Lying
EP5- Self-Mobilization Lumbar Extension Supine
Lumbar Shift Correction

• Stand to the side of the shift. (shift named for direction of shoulders compared to the pelvis)
• Place your shoulder against patient’s thorax or shoulder and grasp patient’s opposite ilium
• Pull patient gently into you while you stabilize thorax/shoulder to correct shift
• Patient should experience centralizing and/or decrease in LE symptoms
• Can either hold position or apply on/off shift correction movements as patient tolerates. Multiple repetitions of on/off movement &/or longer duration sustained correction may be needed

• Note:
  – Patient can use a wall to perform same maneuver as home exercise program
  – Progress with addition of repeated extensions (shown in video with operator shift correction)
Lumbar Self-Mobilization: Repeated Extension in Standing (REIS)

- Have patient stand with feet about shoulder width apart (comfortable position)
- Place hands on posterior lumbar spine at the level of treatment
- While keeping the patient’s eyes and head level with the horizon, have them gently drop pelvis forward, causing lumbar extension to the point where pain centralizes or LE symptoms decrease
- With progression, the patient can use the hands to provide an anteriorly directed force at selected regions of the lumbar spine / pelvis
- Have patient repeat this 10 times
- Be sure to tell patient this should NOT increase leg pain, but may be uncomfortable in the lumbar spine. The focus is on centralizing the LE symptoms
Lumbar Self-Mobilization: Repeated Extension in Lying (REIL)

- Patient lying prone, pillow under hips as needed. (comfortable position)
- Progress to prone without pillow
- Progression to repeated extension without overpressures
- Progress to repeated extensions with overpressure - place your hand at the LS junction and tell patient to keep pelvis down on the pillow while they props themselves on forearm causing lumbar extension
- Patients can either hold extension or perform repeated movements
- Exercises should cause a decrease in or a centralization of LE pain
- Be sure to tell patient this should NOT increase leg pain, but may be uncomfortable in the lumbar spine. The focus is diminishing or centralizing the LE symptoms
Self-Mobilization: Lumbar Extension

- Anteriorly tilt the pelvis in an on and off manner to mobilize the spine into extension
- Reassess symptoms and painful or restricted activities or movements after performing the self mobilization

**Note**
- Adding left sidebending &/or left rotation may facilitate more “extension” on the left (and vice versa for the right)
Lumbar Stabilization (LS) Exercises

**LS1**- ADIM Training in Supine with Heel Slides

**LS2**- ADIM with Bridging and Leg Raise

**LS3**- ADIM Training in Quadruped

**LS4**- Multifidus Training in Quadruped

**LS5**- Quadruped Alternate Leg and Arm Progression

**LS6**- Multifidus Facilitation in Standing

**LS7**- Side Support Progression
Abdominal Drawing in Maneuver (ADIM) Training in Supine and Heel Slides

- Patient supine, hook-lying position
- Place your hand just medial and slightly inferior to the ASIS to palpate TrA
- Instruct patient to roll pelvis posteriorly and anteriorly to find the most pain-free position. This is the base starting position for all stabilization exercises
- In this position, tell patient to “pull your belly button up and in towards the spine and feel for activation of the TrA (palpate just medial and inferior to the ASIS)
- Patient should breathe normally, while holding contraction for a few seconds
- Repeat until form fatigue
- Once base exercise mastered, begin challenging with single leg heel slides
- Repetitions done until fatigue
Abdominal Drawing in Maneuver (ADIM) with Bridging and Leg Raise

- Patient supine, hook-lying position
- Place your hand just medial and slightly inferior to the ASIS to palpate TrA activation
- Instruct patient to assume the base starting position. Activate TrA
- Have patient lift buttocks off the plinth in bridging position (remain in position that does not aggravate any symptoms)
- Progression:
  - Begin with “marching” by lifting a foot off the plinth while maintaining pelvic / trunk stability
  - Progress to unilateral SLR motions while maintaining pelvic / trunk stability
- Repeat until form fatigue
ADIM Training in Quadruped

- Patient on knees in quadruped position
- Place your hand just medial and slightly inferior to the ASIS to palpate Transversus Abdominus (TrA)
- Instruct patient to roll pelvis posteriorly and anteriorly to find the most pain free position. This is the base starting position
- In this position, tell patient to “pull your belly button up and in towards the spine and feel for activation of the TrA
- Patient should breathe normally, while holding contraction for a few seconds
- Repeat until form fatigue

