

Assessment for

Range of Motion

Part 3

Very Important!!!

Also note: I have not specified to “repeat on opposite side” for tests that should be done on both sides. It is a given that you will do the tests on both sides. For example, if you test neck rotation on one side, you will always do it on both sides.

I didn't note this in the slides for brevity, but please remember that you'll always test both sides.

Take note of which muscles are lengthening and shortening for cues on what muscle is doing what action.

Very Important!!!

Please note: This slide deck shows both STRENGTHENING and STRETCHING poses/exercises. The ROM testing indicates restrictions for RANGE OF MOTION (ROM) ONLY! For example, if a slide tells you that the if the client has restrictions with the ROM test that the muscle that is probably restricted is the subscapularis, that means you need to STRETCH (NOT strengthen) the subscapularis.

So, why did I also list strengthening exercises in this slide deck?

#1) Because we will eventually test for lack of strength to determine which muscles are weak. When we do cover this, you will already know how to strengthen those muscles. This saves time for both of us.

#2) Because many people who need to stretch muscles in a particular area may also be weak in that area. NOT NECESSARILY...so don't automatically assume they need strengthening, but use common sense (and TEST for strength – which we will learn later). For example, if a client is tight in their pecs, but they are a weight lifter, they probably only need stretching for the pecs. But, if a client is tight in their pecs and they are very sedentary, chances are good that they will need both stretching and strengthening.

Key to Slides

- Refer to Thomas Myers Anatomy Trains
- BFL – Back Functional Line
- LL – Lateral Lines
- DFAL – Deep Front Arm Line
- DFL – Deep Front Line
- DBAL – Deep Back Arm Line
- FFL – Front Functional Line

Key to Slides (cont'd)

- LL – Lateral Line
- SBAL – Superficial Back Arm Line
- SBL – Superficial Back Line
- SFAL – Superficial Front Arm Line
- SFL – Superficial Front Line
- SL – Spiral Line

Lower Body Tests

Side Bend

1. Place your foot between client's feet (standing behind him)
2. Ask client to bring feet against close to your foot, toes aligned straight ahead
3. Keep client from moving hips or shoulders forward. Movement comes from side bending with no compensations

No Restrictions: Client is able to slide fingers the same distance down both legs and can reach knee on both sides.

Restrictions may indicate issue with Quadratus Lumborum (LL, pg. 207) and External Oblique (LL, SL, FFL, pg. 209 - 212) – Look up in TGB



Note: Not a definitive test. See Trunk Rotation Test

Contract/Strengthen Quadratus Lumborum

Flexing the trunk to one side in Trikonasana

Both sides contract in Chakrasana (wheel pose)

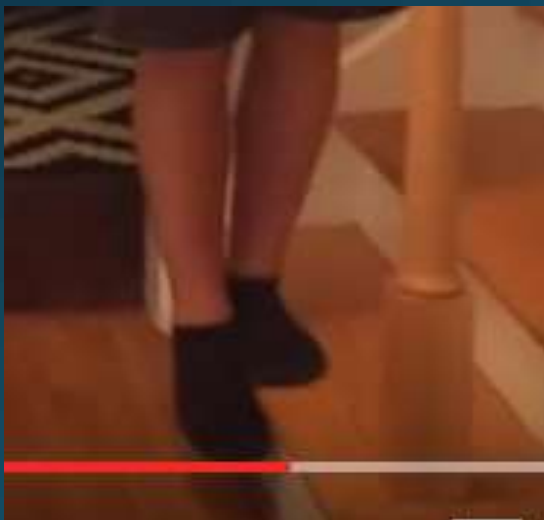
Assists in rotating the vertebral column in twisting poses such as Ardha Matsyendrasana (1/2 lord of the fishes)

Stretch the QL

Lengthening side in Jathara Parivartanasana (supine spinal twist)

Child's Pose and Puppy Pose variations - walking hands one direction, pushing hips/torso other way

