Hip External Rotation

Evaluation and Measurement

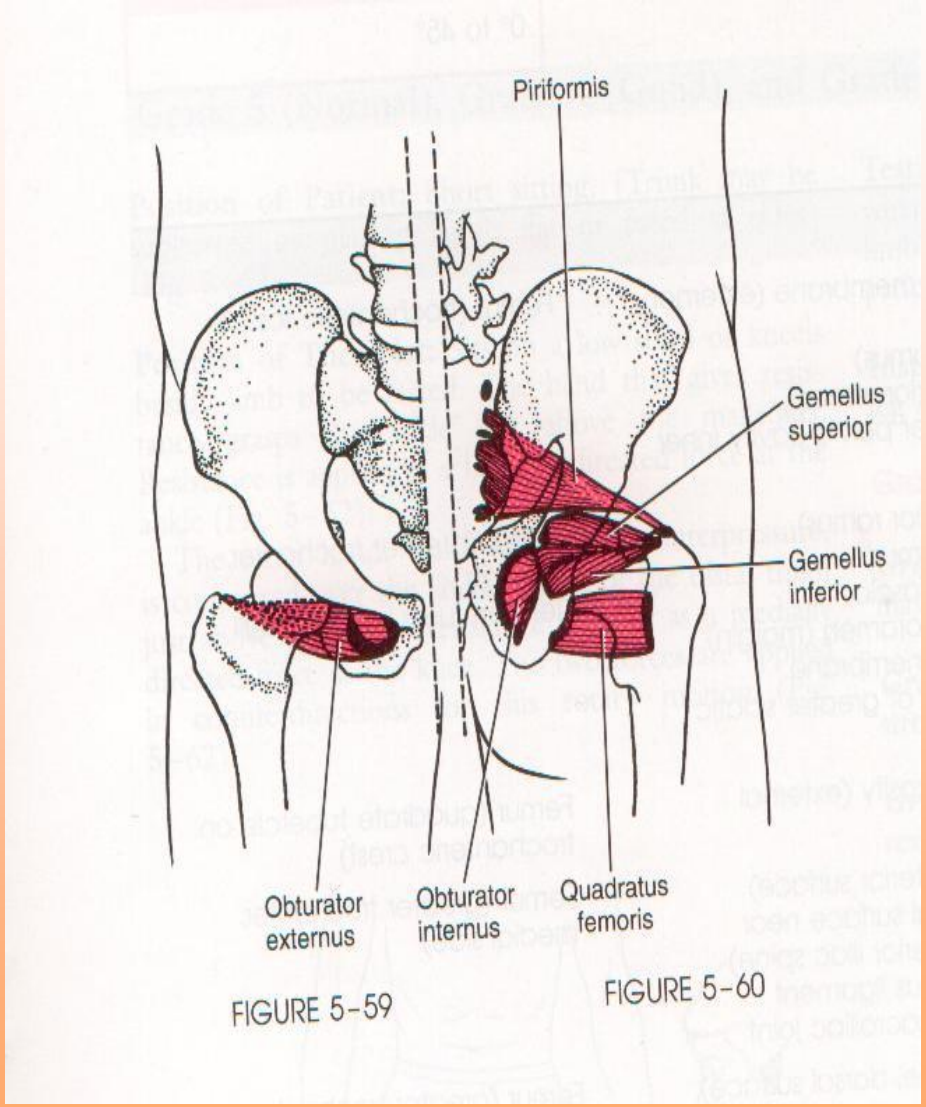
By Isabelle Devreux

Hip Ext. Rotation:

- ROM : 0° to 45°(less with hip extended).

- Muscles :

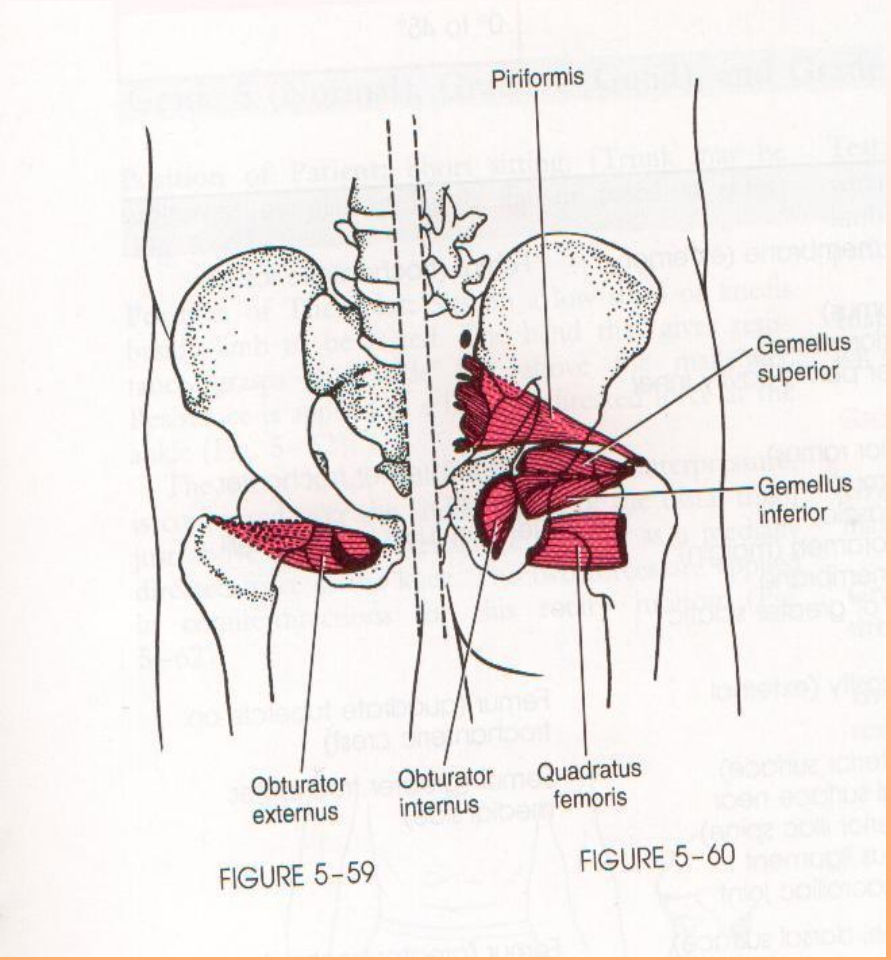
1. Obturator externus
2. Obturator internus
3. Quadratus Femoris
4. Piriformus
5. Gemellus Superior
6. Gemellus Inferior



Hip External Rotation

Piriformis:

- Origin: pelvic surface of sacrum between & lat. to 1,2,3,4 pelvic sacral; margin of greater sciatic foramen and pelvic surface of sacrotuberous ligament.
- Insertion: Superior border of greater traochanter of femur.
- Nerve: sacral plexus: L5,S1,S2



Hip External Rotation

2. Quadratus Femoris:

- Origin: proximal part of lateral border of tuberosity of ischium.
- Insertion: prox. Part of quadrate line extending distally from intertrochanteric crest.
- Nerve: sacral plexus : L4,L5,S1