- Progression:
  - Ask patient to maintain this position with activation of TrA, then adding on a unilateral hip extension and/or a hip ext/abd/ER motion repeatedly while maintaining lumbo-pelvic position and TrA activation
  - Add in UE movement challenges +/- resistance
Multifidus Training in Quadruped

- Patient on knees in quadruped position.
- Place your hand just medial and slightly inferior to the ASIS to palpate TrA.
- Instruct patient to roll pelvis posteriorly and anteriorly to find the most pain-free position. This is the base starting position for all stabilization exercises.
- In this position, place your fingers on either side of a lumbar spinal segment.
- Instruct patient to “make this muscle contract under my fingers”. May need to tap them with your fingers for facilitation.
- Patient should breathe normally, while holding contraction for a few seconds.
- Repeat until form is lost or fatigue.
Quadruped Alternate Leg and Arm Progression

- Patient on knees in quadruped position
- Have patient begin in the base quadruped starting position with TrA and multifidus contractions
- In this position, place your fingers on either side of a lumbar spinal segment
- Instruct patient to “raise your right arm while keeping the pelvis stable” (+/- resistance) Palpation helps with tactile feedback
- Once mastered, do the same with alternate legs (+/- resistance)
- Once able to master those base movement positions, add alternate arm and leg raising. (+/- resistance)
- Repeat until form fatigue
Multifidus Facilitation in Standing

- Have patient stand with feet about shoulder width apart (comfortable position), then take normal step length forward with one foot.
- Place hands on posterior lumbar spine at the level of treatment.
- Instruct patient to place their hand by yours, over the multifidus on the opposite side of the forward foot.
- Instruct patient to weight shift forward as if going to walk.
- Cue patient to feel the multifidus contraction under their hand.
- Weight shift back and forth until patient is able to facilitate multifidus contraction.
Side Support Progression

- Side Support with Knees Flexed
  - Side Support with Knees Extended
  - Side Support with Knees Flexed
  - Side Support with Knees Extended
  - Side Support with Knees Extended – Abduct Top Leg
Neural Dynamics (ND)

Assessment

- Straight Leg Raise
- Slump Testing
- Prone Femoral Nerve

Intervention

ND1- Side Lying Femoral Nerve

ND2- Lumbar Prone Unilateral PA Mobilization with Straight Leg Raise

ND3- Lumbar Side Lying Rotation Mobilization with Straight Leg Raise
Adverse Neural Dynamics
Straight Leg Raise

- Patient supine, no pillow, UEs at side, legs uncrossed
- Assess resting symptoms
- Grasp ankle, place other hand proximal to the knee to maintain full knee extension throughout the test.
- Introduce motions in this order:
  1. Flex hip to 90, if able. May have to stop at HS tension
  2. Ankle dorsiflexion
  3. Hip internal rotation
  4. Hip Adduction
  5. Cervical spine flexion
- Note: If symptoms decrease with release of ankle DF, this may implicate adverse neural dynamics as a possible source of symptoms

- Assess ROM and pain response before, during and after each added movement. Apply overpressure, if indicated, to provoke symptoms
- Note – You must ensure enough painfree ROM in LE joints to not confuse symptom response. For example, if knee is painful in full extension, you may bring on sx only by keeping knee fully extended. Instead, you would perform SLR while sustaining the knee in as much knee ext possible without bringing on pain from the knee
Adverse Neural Dynamics Slump Testing

- Ask the patient to sit upright with her hands clasped behind her back and her knees together.

- Introduce motions in this order:
  1. Spinal flexion
  2. Neck flexion
  3. Knee extension
  4. Ankle dorsiflexion
  5. Release neck flexion

- Note: If symptoms decrease with release of neck flexion, this may implicate adverse neural dynamics as a possible source of symptoms.

- Assess ROM and pain response before, during and after each added movement. Apply overpressure, if indicated, to provoke symptoms.