Step stretch: Stand side ways on step, hand on rail. Let one foot dangle off step as shown in photo. Then take opposite arm up into Konasana



Stretch the QL (cont'd)

Alternative to stretch done on step, shown in previous slide, is to use a block. Stand on a block with left foot, bending the left knee, with the side body toward wall, as shown. Put left forearm (or just hand if that feels better) on the wall and reach right arm up and over for a lateral stretch. Let the right foot hang down – it doesn't need to touch the floor, but go toward the floor. In the photo, Zakia is offering Nancy an assist by gently pulling on her leg. Repeat on other side.

Don't forget to bend the knee of the supporting leg.

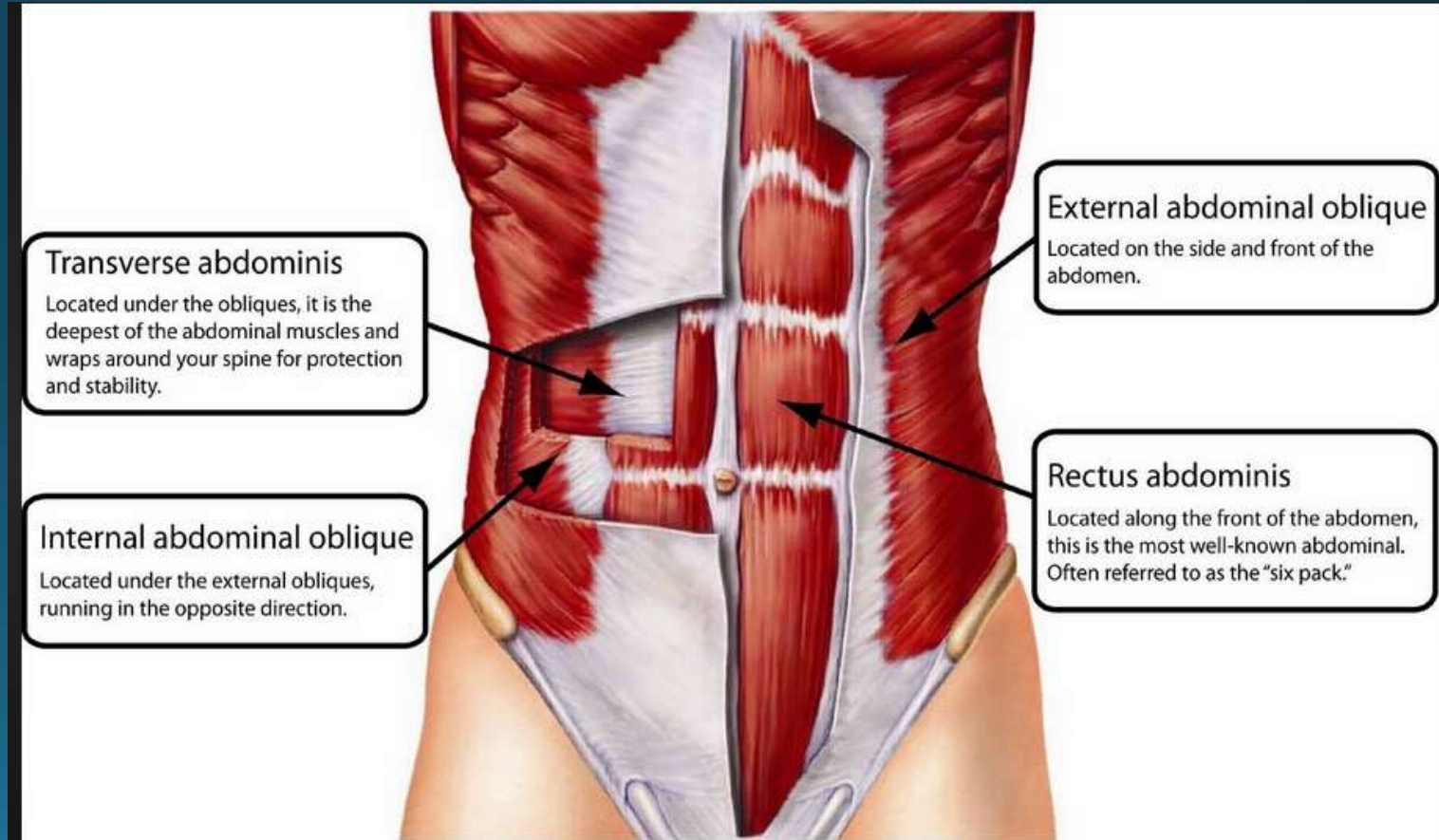


Contract/Strengthen External Oblique

Bottom side external oblique contracts in Trikonasana (side angle)
Oblique Curls

Stretch the External Oblique

Konasana (lateral flexion)
Jathara Parivartanasana (supine spinal twist)



Trunk Rotation

1. Client lies on side with lower leg, hips, shoulder and back aligned, lower knee toward table/mat
2. Place one hand on greater trochanter to stabilize hip
3. Press shoulder down to table slowly and gently

No Restrictions: Upper shoulder can touch table

Restrictions: Upper shoulder can't touch table

Restrictions may indicate issue with **Quadratus Lumborum** (LL, pg. 207)

The QL already covered in a previous slide



Flat Back

1. Have seated client drop head and lean forward
2. Look for flattened areas ranging over 2-3 vertebrae
3. Press or tap spinal processes in these areas looking for tenderness

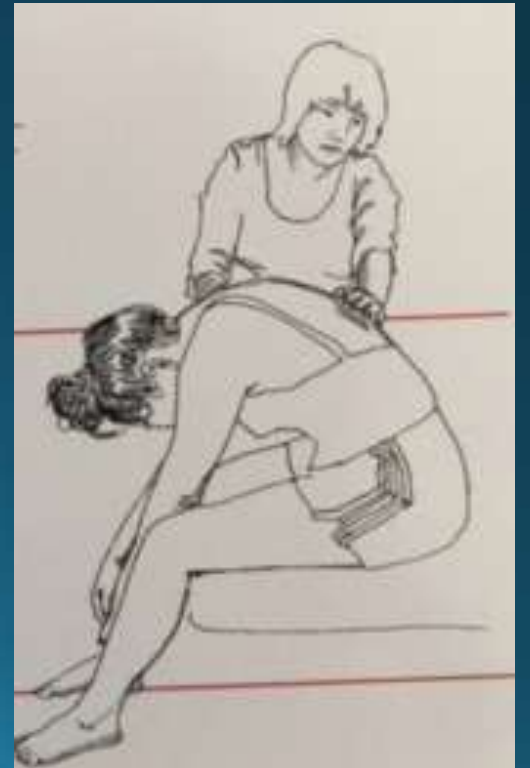