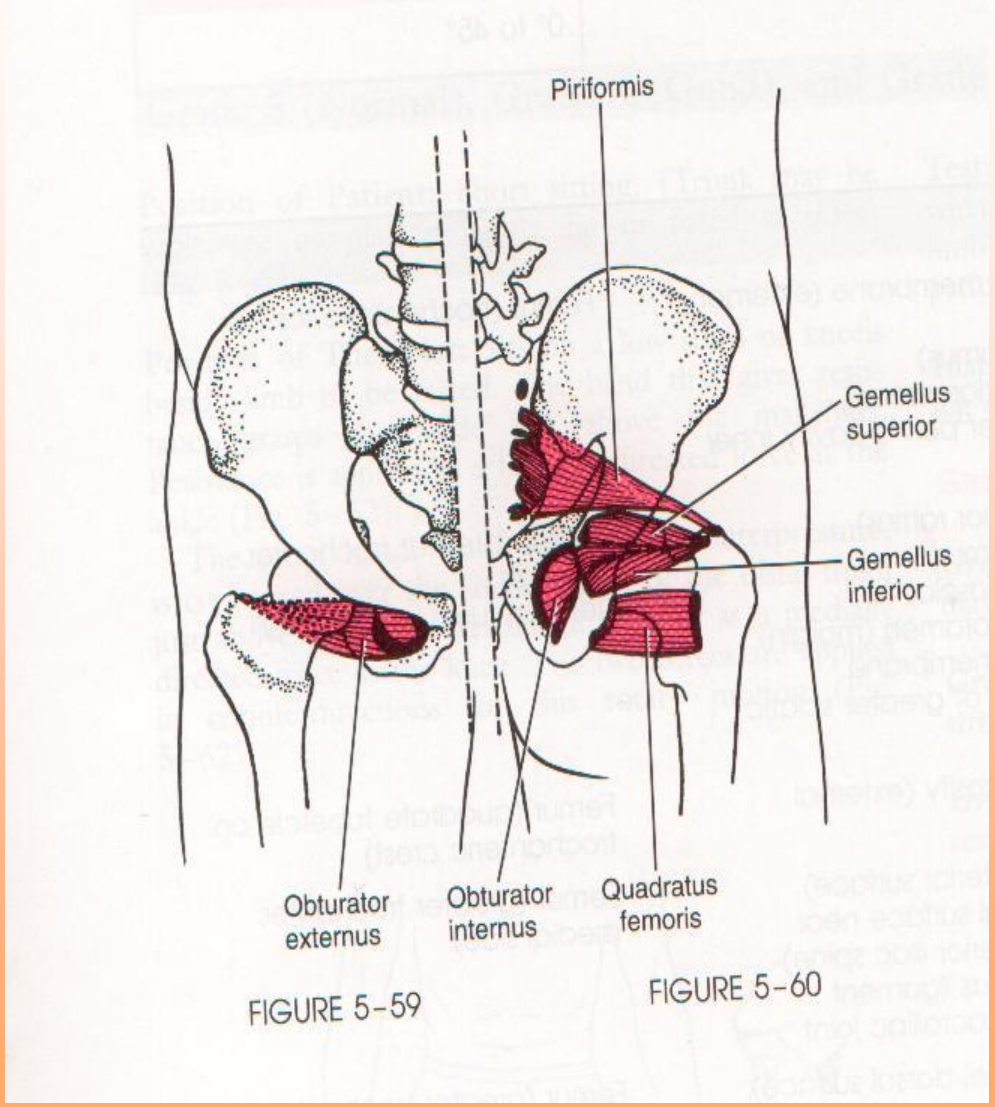


FIGURE 5-59

FIGURE 5-60

Hip External Rotation

3. Obturator Internus:

Origin: internal of pelvic surface of obturator membrane and margin of obturator foramen;Pelvic surface of ischium post. & prox. to obturator foramen.

Insertion: Medial surface of greater trochanter prox. to trochanteric fossa.

Nerve: sacral plexus: L5,S1, S2.

4. Obturator Externus:

Origin: Rami of pubis and ischium, ext. surf. of obturator membrane.

Insertion: trochanteric fossa of femur.

Nerve Obturator nerve: L3, L4

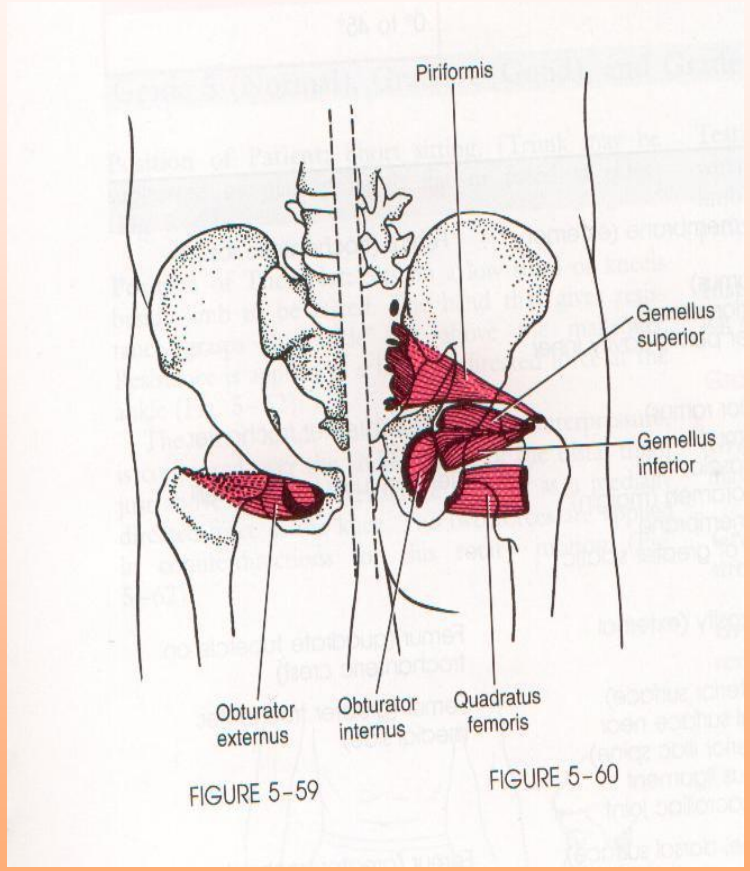


FIGURE 5-59 FIGURE 5-60

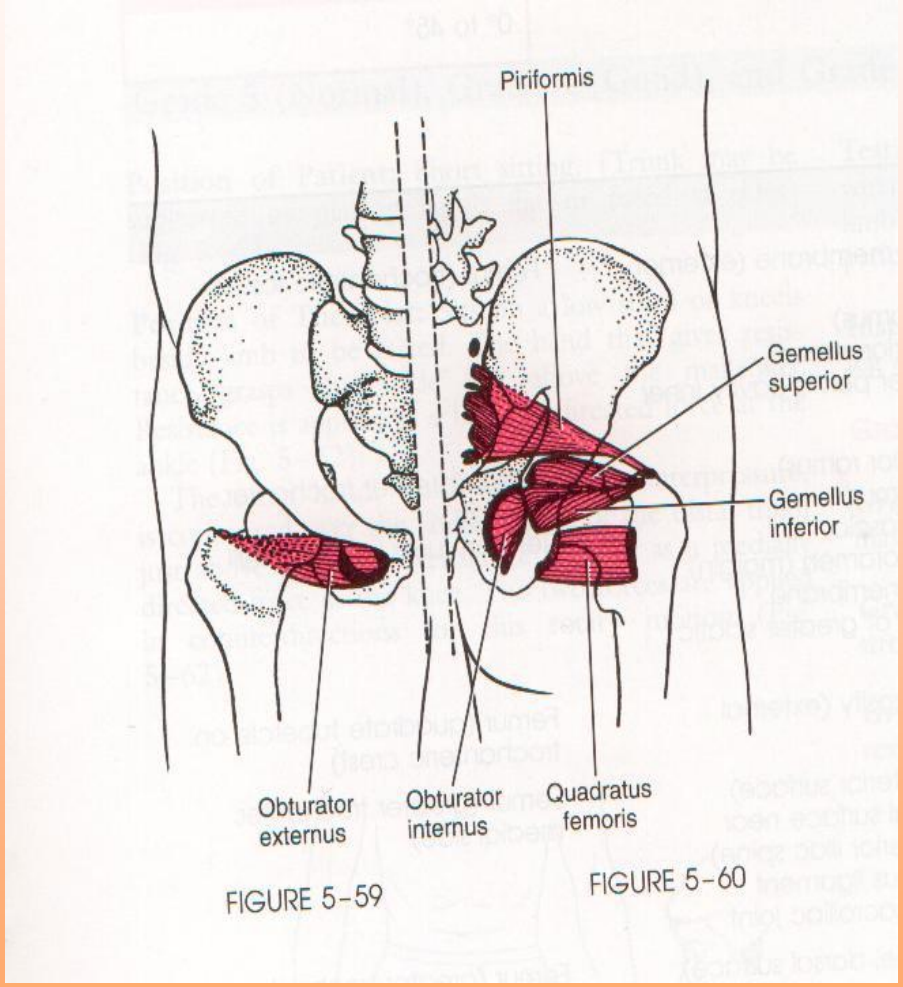
Hip External Rotation

- Gemellus Superior:

Origin: external surface of spine of ischium.

Insertion: with tendon of obturator internus into the medial surface of greater trochanter of femur.

Nerve : Sacral plexus: L5,S1,S2



Muscle Action of all Above Mentioned

- Action→ lateral or external rotation.