- Note: As with the SLR, make sure that all body regions are able to move through the motions you are inducing to decrease the likelihood of confusion based on sx response. For example, if the patient has pain with knee ext or ankle DF, you will want to avoid these end range positions that elicit sxs during the test. Instead, just move through motion “short” of bringing on local pain.
Adverse Neural Dynamics
Prone Femoral Nerve

- Patient prone, no pillow, arms at the side or hanging off plinth as shown, legs uncrossed and straight
- Assess resting symptoms.
- Proximal hand placed just distal to the hip joint, on the femur
- Hold femur down on the plinth, then passively flex the knee to onset of nerve symptoms (comparable sign)
- Note where in the range of knee flex the symptoms begin
- Use knee flexion pain onset a your marker for patient progression or regression
- To differentiate between femoral neural dynamics vs rectus femoris tightness, it is helpful to assess in side-lying and compare sxs with and without neck flexion
Side-Lying Femoral Nerve

- Place the patient in side-lying
- With the patient in spinal flexion, position & support the hip in neutral and passively flex the knee while assessing range of motion and symptom response
- Next, extend the knee, flex the neck and repeat knee flexion (while maintaining the hip/thigh position perfectly)
- Decreased knee flexion before sx onset or increased symptoms with the addition of cervical flexion may indicate adverse neural dynamics
- Assess pain response before, during and after this technique
Lumbar Prone Unilateral PA Mobilization with Straight Leg Raise

- Patient prone, leg of the treatment side off the plinth with the foot on the floor.
- You will have to adjust plinth height for patient comfort.
- Have patient flex the hip until just the onset of leg symptoms.
- Apply graded unilateral PA mobilizations to the lumbar segment that changes leg pain.
- Repeat graded mobilizations for 30 seconds.
- Reassess, and if able, have patient flex the hip a bit more to new onset of symptoms.
- Repeat graded unilateral PA mobilizations for 30 seconds.
- Continue in this manner for 3 bouts of 30 seconds.
- Assess pain response before, during and after this technique.
Lumbar Side-lying Rotation Mobilization with Straight Leg Raise

- Patient side-lying, treatment/painful side up
- Position patient as you would for the Lumbar Side-Lying Rotational Manipulation
- Once in position, unhook top leg and have patient perform a straight leg raise with their top leg to onset of leg symptoms
- Use your caudal leg to hook over the patient's leg. Use your leg to fine tune and adjust tension on patient
- Perform graded lumbar rotational mobilizations for a bout of 30 seconds
- Reassess, and if able, have patient flex the hip a bit more to increase SLR to new onset of symptoms.
- Repeat graded mobilizations for 30 seconds
- Continue in this manner for 3 bouts of seconds
- Assess pain response before, during and after this technique
- **Options** 1) keep the spine stable and perform SLR motions on/off, 2) keep the LE position stable and do a thrust manipulation
In 2007 a task force was commissioned by the American Academy of Orthopaedic and Manual Physical Therapists to develop a model for standardizing the terminology used to describe manipulation interventions. The model simply describes the rate of force application, rather than using controversial and politically charged words such as “manipulation” or “mobilization.” This model was designed to be used in clinical trials so techniques could be described with more precision and universal understanding, the descriptions can also be utilized in clinical documentation such as electronic medical records. We have created a compendium of commonly used manual therapy interventions here. The wording could be altered based on specific modifications of the technique. The point is it clearly articulates to the reader what was done to the patient.

The characteristics proposed by Mintken et al\(^1,2\) to describe manipulative techniques include:

- Rate of force
- Location in range
- Direction of force
- Target of force
- Relative structural movement
- Patient position