No Restrictions: Back smoothly rounded; no tenderness

Restrictions: Flattened areas and tenderness

Restrictions may indicate issue with **Deep Paraspinals (see TGB)**

Strengthen: Bhujangasana (cobra), Parsvakonasana (side angle) , Navasana (boat)

Stretch: with Halasana (plow) , Cat/Cow , Balasana



Rectus Abdominis (see pg. 210 TGB)

Testing for shortened rectus abdominis:

- If a person has thoracic kyphosis or does a lot of ab crunches, they might have shortened rectus abdominis
- Ask client to stretch out in Tadaka Mudra (long arms and legs on the mat) and ask them if they feel tight in abs. If you palpate, do so gently and with their permission to feel for tightness
- If they feel tightness (or you feel it) they may have chronic contraction issues or muscle shortness

Length of Abs

- Often, we see a lack of strength in all abs
- **If we do see a shortness in ab muscles, make sure client is not doing excessive crunches (instead, you need to encourage other forms of core work that engage transverse more than rectus abdominis) and you should include:**
 - Tataka Mudra (laying stretch out, arms up)
 - Tadasana and other standing poses with awareness of length in the abs
 - Setubandasana (bridge)
 - Ustrasana (camel)
 - Lateral flexion and rotation poses (for oblique lengthening)
 - Standing tall and stretching through abs/hips while walking

Strength of Abs

- Lack of core strength can be the result of weak transverse abs(TrA)
- It can also be from dysfunctional use of the trunk that is creating a situation where the lower fibers of the rectus abdominis are not keeping the client out of excessive anterior tilt.