- Quadratus femoris and obturatus externus may assist in hip adduction.
- Piriformis, obturator int. and gemilli may assist in abduction when the hip is flexed.
- ROM → 45° lat. rot.
- If knee extention → limited due to :
  - **the lateral band of ilio-femoral lig.**
  - **and the tension in the hip medial rotator muscles.**

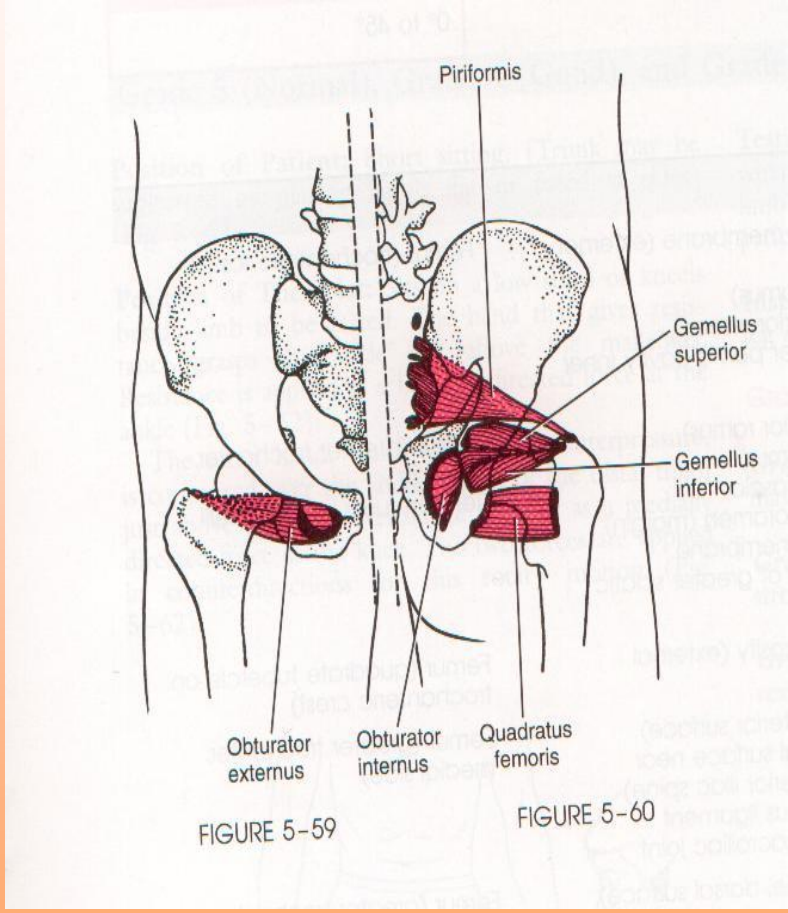


FIGURE 5-59

FIGURE 5-60

Testing of Lateral Rotation : gr. 3

- Pt. position: sitting w. legs over edge of table & grasps the edge to stabilize pelvis. Cushion is used under popliteal fossa to protect popliteal vessels from injury. (edge of the plinth)

- Therapist: stands on the side of the affected leg. prox. hand applies pressure above the knee joint to prevent abd. + flex. of the hip.

- Command: bring your foot over the other leg keeping your thigh in contact with the table---relax.

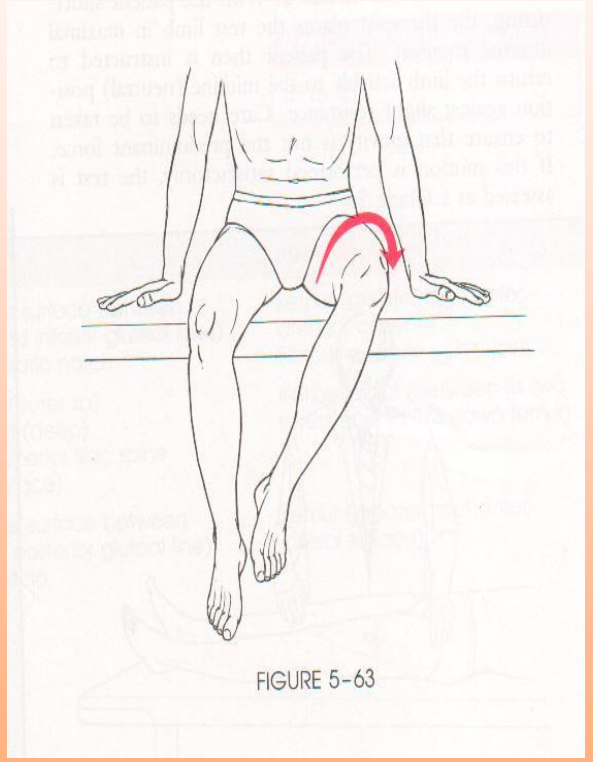


FIGURE 5-63

Hip Lat. Rot.: Grade 4 & 5

- Pt. & therapist position and stabilization as in gr. 3 + resistance on the medial surface of the leg above the ankle joint & press down + laterally.

- For gr. 5: same but max. resistance + hold

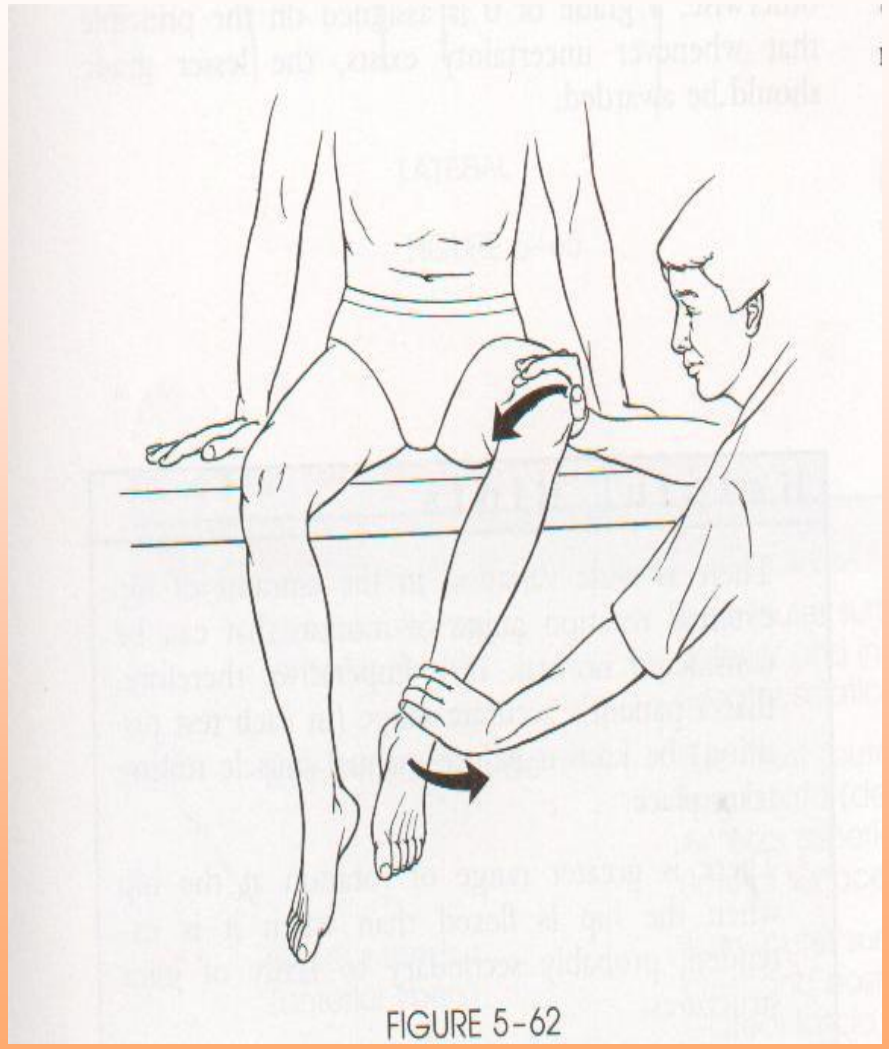


FIGURE 5-62

Hip Lat. Rotation : Grade 2

- Patient is in supine, affected leg is in medial rotation & away from the therapist.
- Therapist stands at the level of the thigh; proximal hand stabilizes the pelvis on the anterior iliac spine.
- Command: « turn your leg outward through full range or roll your leg out. »

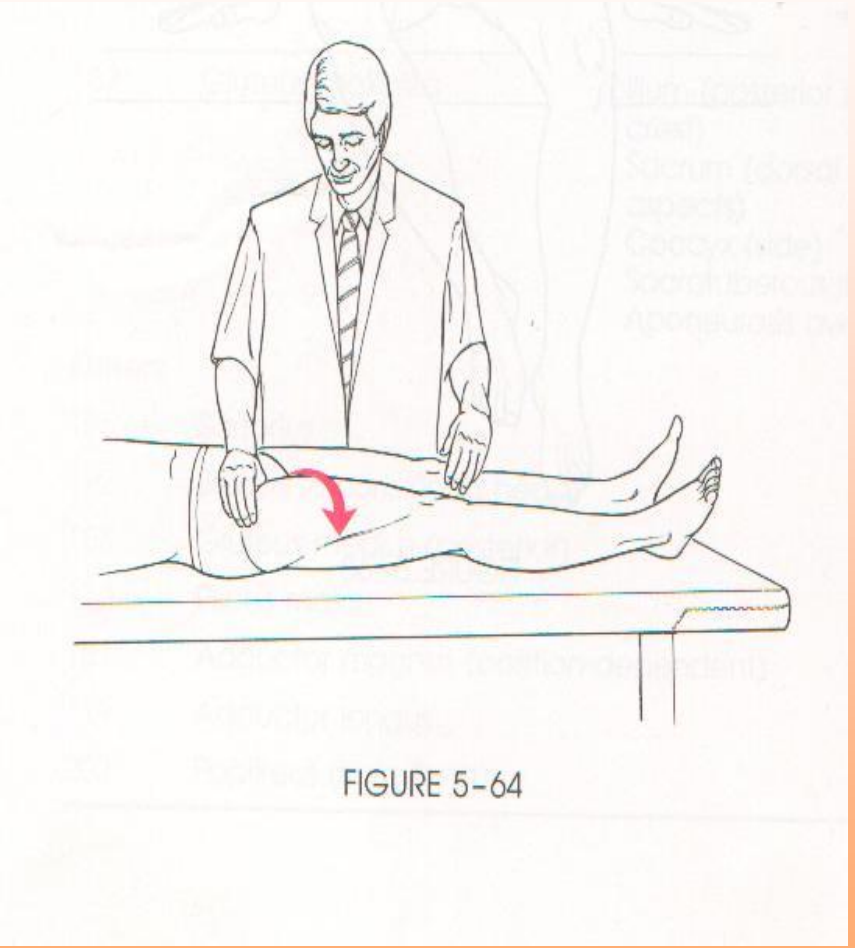


FIGURE 5-64

Hip Lat. Rotation: Grade 1-0

- Patient position as gr.2.
- Therapist position as gr. 2 .
- Palpation: deeply the ms.contraction behind the greater trochanter.