<table>
<thead>
<tr>
<th>Technique</th>
<th>Description using AAOMPT Guidelines</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Foot and Ankle Techniques</strong></td>
<td></td>
</tr>
<tr>
<td>Talocrural (TC) AP Mobilization in Supine</td>
<td>Low-velocity, mid to end range, anterior to posterior oscillatory force to the talus on the distal tibiofibular joint in a supine position, with varying amounts of ankle dorsiflexion</td>
</tr>
<tr>
<td>Talocrural (TC) PA Mobilization in Prone</td>
<td>Low-velocity, mid to end range, posterior to anterior oscillatory force to the talus on the distal tibiofibular joint in a prone position, with varying amounts of ankle dorsiflexion</td>
</tr>
<tr>
<td>Distal Tib-Fib PA Mobilization in Prone</td>
<td>Low-velocity, mid to end-range, posterior to anterior oscillatory force to the distal fibula on the tibia in a prone position, with slight ankle plantarflexion</td>
</tr>
<tr>
<td>Distal Tib-Fib AP Mobilization in Supine</td>
<td>Low-velocity, mid to end-range, anterior to posterior oscillatory force to the distal fibula and/or tibia in a supine position, with slight ankle plantarflexion</td>
</tr>
<tr>
<td>Talocrural (TC) and Subtalar (ST) Lateral Glides</td>
<td>Low-velocity, mid to end-range, medial to lateral oscillatory force to the medial side of the left talus (or calcaneus) on the lower leg in a left sidelying position</td>
</tr>
<tr>
<td>Talocrural (TC) and Subtalar (ST) Medial Glides</td>
<td>Low-velocity, mid to end-range, lateral to medial oscillatory force to the lateral side of the right talus (or calcaneus) on the lower leg in a left sidelying position</td>
</tr>
<tr>
<td>Rearfoot Distraction Manipulation</td>
<td>High-velocity, end-range, longitudinal traction force to the dorsum of the foot on the lower leg in a supine position, with ankle dorsiflexion and eversion</td>
</tr>
<tr>
<td>Cuboid Manipulation</td>
<td>A high-velocity end-range dorsal-lateral force to the plantar-medial aspect of the cuboid in prone, with forefoot plantar flexion and inversion</td>
</tr>
<tr>
<td>Ankle Dorsiflexion Mobilization with Movement (MWM)</td>
<td>Low-velocity, end-range, anterior to posterior sustained glide to the talus in a standing position, with active ankle dorsiflexion and knee flexion in an on/off fashion</td>
</tr>
<tr>
<td>Metatarsal AP/PA Mobilization</td>
<td>Low-velocity, mid to end-range, anterior to posterior and posterior to anterior oscillatory force to the 1st metatarsal on the 2nd metatarsal in a supine position</td>
</tr>
<tr>
<td><strong>1st MTP Mobilization</strong></td>
<td>Sustained mid to end-range distraction force to the proximal phalanx followed by a low-velocity, mid to end-range physiological flexion force to the proximal phalanx on the 1st metatarsal in a supine position</td>
</tr>
<tr>
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</tr>
<tr>
<td><strong>1st MTP Manipulation</strong></td>
<td>High-velocity, end-range, longitudinal traction force to the proximal phalanx on the 1st metatarsal in a supine position</td>
</tr>
</tbody>
</table>

### Knee Techniques

<table>
<thead>
<tr>
<th><strong>Knee Flexion in Neutral/IR/ER</strong></th>
<th>Low-velocity, mid to end-range, oscillatory force into tibiofemoral flexion in a supine position, with tibial internal or external rotation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Knee Extension Neutral/Varus/Valgus (GR II- III)</strong></td>
<td>Low-velocity, mid-range, oscillatory force into tibiofemoral extension in a supine position, in neutral or with varus or valgus stress</td>
</tr>
<tr>
<td><strong>Knee Extension Neutral/Varus/Valgus (GR IV)</strong></td>
<td>Low-velocity, end-range, oscillatory force into tibiofemoral extension in a supine position, in neutral or with varus or valgus stress</td>
</tr>
<tr>
<td><strong>Knee AP/PA Progression (Gr II-IV)</strong></td>
<td>Low-velocity, mid to end-range, anterior to posterior or posterior to anterior oscillatory force to the tibia in a supine position, with the knee flexed to 90 degrees</td>
</tr>
<tr>
<td><strong>Patellar Glides Caudal/ Cephalad (Gr II-IV)</strong></td>
<td>Low-velocity, mid to end-range, caudal or cephalad oscillatory force to the patella on the femur in a supine position, with the knee slightly flexed</td>
</tr>
<tr>
<td><strong>Patellar Glides Sideglides (Gr II-IV)</strong></td>
<td>Low-velocity, mid to end-range, lateral to medial oscillatory force to the patella on the femur in a sidelying position, with the knee slightly flexed</td>
</tr>
<tr>
<td><strong>Proximal Tib-Fib PA Glides</strong></td>
<td>Low-velocity, mid to end-range, posterior to anterior oscillatory force to the proximal fibula on the tibia in a prone position, with slight knee flexion</td>
</tr>
<tr>
<td><strong>Fibular Head Manipulation</strong></td>
<td>High-velocity, end-range, anterior force to the head of the fibula on the tibia through end range flexion and external rotation of the knee in a supine position</td>
</tr>
<tr>
<td><strong>Knee Flexion Mobilization with Movement (MWM)</strong></td>
<td>Low-velocity, mid to end-range, sustained medial to lateral force to the proximal tibia in a prone position, with active knee flexion</td>
</tr>
</tbody>
</table>