Strength of Abs

To remedy this:

- “While many clinicians will add a posterior pelvic tilt to the rehab program, this usually occurs as a progression from the abdominal hollowing.
- The problem with this approach is that, as the TrA becomes stronger and thicker, it holds the lumbar spine in increased lordosis.
- This will make it more difficult to stretch the posterior lumbar fascia which is required in order for the pelvis to rotate backwards.” (to bring it into neutral)
- **Keep reading...the approach above is not the best solution!**

Strength of Abs

- “A more appropriate treatment option would include soft tissue release of the thoraco-lumbar fascia, the rectus femoris and TrA.
- As these tissues relax and lengthen, the rectus femoris will be able to function better in order to create and maintain a neutral pelvis which has been shown to decrease complaints of low back pain (Levine 1996).
- Progression to a strengthen program should include the rectus femoris (via posterior pelvic tilts, not crunches/sit-ups) and the hip extensors (hamstrings/gluteus maximus).”

Source (active at time of publication:

<https://assesstreatcondition.wordpress.com/2013/06/27/pelvic-tilting-and-the-myth-of-the-transverse-abdominis/>)

Strength of Abs

- Transverse ab strength may be tested by having client lie on table (straight legs). Slide hand under low back and ask them to posterior tilt using abs (draw navel to spine – ask them to “smash your hand”). If they can’t do this, they have very weak transverse – SEE NEXT SLIDE for MORE TESTING!

Strength of Abs (continued)

- From previous slide test, if client can “smash your hand” then passively lift their legs to 90 degrees while hand is still under their back. Ask them to “keep smash your hand” as they lower legs toward ground. (Knees may have to bend if hams are tight)
- Strong – legs go all the way or within a couple of inches of ground
- Fairly Strong – Legs go about half way
- Needs work – Anything less than half way
- IMPORTANT to make sure they are still VERY actively pressing your hand down (“smashing your hand”)

Strength of Abs (continued)

- Video: Go to about 3 minutes and 15 seconds of this video and you will see Dr. Bryan teaching PT students how to do the transverse ab strength test exactly the way it is described here (in posterior tilt). (As always, the links are active at the time of publication)

<https://www.youtube.com/watch?v=R85c8rtDpUM>

- I mention the posterior tilt because we usually stay in neutral.
**More about this on next slide