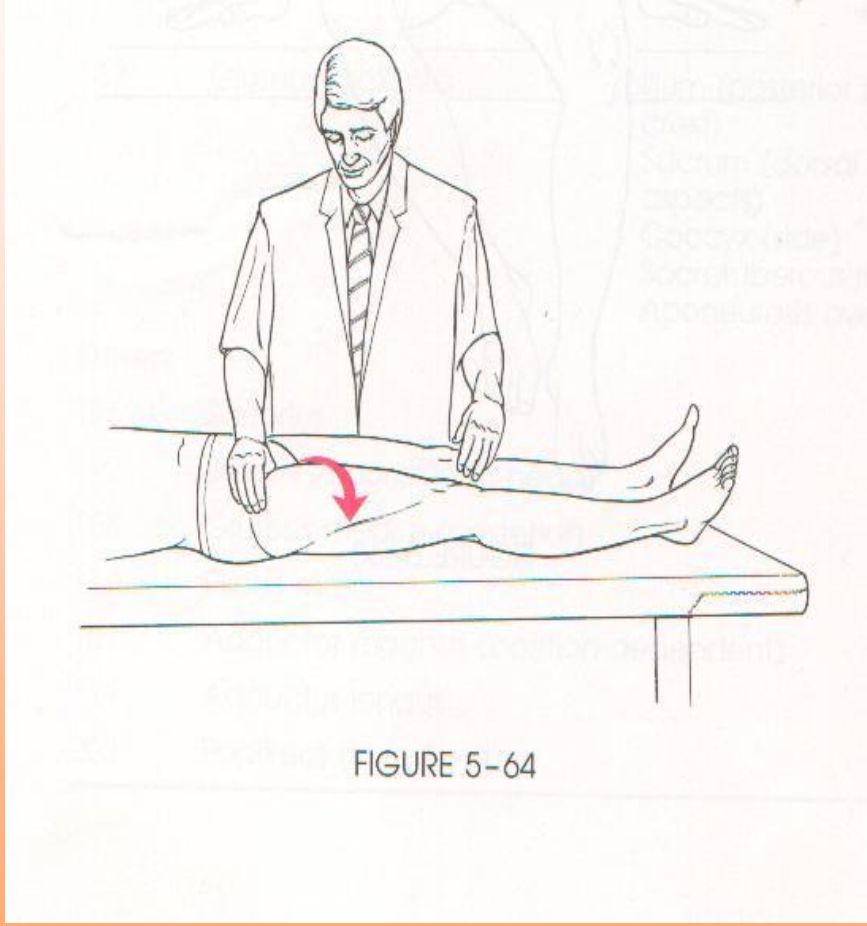


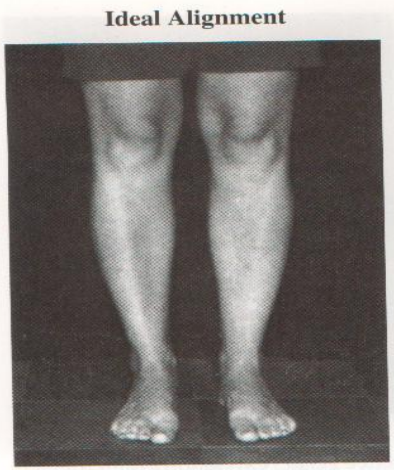
FIGURE 5-64

Hints:

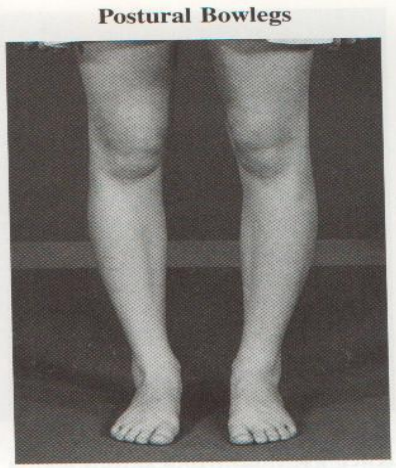
- There is a wide variation in the amount of hip external rotation ROM that can be considered as normal.
- There is greater ROM when the hip is flexed than when extended probably secundary to laxity of joint structures.
- In short sitting tests, the patient should not be allowed to use the following motions:
  - Lift the contralateral buttock off the table or lean in any direction to lift the pelvis.
  - Increase flexion of the test knee.
  - Abduct the test hip.

- Effects of weakness: of lateral hip rotators will produce a medial rotation of the femur + *pronation* of the foot & tendency for knock knee position or *genu valgus*.

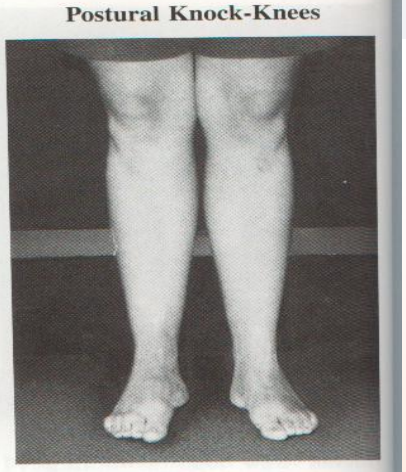
- Effects of contracture of ext. hip rot.:
  - Contracture of lat. rot. of the hip occurs usually in an abducted position of the hip.
  - ROM of medial rotation will be limited in standing with toes outwardly directed.



Ideal Alignment: In ideal alignment, the hips are neutral in rotation, as evidenced by the position of the patellae facing directly forward. The axis of the knee joint is in the coronal plane, and flexion and extension occur in the sagittal plane. The feet are in good alignment.



Postural Bowlegs: Postural bowlegs result from a combination of medial rotation of the femurs, pronation of the feet, and hyperextension of the knees. When femurs medially rotate, the axis of motion for flexion and extension is oblique to the coronal plane. From this axis, hyperextension results in external rotation, resulting in a separation at the knees and apparent bowing of the legs.



Postural Knock-Knees: Postural knock-knees result from a combination of lateral rotation of the femurs, supination of the feet and hyperextension of the knees. With lateral rotation, the axis of the knee joint is oblique to the coronal plane, and hyperextension results in adduction at the knees.

BOW LEGS

- Medial rot Femur
- Pronation of feet
- Hyperextention of knees

KNOCK KNEES:

- Lat. Rot of femur
- Supination of feet
- Hyperextention knees

Terminology

- Knock Knees: genu valgus (valgum)
- Bow legs: genu varus (varum)
- Knee hyperextention: genu recurvatum.

Hip Internal Rotation

Evaluation and Measurement

by Isabelle Devreux

Hip Internal Rotation

- ROM: 0° to 45°.
- Gluteus minimus and tensor of the fascia latae(prime movers)
- Accesory ms.:
  - Gluteus medius
  - Semitendinosis
  - Semimembranosus