### Hip Techniques

<p>| <strong>Hip Internal Rotation in Prone Grade II-IV</strong> | Low-velocity, mid to end-range, oscillatory lateral force to the contralateral pelvis in prone, with the ipsilateral hip in end range internal rotation |</p>
<table>
<thead>
<tr>
<th>Procedure</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hip Internal Rotation in Supine Grade II-IV</td>
<td>Low-velocity, mid to end-range, oscillatory internal rotation force to the distal femur on the acetabulum in a supine position, with the hip flexed 90 degrees</td>
</tr>
<tr>
<td>Hip Internal Rotation in Supine in Extension Grade II-IV</td>
<td>Low-velocity, mid to end-range, oscillatory internal rotation to the distal femur on the acetabulum in a supine position, with the hip slightly abducted and the knee flexed 90 degrees</td>
</tr>
<tr>
<td>Hip External Rotation Mobilization in Supine</td>
<td>Low-velocity, mid to end-range, oscillatory external rotation force to the distal femur on the acetabulum in a supine position, with the hip flexed 90 degrees</td>
</tr>
<tr>
<td>Hip Caudal Glides in Supine w Belt</td>
<td>Low-velocity, end-range, oscillatory caudal glide to the proximal femur through a belt with the patient in a supine position, with varying degrees of hip flexion, ab/adduction and internal/external rotation</td>
</tr>
<tr>
<td>Hip Lateral Glides in Supine w Belt</td>
<td>Low-velocity, end-range, oscillatory lateral glide to the proximal femur through a belt with the patient in a supine position, with varying degrees of hip flexion, ab/adduction and internal/external rotation</td>
</tr>
<tr>
<td>Hip Anterior-Posterior Glides Progression</td>
<td>Low-velocity, mid-end-range, anteromedial to posterolateral oscillatory force to the femur in a supine position, with hip flexion, adduction and external rotation</td>
</tr>
<tr>
<td>Hip Posterior-Anterior Glides</td>
<td>Low-velocity, end-range, posterior to anterior oscillatory force to the proximal femur in a prone position with knee flexed to 90 degrees</td>
</tr>
<tr>
<td>Hip Posterior-Anterior Glides on Figure Four Position</td>
<td>Low-velocity, end-range, posterior to anterior oscillatory force to the proximal femur in a prone position, with hip flexion, abduction and external rotation</td>
</tr>
<tr>
<td>Hip Long Axis Distraction Mobilization/Manipulation</td>
<td>High-velocity, end-range, longitudinal traction force to the lower extremity on the acetabulum in supine with slight hip flexion, abduction, and varying degrees of internal and external rotation of the lower extremity</td>
</tr>
<tr>
<td>Hip Extension Mobilization</td>
<td>Low-velocity, mid to end-range oscillatory force into hip extension in a prone position with the knee flexed to 90 degrees</td>
</tr>
<tr>
<td>Hip Medial Glides in Side-lying</td>
<td>Low-velocity, end-range, inferior-medial oscillatory force to the proximal femur in a sidelying position, while an assistant applies a longitudinal traction force to the hip in slight abduction</td>
</tr>
<tr>
<td>Lumbopelvic Techniques</td>
<td>Description</td>
</tr>
<tr>
<td>--------------------------------------------------------------------------------------</td>
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</tr>
<tr>
<td>Lumbar Neutral “Gapping” Manipulation aka the “million dollar roll”</td>
<td>High-velocity, end-range, right-rotational force to the lower lumbar spine on the mid lumbar spine in a right side-lying, left thoracolumbar side-bent and rotated position</td>
</tr>
<tr>
<td>Lumbar Extension Manipulation</td>
<td>High-velocity, end-range, anterior-superior force to the right pelvis on the lower lumbar spine in a right side-lying, left thoracolumbar side-bent and rotated position</td>
</tr>
<tr>
<td>Lumbopelvic Regional Manipulation</td>
<td>High-velocity, end-range, posterior-inferior force to the right innominate on the lower lumbar spine in supine, with lumbar right side-bending and left rotation</td>