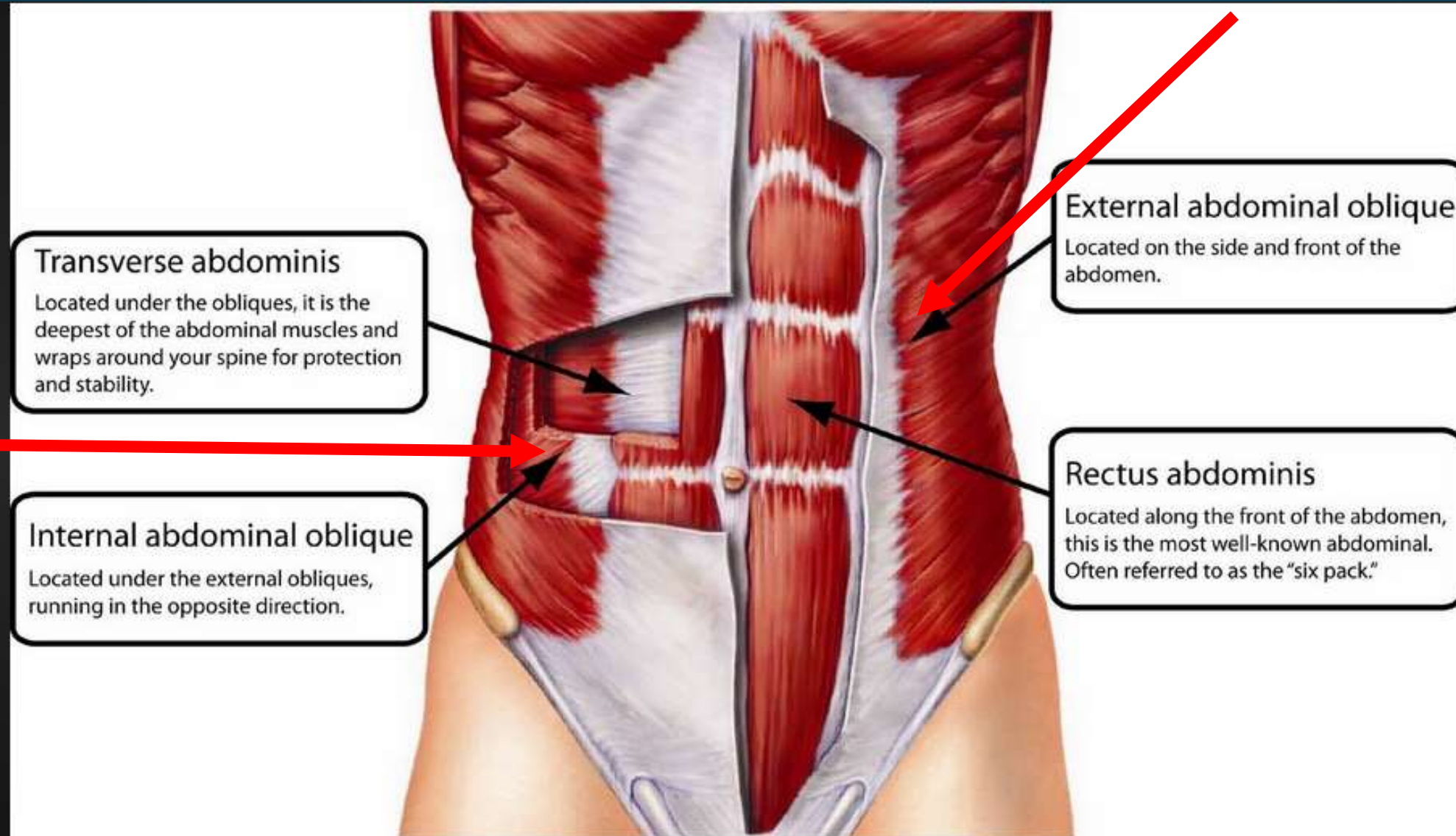
Strengthening Ab Exercises

- Navasana (boat – but remember psoas involvement), Uddiyana Bandha, Kakasana (Crow), Sirsasana (headstand)
- The test movement itself shown in previous slides (leg lowering while in posterior tilt) is a GREAT transverse strengthener; however, you HAVE to make sure the tilt is coming from the transverse abs and NOT from the psoas. If this can't be accomplished, then leave the spine in neutral for strengthening exercises (but keep the test the same).
- **Posterior tilt: We normally use neutral spine, but some PT's will advance this to posterior tilt for more workload. If I felt this might be too hard or confuse my client, I'd omit it.

Ab Exercises

- We think back pain is often from weak abs, but it might be more from thickening and tightness of soft tissue (fascia, aponeurosis, etc.).
- Here is a good article with more info (active at the time of publication)
<https://assesstreatcondition.wordpress.com/2013/06/27/pelvic-tilting-and-the-myth-of-the-transverse-abdominis/>
- (See previous slides for ab lengthening postures)

Note Int/Ext Oblique Locations



External vs. Internal

Oblique muscle fibers run diagonally.