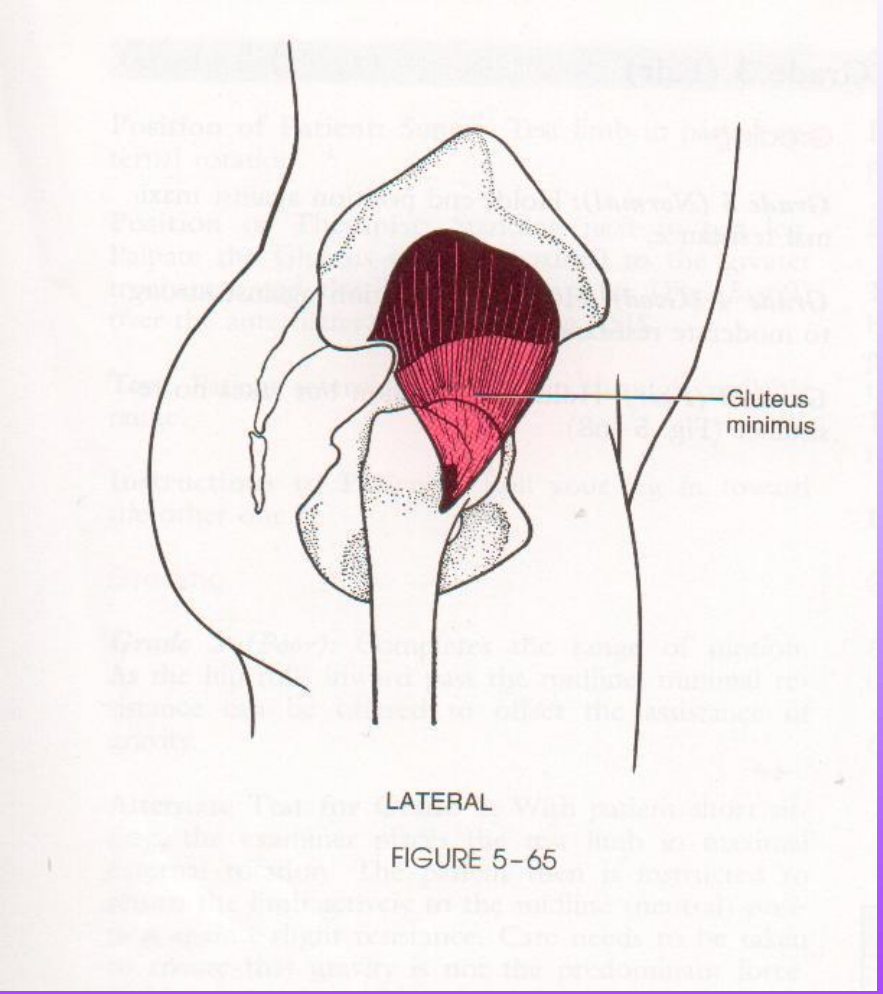
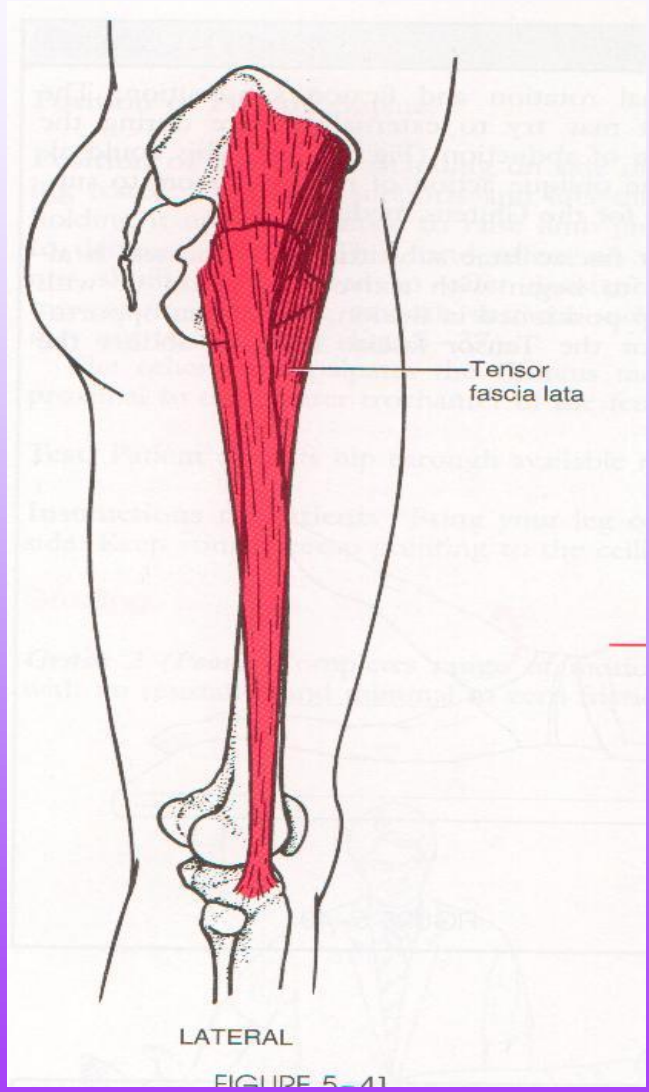


FIGURE 5-65

Hip Int. Rotation

Tensor of the Fascia Latae:

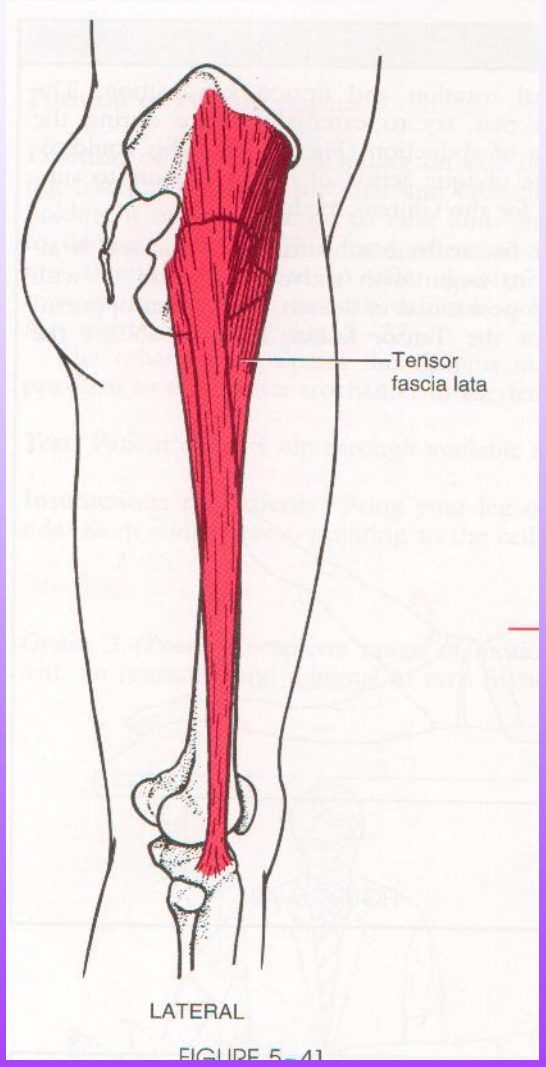
- Origin: ant. part of the iliac crest; outer surface of ASIS.
- Insertion: iliotibial tract of fascia latae at the junction of proximal and middle third of thigh.
- Nerve: L4, L5, S1
- Action: medially rotates, abducts & flexes the hip joint.
- May assist in knee extension by iliotibial tract.



Limitations in hip medial rotation.

- If knee flexion : 45° but less with knee extended.

- ROM is limited by:
  - Tension of the iliofemoral ligament when hip is extended.
  - Tension in the ischio-capsular lig. when knee is flexed.
  - Tension of hip lateral rotator ms.



Hip Internal Rotation:Grade 3, 4 & 5 « Fair, Good & Normal Strength »

- Position of therapist short sitting. Arms may be used for trunk support at sides or crossed over the chest.
- Resistance for gr.4 & 5 : distal hand is placed proximal to the ankle joint just above the maleollus (on the lateral side).For gr.5 « hold ».
- Stabilization: Over the medial surface of the thigh just above the knee.

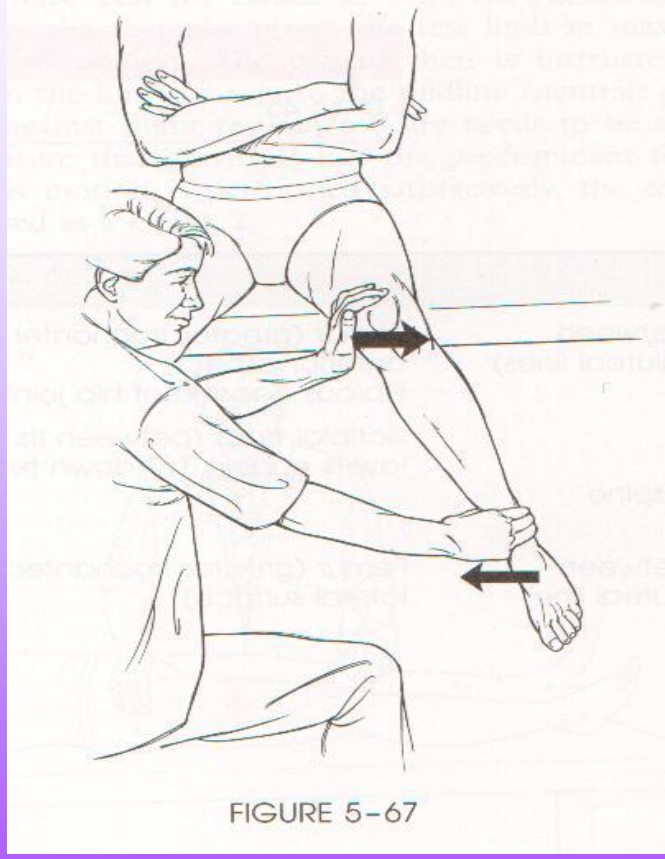


FIGURE 5–67

Hip Internal Rotation - Grade 2: poor strength

- Pt. Position: backlying, affected leg is away from the therapist and in external rotation.
- Therapist: stands beside the table, proximal hand stabilizes the pelvis.
- Command: turn your leg through full ROM---relax.