</tr>
<tr>
<td>Lumbar Alternate Neutral Gapping Manipulation</td>
<td>High-velocity, end-range, left-rotational force to the pelvis on the lower lumbar spine in left side-lying, with right thoracolumbar rotation and slight right hip flexion</td>
</tr>
<tr>
<td>Lumbar Central Posterior/Anterior (PA) Graded Mobilization</td>
<td>A low-velocity, mid to end-range, posterior-anterior oscillatory force through the spinous process of the lumbar spine on the upper lumbar spine in a prone position</td>
</tr>
<tr>
<td>Lumbar Unilateral Posterior/Anterior (PA) Graded Mobilization</td>
<td>A low-velocity, mid to end-range, posterior-anterior oscillatory force through the articular pillar of the lower lumbar spine on the upper lumbar spine in a prone position</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Thoracic Techniques</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supine Extension Manipulation of the Upper Thorax (T1-T3)</td>
<td>A high-velocity, end-range, A-P force through the elbows to the cervicothoracic junction on the upper thoracic spine in a supine bridged position</td>
</tr>
<tr>
<td>Seated Mid Thoracic Distraction Thrust</td>
<td>A high-velocity, mid to end-range, distraction force to the midthoracic spine on the lower thoracic spine in a sitting position, in slight flexion with the patient’s arms crossed</td>
</tr>
<tr>
<td>Seated CT Junction Thrust</td>
<td>A high-velocity, end-range, traction force to the cervicothoracic junction on the upper thoracic spine in a sitting position with the patient’s hands interlaced behind their neck</td>
</tr>
<tr>
<td>Supine Mid Thoracic Flexion</td>
<td>A high-velocity, end-range, anterior-posterior force through the elbows to the middle thoracic spine on the lower thoracic spine in a supine position with patient’s arms crossed</td>
</tr>
<tr>
<td>Prone Mid-Lower Thoracic Extension Manipulation</td>
<td>A high-velocity, mid to end-range, posterior-to-anterior force to the midthoracic spine on the upper thoracic spine in a prone position</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
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</tr>
<tr>
<td><strong>Cervical Techniques</strong></td>
<td><strong>Description</strong></td>
</tr>
<tr>
<td>Cervical Spine Central PA</td>
<td>A low-velocity, mid to end-range, posterior-anterior oscillatory force through the spinous process of the mid cervical spine on the lower cervical spine in a prone position with the cervical spine in slight flexion</td>
</tr>
<tr>
<td>Cervical Spine Unilateral PA</td>
<td>A low-velocity, mid to end-range, posterior-anterior oscillatory force through the articular pillar of the mid cervical spine on the lower cervical spine in a prone position with the cervical spine in slight flexion</td>
</tr>
<tr>
<td>Cervical Spine Hold-Relax Technique (flexion/opening)</td>
<td>A patient generated right side-bending force to the mid cervical spine on the lower cervical spine in supine with flexion and right lateral translation</td>
</tr>
<tr>
<td>Cervical Spine Hold-Relax Technique (extension/closing)</td>
<td>A patient generated left side-bending force to the mid cervical spine on the lower cervical spine in supine with extension and right side bending</td>
</tr>
<tr>
<td>Cervical Spine Extension/Closing Thrust (C2-C7)</td>
<td>A high-velocity mid-range inferior-medial force to the left articular pillar of the mid cervical spine on the lower cervical spine in supine, with slight extension, left sidebending and right rotation</td>
</tr>
<tr>
<td>Cervical Spine Flexion/Opening Thrust (C2-C7)</td>
<td>A high-velocity mid-range right lateral translation force to the left articular pillar of the mid cervical spine on the lower cervical spine in supine, with slight flexion, left sidebending and right rotation</td>
</tr>
<tr>
<td>Supine Cervical Upslope Manipulation (C2-T1)</td>