EXTERNAL oblique fibers run diagonally downward, just as your hands would run if you were putting hands in your jacket pocket.

I remember EXTERNAL obliques as, "Let me put my hands in the upper pocket of my jacket and see if I have any "EX – tra" money. – EX as in EXTRA and EX as in EXTERNAL" And then I know the internal obliques are the opposite (running upward

As always, ignore if this confuses you. Your mileage may vary with this mnemonic device 😊

Rectus Abdominis and Obliques ROM Test

- For obliques, observe client in Trikonasana.
 - Restrictions in upper side indicate possible lack of strength in internal oblique and lack of flexibility in external oblique.
 - Restrictions in lower side indicate possible lack of flexibility in internal oblique and lack of strength in external oblique.
- **Strengthen/Stretch (opposite sides):** Trikonasana, Konasana, Utthita Parsvakonasana (extended side angle), Twisting Postures

Hip Flexors (Thomas Test)

1. Position client on table, thighs extended beyond edge
2. Pull client knee to chest, ask them to hold with hands clasp beneath knee

No Restrictions: Thigh extends and leg hangs directly below knee (may NOT be a full 90°)

Restrictions:

- Thigh off table to some degree indicates **Psoas (DFL, pg 332-334)**
- Leg extends beyond knee indicates **Rectus Femoris (SFL, pg 306)**
- Knee can't be kept in alignment with hip (leg abducts away from body) indicates **Tensor Fascia Lata or TFL (LL, SL, pg 324)**

Look these up in TGB

Watch 2 ways to perform test (2nd described above) test here:

http://www.physio-pedia.com/Thomas_Test

(All links are active at the time of publication)



Hip Flexors (Thomas Test)

Yoga poses/exercises to **strengthen** Psoas, Rectus Femoris, TFL (look up in TGB)

Psoas: Supta Padangusthasana (hand to big toe) and Navasana (boat)

Rectus Femoris: Utkatasana (chari) and Padahastangasana (hand under foot forward fold)

TFL: Parsvotthanasana (pyramid, back leg), Ardha Chandrasana (half-moon, stabilizes lifted leg)

Yoga poses/exercises to **stretch/release** Psoas, Rectus Femoris, TFL:

Psoas: Setubandasana (bridge) and Anjaneyasana (need some posterior tilt to get hip flexor stretches)

Rectus Femoris: Supta Virasana, Natarajasana, Kapotanasana (back leg)

TFL: Padmasana, Ardha Matsyendrasana

Heel-to-Buttock Rectus

1. Bend knee with foot on table. Drop test leg over edge of table
2. Place hand on knee or thigh and other hand at ankle
3. Flex knee by moving ankle toward buttock with foot in neutral (not pointed) Stop when restriction is felt

No Restrictions: Thigh extends and leg hangs directly below knee

Restrictions: Lower leg hangs forward, heel will not touch buttock. Thigh may also be restricted by tight psoas

Restrictions may indicate issue with **Rectus Femoris (SFL)**, previously covered



Heel-to-Buttock Vastus

1. With knee flexed and ankle neutral (toe not pointed) bring heel to buttock
2. Note point where resistance is felt

No Restrictions: Heel reaches (or gets close to!) buttock

Restrictions: Heel cannot reach buttock.