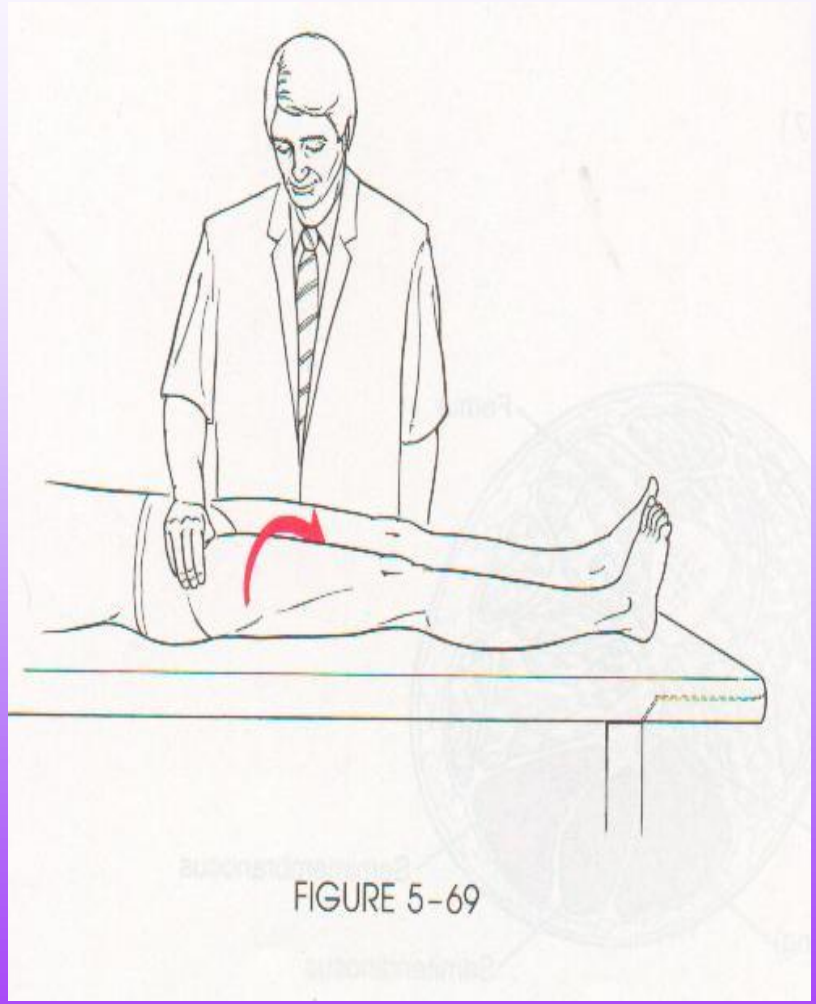


FIGURE 5-69

Hip Int. Rot.: Grade 1 – 2 (Trace & Zero)

- Pt. Position: Supine.
- Palpation: Therapist's proximal hand palpates the contraction of Tensor of Fascia Latae near its origin posterior and distal to ASIS of ilium.
- Distal hand grasps around the ankle.
- Command: « Try to turn your leg inwards ».

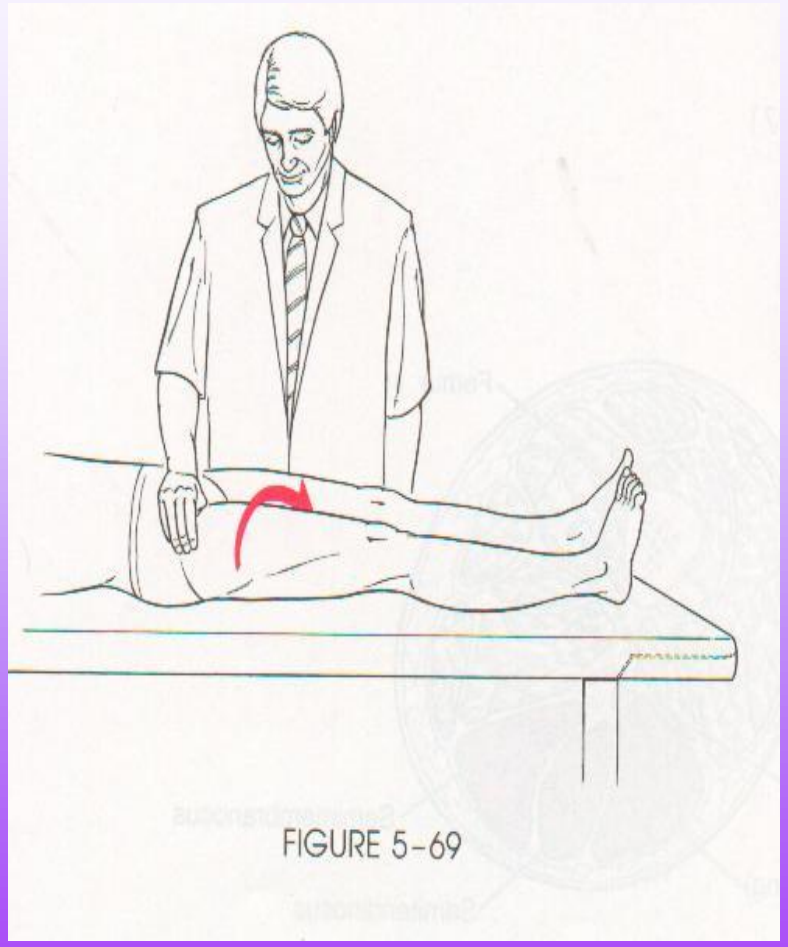


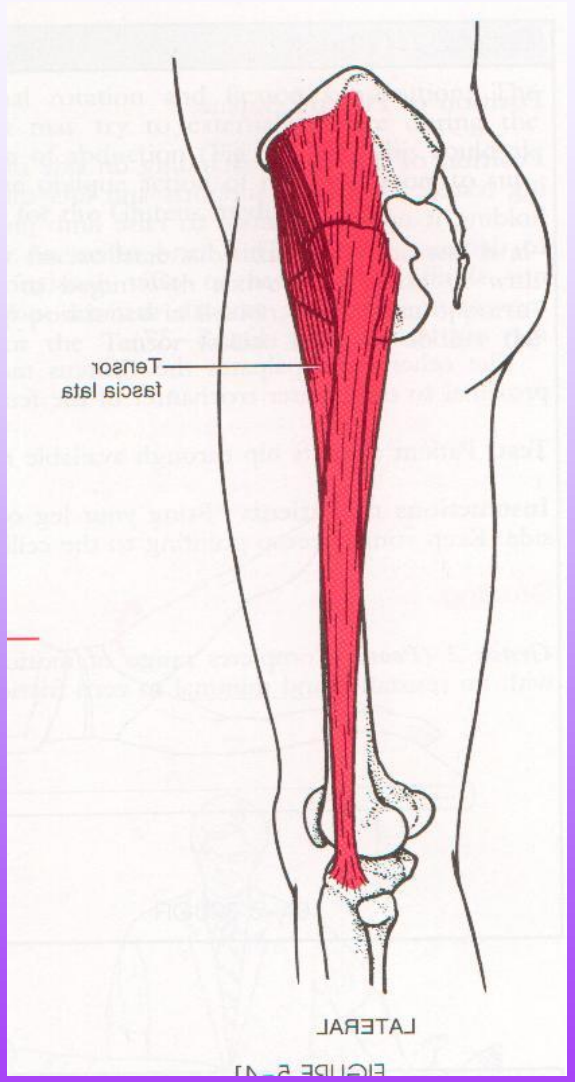
FIGURE 5-69

Effects of Weakness in Medial Rotators

- Weakness will result in lateral rotation of the lower extremity in standing and walking.

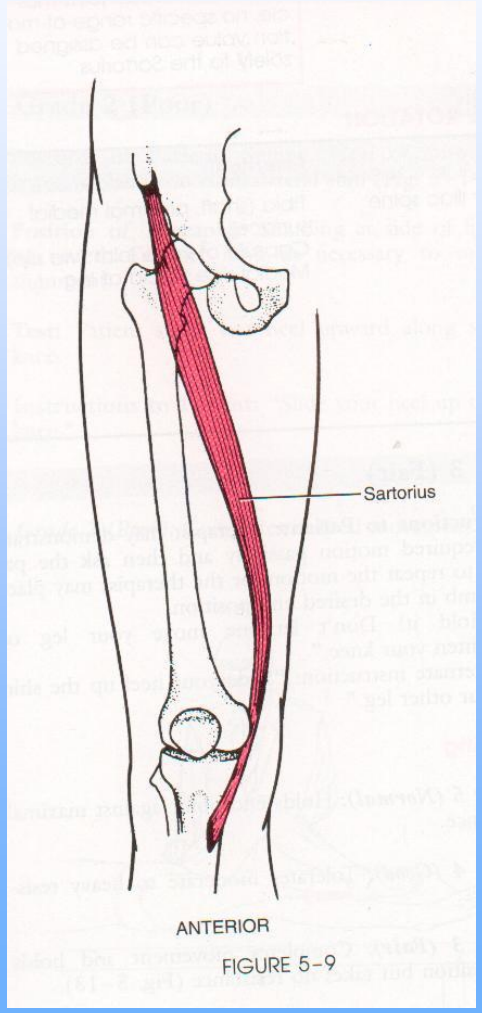
- During test: if pt. in supine; the pelvis will tilt anteriorly if much resistance is applied but it is not a substitution movement.