<td>A high-velocity, mid-range right rotational force to the mid cervical spine on the lower cervical spine in supine, with right rotation and left sidebending</td>
</tr>
<tr>
<td>AA Region Hold-Relax Technique</td>
<td>A patient generated left rotational force of the upper cervical spine on the mid cervical spine in supine with full cervical flexion and end range right rotation</td>
</tr>
<tr>
<td>OA Region Hold-Relax Technique</td>
<td>A patient generated extension force of the occiput on the upper cervical spine in supine, with upper cervical flexion, left rotation and slight right sidebending</td>
</tr>
<tr>
<td>Shoulder Techniques</td>
<td>Description</td>
</tr>
<tr>
<td>----------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Glenohumeral Internal Rotation (Gr I-IV)</td>
<td>Low-velocity, mid to end-range, oscillatory internal rotation force to the humerus on the glenoid in a supine position, with 90 degrees of shoulder abduction and elbow flexion</td>
</tr>
<tr>
<td>Glenohumeral External Rotation (Gr I-IV)</td>
<td>Low-velocity, mid to end-range, oscillatory external rotation force with slight distraction to the humerus on the glenoid in a supine position, with 90 degrees of shoulder abduction and elbow flexion</td>
</tr>
<tr>
<td>Glenohumeral Horizontal Adduction (Gr III-IV)</td>
<td>Low-velocity, mid to end-range, oscillatory adduction force with slight distraction to the humerus on the glenoid in a supine position, with 90 degrees of shoulder flexion and elbow flexion</td>
</tr>
<tr>
<td>Glenohumeral Caudal Glides (Gr II-IV) with Abduction Progression</td>
<td>Low-velocity, mid to end-range, oscillatory caudal force with slight distraction to the humerus on the glenoid in a supine position, with 90 degrees of shoulder abduction and elbow flexion</td>
</tr>
<tr>
<td>Glenohumeral Anterior-Posterior (AP) Glides (Gr III-IV)</td>
<td>Low-velocity, mid to end-range, oscillatory anterior to posterior force with slight distraction to the humerus on the glenoid in a supine position, with 90 degrees of shoulder abduction and elbow flexion</td>
</tr>
<tr>
<td>Acromioclavicular (AC) Anterior-Posterior (AP) Glides</td>
<td>Low-velocity, mid to end-range, oscillatory anterior to posterior and posterior to anterior force to the clavicle on the acromion in a supine position</td>
</tr>
<tr>
<td>Acromioclavicular Rotation (Gr II-IV)</td>
<td>Low-velocity, mid-range, inferior to superior oscillatory force to the clavicle on the acromion in a supine position</td>
</tr>
<tr>
<td>Sternoclavicular (SC) Posterior Glides</td>
<td>Low-velocity, mid to end-range, oscillatory anterior to posterior force to the clavicle on the sternum in a supine position</td>
</tr>
<tr>
<td>Scapulothoracic Glides, Multiple Directions</td>
<td>Low to high-velocity, end-range, force into retraction and/or posterior tilt to the scapula on the thorax in a sidelying position</td>
</tr>
<tr>
<td>Elbow Techniques</td>
<td>Description</td>
</tr>
<tr>
<td>Elbow Flexion Graded Mobilization (Neutral/Abduction/Adduction)</td>
<td>Low-velocity, mid to end-range, oscillatory force into humeroulnar flexion in a supine position, in neutral or with varus or valgus stress</td>
</tr>
<tr>
<td>Elbow Extension Graded Mobilization (Neutral/Abduction/Adduction)</td>
<td>Low-velocity, mid to end-range, oscillatory force into humeroulnar extension in a supine position, in neutral or with varus or valgus stress</td>
</tr>
<tr>
<td>Elbow Longitudinal Distraction in Flexion Graded Mobilization</td>
<td>Low-velocity, end-range, oscillatory distraction force to the ulna on the humerus in a supine position, with the elbow flexed to 90 degrees</td>
</tr>
<tr>
<td>Humeral-Radial Anterior-Posterior/ Posterior-Anterior (AP/PA) Graded Mobilization</td>
<td>Low-velocity, mid to end-range, anterior to posterior or posterior to anterior oscillatory force to the radius on the humerus in a supine position, with the elbow extended and the forearm supinated</td>
</tr>
<tr>