Restrictions may indicate issue with **Vastus Medialis (SFL)**, **Vastus Intermedius (SFL)**, **Vastus Lateralis (SFL)**, **Rectus Femoris (SFL)** – pg 306

Look up in TGB



Heel-to-Buttock Vastus (vastus muscles as a group)

Yoga poses/exercises to Strengthen (look up in TBG):

Vastus Medialis – Trikonasana (triangle), Utkatasana (chair pose; work with heels elevated or work the lower range of motion more)

Vastus Intermedius - Virabhadrasana II (warrior 2; back leg)

Vastus Lateralis - Virabhadrasana II (warrior 2; back leg)

All Vasti – Utthita Parsvakonasana (Extended Side Angle; front leg because rectus femorus is shortened and less effective with greater hip flexion), Bhujangasana (Cobra; work to extend the knees)

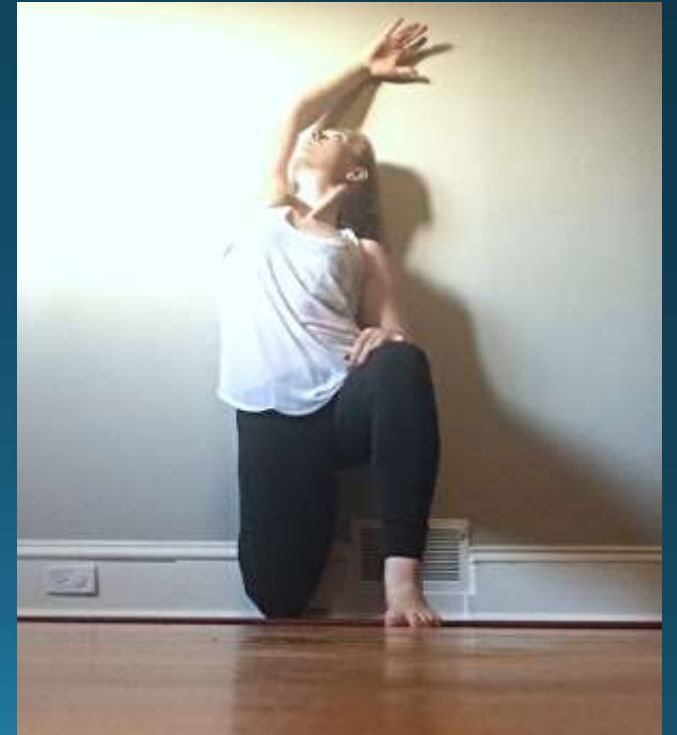
Rectus Femoris (previously covered - Utkatasana and Padahastangasana)

Heel-to-Buttock Vastus

Yoga poses/exercises to Stretch

Vastus Medialis, Intermedius and Lateralis (Vastii)

- Virasana (heroes pose)
- Eka Pada Rajakapotasana (king pigeon; back leg)
- Supta Virasana (reclining hero)
- Also, try quad stretch against wall (see pic). To create more lateral stretch:, extend arm and laterally flex adds to stretch



Heel-to-Buttock Vastus

Yoga poses/exercises to Stretch Rectus Femoris (continued)

Rectus Femoris (25% of the quads) - previously covered, but a few more things to add:

Rectus Femoris is not stretched fully in seated Virasana (Heroes – sitting with torso up, knees up, heels out)

It is only fully stretched in poses where we combine hip extension and knee flexion as we do in **Supta Virasana** (full reclining hero pose), a variation of **Anjaneyasana with heel to buttock**, and **Setubandhasana** (bridge)

Heel-to-Buttock Vastus

Yoga poses/exercises to Stretch Rectus Femoris (continued)

Dhanurasana (Bow), Chakrasana (Wheel) and Natarajasana (Dancer's) stretch the rectus femoris **IF the hip joint is not in alignment with the knee joint**

In these poses, the knees are actually moving away from buttocks (if the hand wasn't pulling it in). **In order to maximally stretch quads, knee should be fully flexed (heels to buttocks), as in RECLINED hero pose. (see next slide)**

Good resources: <http://www.asfyt.com/blog/anatomy-of-asana-dhanurasana>
<http://www.dailybandha.com/2014/06/the-rectus-femoris-muscle-in-yoga.html>

Links active at the time of publication

Stretching the rectus femoris is best accomplished in poses that combine hip extension and knee flexion. Poses like Virasana (with the hips flexing) are good for stretching the other heads of the quadriceps, however, a reclining variation is necessary to lengthen the rectus femoris. Figure 3 illustrates two poses that stretch this muscle.