Due to its anatomical attachments, the TFL, when contracting to max. will pull forward the pelvis as it medially rotates.



Hip Flexion, abd. and external rotation with knee flexion: Sartorius

- ROM : combined joint action; ROM is incomplete.
- Muscle: Sartorius:
- Origin: ASIS and half of notch just distal to spine.
- Insertion : proximal part of medial surface of tibia near anterior border.
- Nerve: Femoral, L2, L3.
- Action:
  - **flexes, laterally rotates and abducts the hip joint.**
  - **Flexes and assist in medial rotation of the knee joint**



Testing grade 3 for Flex., Abd., Ext. Rot. , knee flex.combined

- Pt.: Sitting w. legs over the side of the table, heel of limb to be tested in front of the opposite ankle.
- Th.: proximal hand stabizes the pelvis.
- Command: »raise your heel up to knee with flex., abd. & lat. rot. & knee flexion. »

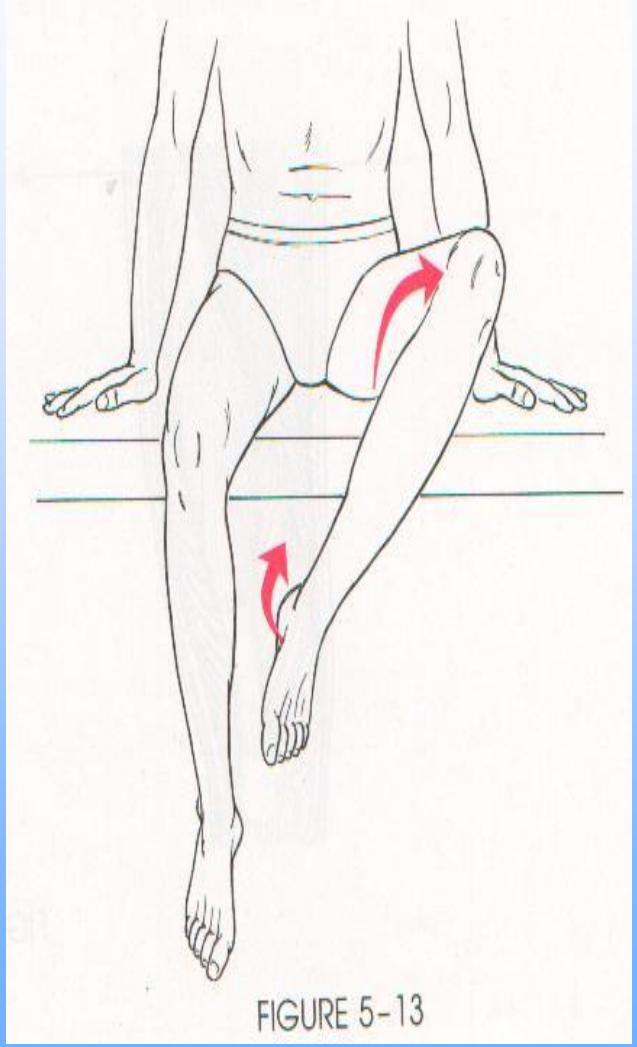


FIGURE 5-13

Testing grade 4-5 – Sartorius (ext. Rot, knee flex.)

- Pt. & therapist in same position as gr.3.
- Resistance: Proximal hand is above the knee to resist hip flex. & abd.. Distal hand is above the ankle to resist hip lat. rotation.
- Position can also be done in supine lying.

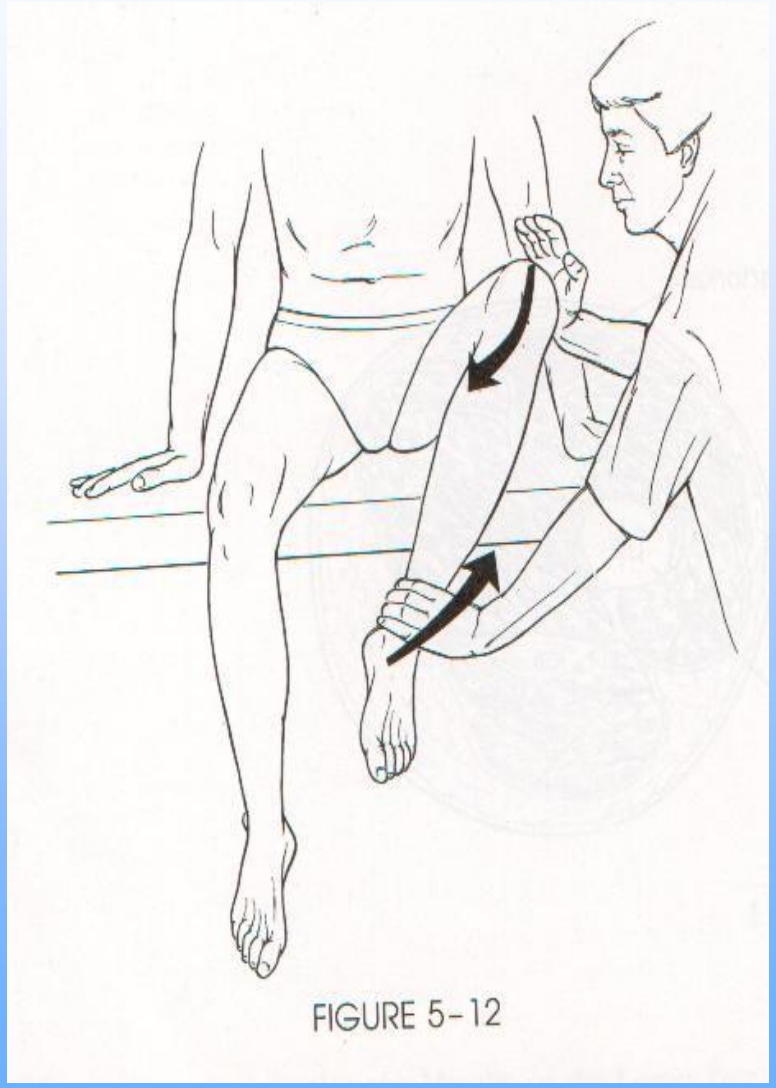


FIGURE 5-12

Testing gr. 2: Sartorius

- Pt.: backlying with heel of limb to be tested on opposite ankle.
- Th. Position: beside the patient with proximal hand fixing the pelvis.
- Command»slide your heel along leg to knee with flexion; abd., &lat. rot.of hip, & flexion of knee.