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</tr>
<tr>
<td>Forearm Pronation/Supination Graded Mobilization</td>
<td>Low-velocity, mid to end-range, pronation or supination force to the distal radioulnar joint in a supine position, with the elbow flexed to 90 degrees</td>
</tr>
<tr>
<td>Radial Head Posterior-Anterior (PA) Manipulation</td>
<td>High-velocity, end-range, posterior to anterior force to the radius on the ulna during humeroulnar extension in standing</td>
</tr>
<tr>
<td>Elbow Mobilization with Movement (treating lateral epicondyalgia)</td>
<td>Low-velocity, end-range, medial to lateral sustained glide to the ulna on the humerus in a supine position, with active gripping or wrist extension in elbow extension and forearm supination</td>
</tr>
<tr>
<td><strong>Wrist and Hand Techniques</strong></td>
<td><strong>Description</strong></td>
</tr>
<tr>
<td>Radiocarpal (RC) Anterior-Posterior (AP) Glides (Gr II-IV)</td>
<td>Low-velocity, mid to end-range, anterior to posterior or posterior to anterior oscillatory force to the proximal carpal row on the radius in a supine position with the forearm in neutral and the elbow flexed to 90 degrees</td>
</tr>
<tr>
<td>Radiocarpal (RC) Ulnar Glides (Gr II-IV)</td>
<td>Low-velocity, mid to end-range, ulnar oscillatory force to the proximal carpal row on the radius in a supine position with the forearm supinated and the elbow extended</td>
</tr>
<tr>
<td>Radiocarpal (RC) Radial Glide (Gr II-IV)</td>
<td>Low-velocity, mid to end-range, radial oscillatory force to the proximal carpal row on the radius in a supine position with the forearm pronated and the elbow extended</td>
</tr>
<tr>
<td>Metacarpalpalangeal (MCP), Anterior-Posterior/ Posterior-Anterior (AP/PA) Glides (Gr II-IV)</td>
<td>Low-velocity, mid to end-range, anterior to posterior or posterior to anterior oscillatory force to the proximal phalanx on the metacarpal in a seated position with slight MCP flexion</td>
</tr>
<tr>
<td>Interphalangeal (PIP) Anterior-Posterior/ Posterior-Anterior (AP/PA) Glides (Gr II-IV)</td>
<td>Low-velocity, mid to end-range, anterior to posterior or posterior to anterior oscillatory force to the middle phalanx on the proximal phalanx in a seated position with slight MCP flexion</td>
</tr>
<tr>
<td>Interphalangeal (DIP) Anterior-Posterior/ Posterior-Anterior (AP/PA) Glides (Gr II-IV)</td>
<td>Low-velocity, mid to end-range, anterior to posterior or posterior to anterior oscillatory force to the distal phalanx on the middle phalanx in a seated position with slight MCP flexion</td>
</tr>
<tr>
<td>Procedure</td>
<td>Description</td>
</tr>
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<td>---------------------------------------------------------------------------</td>
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</tr>
<tr>
<td>Scapulunate Radiocarpal Manipulation</td>
<td>A high-velocity, end-range posterior to anterior force to the scaphoid on the radius in a standing position with elbow extension and forearm pronation</td>
</tr>
<tr>
<td>1&lt;sup&gt;st&lt;/sup&gt; Carpometacarpal (CMC) Anterior- Posterior/ Posterior-Anterior (AP/PA) Graded Mobilization GR II-IV</td>
<td>Low-velocity, mid to end-range, anterior to posterior or posterior to anterior oscillatory force to the 1&lt;sup&gt;st&lt;/sup&gt; metacarpal on the trapezium in a seated position</td>
</tr>
<tr>
<td>Intercarpal Horizontal Extension Mobilization</td>
<td>Low-velocity, mid to end-range, dorsal to palmar oscillatory force to the dorsal side of the carpal bones decreasing the transverse palmar arch with the forearm in neutral and the elbow flexed to 90 degrees</td>
</tr>
<tr>
<td>Intercarpal Horizontal Flexion Mobilization</td>
<td>Low-velocity, mid to end-range, palmar to dorsal oscillatory force to the palmar side of the carpal bones increasing the transverse palmar arch with the forearm in neutral and the elbow flexed to 90 degrees</td>
</tr>
</tbody>
</table>