Figure 3. Source: Ray Long, Daily Bandha

- The Dancer's Pose on the right stretches the rectus femoris while the one on the left doesn't because the hip is in alignment with the knee.



Knee to Armpit

1. Put client on back; flex one knee up
2. Push flexed knee toward opposite armpit but avoid direct knee pressure

No Restrictions: Knee and thigh lie flat on chest

Restrictions: Knee will not reach chest

Restrictions usually indicate tightness in **Gluteus Maximus** (pg. 315, LL), **Hamstrings** (pg. 311, SBL)

Look up in TGB



Knee to Armpit

Yoga poses/exercises that strengthen/contract Gluteus Maximus

- Virabhadrasana III (lifts and externally rotates back leg and fibers that insert on IT band assist in straightening knee)
- Ustrasana (Camel)
- Purvottanasana (Inline Plank)

Yoga poses/exercises that stretch Gluteus Maximus

- Uttanasana (forward fold)
- Parsvottanasana (pyramid; esp. front leg)
- Prasarita Padottanasana (wide leg forward fold)
- Virabhadrasana III (standing leg)
- Halasana (plow pose)

Knee to Armpit

Yoga poses/exercises that strengthen/contract Hamstrings

- Virabhadrasana I (front leg eccentrically contracted, back leg concentrically contracted)
- Purvottanasana (upward plank)
- Utthita Parsvakonasana (Extended Side Side Angle Front Leg)

Yoga poses/exercises that stretch Hamstrings

- Prasarita Padottanasana (wide leg forward fold)
- Paschimottanasana (**seated forward fold**)
- Kurmasana (kooor-MAHS-anna – Turtle) – especially the semitendinosus and semimembranosus because of the abduction of the legs

Standing Toe Touch - Uttanasana

1. Ask client to perform Uttanasana
2. While many testers perform this with locked knees, I prefer a very slight bend to protect knees. I do not believe this will skew your results significantly.

No Restrictions: Can touch fingertips to the floor

Restrictions: Cannot touch fingertips to floor (not indefinitely, may not reach floor)

Restrictions usually indicate tightness in **Hamstrings** (SBL – previous covered), ****Adductor Magnus** (pg. 319, DFL), or **Gluteus Maximus** (LL – previously covered) ****Look up in TGB**

May also be Gastrocnemius (see Ankle Dorsiflexion Test), Paraspinals (see Flat Back Test), or Vastus Lateralis (see Heel-to-Buttock Vastus Test)

Leg Lift (Uttanasana alternative)

If a client can't comfortably perform a standing forward fold, you might use a Leg Lift test. Place client on table with one knee bent and opposite leg straight. Slowly raise his leg (it is a passive movement for client – you do the work) to 90 degrees or as far as you can go without excessive resistance or discomfort to client and without client lifting hips.

Restrictions: Ask client where restriction is felt. If it is in low back, this may indicate disk issues. Refer to physician. If restriction is in hamstrings or gastrocnemius, these areas may benefit from extra stretch. Can also be restrictions in Adductor Magnus or Gluteus Maximus.

No restrictions: Client's leg can extend to 90 degrees with no excessive discomfort or pain, and client does not attempt to raise hips to compensate.

Standing Toe Touch

Yoga poses/exercises that strengthen/contract Adductor Magnus
(hams and glute max already covered)

- Ardha Matsyendrasana (1/2 lord of the fishes; top leg)
- Dandasana (staff pose; to adduct and internally rotate legs)
- Parighasana (gate – kneeling leg – maintains internal rotation and hip extension)

Yoga poses/exercises that stretch Adductor Magnus

- Prasarita Padottanasana (wide leg forward fold)
- Paschimottanasana (seated forward fold)
- Kurmasana (kooor-MAHS-anna – Turtle) – especially the semitendinosus and semimembranosus because of the abduction of the legs