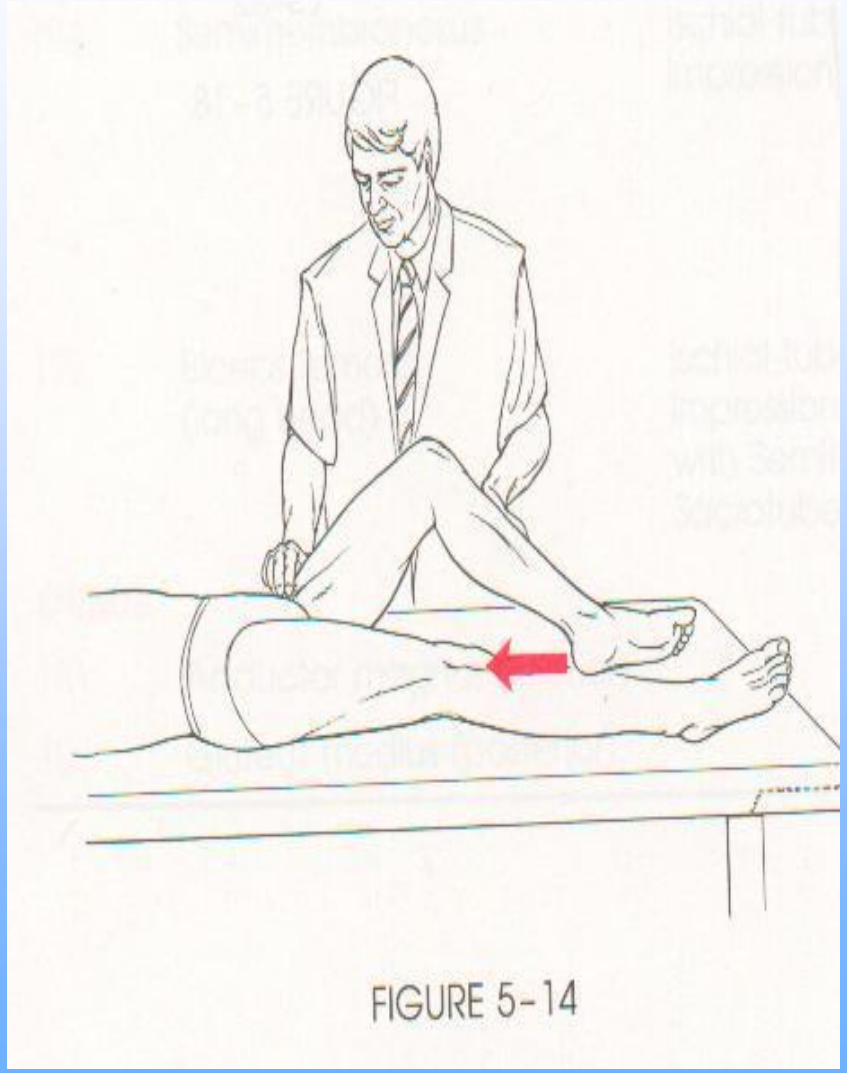


FIGURE 5-14

Testing Grade 1-0 (Sartorius)

- Pt. Position same as for gr. 2; w. hip flexed & lat. rotation.
- Distal hand of therapist supports leg under knee, proximal hand palpates near the origin of the sartorius just below ASIS.
- Command: « try to pull your thigh towards you, flexing the hip joint---relax ».

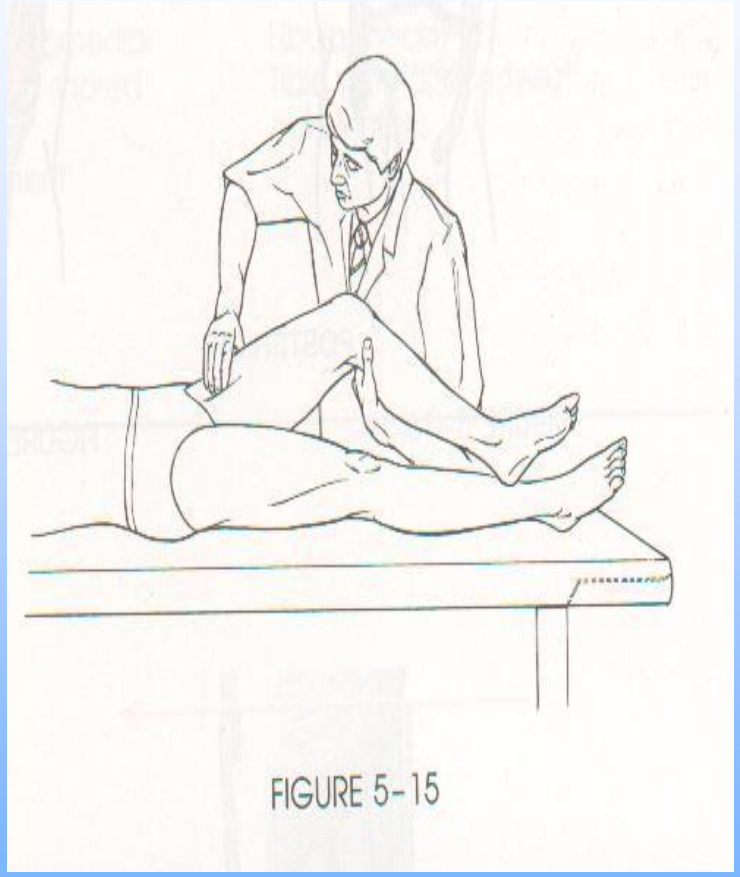


FIGURE 5-15

Testing Sartorius (Abd, ext. Rot. Knee flex.)

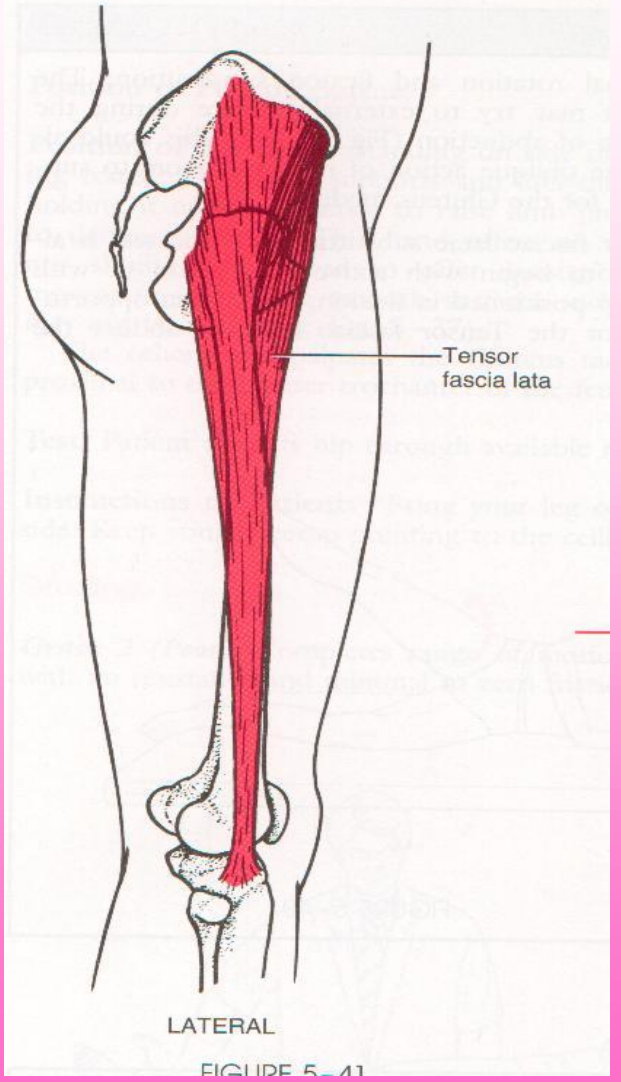
- Effects of weakness: decreases strength of hip flexion, abduction, and lateral rotation.
- Contributes to anteromedial instability of the knee joint.
- Effects of contracture: Flexion, abduction, and lateral rotation deformity of the hip, with flexion of the knee.
- Position of the leg: as in sartorius test position in flex., abd., & lat. rotation. But this position is mainly held by the hip adductors.

Hip abduction from flexed position: Tensor of the Fascia Latae

ROM: Combined joint action, ROM incomplete.(+- 30°)

Tensor of the Fascia Latae:

- Origin: ant. part of ext. lip of the iliac crest, outer surface of the ASIS.
- Insertion: Into iliotibial tract of fascia latae at junction of prox. & middle thirds of thigh.
- Nerve: Sup. Gluteal , L4, L5, S1.
- Action: Flexes & medially rotates and abducts the hip joint, tenses the fascia latae & may assist in knee ext;



Hip abduction from flexed position: Tensor of the Fascia Latae: Grade 3 « Fair strength »

- Pt . Position: Sidelying with lower knee slightly flexed for balance, limb to be tested flexed at 45° at hip &internally rotated.
- Therapist stands behind the pt. with the prox. hand fixing the pelvis.
- « Raise up your leg ---relax.

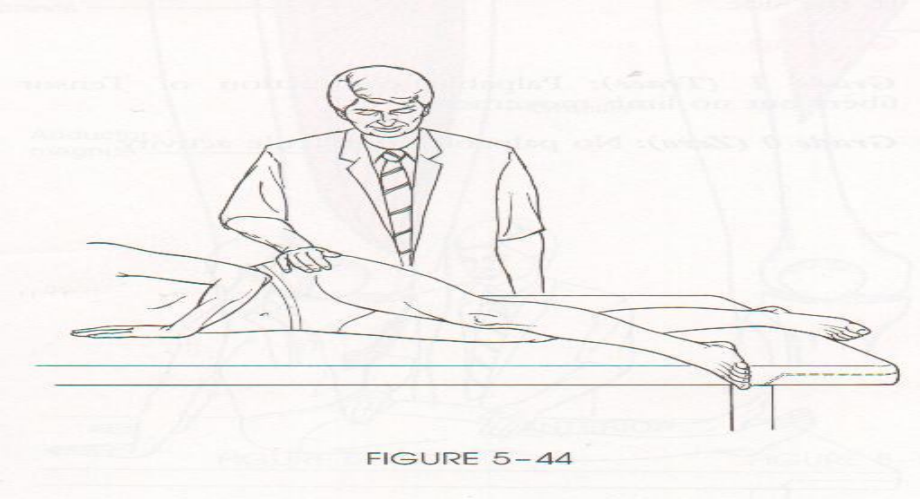


FIGURE 5–44

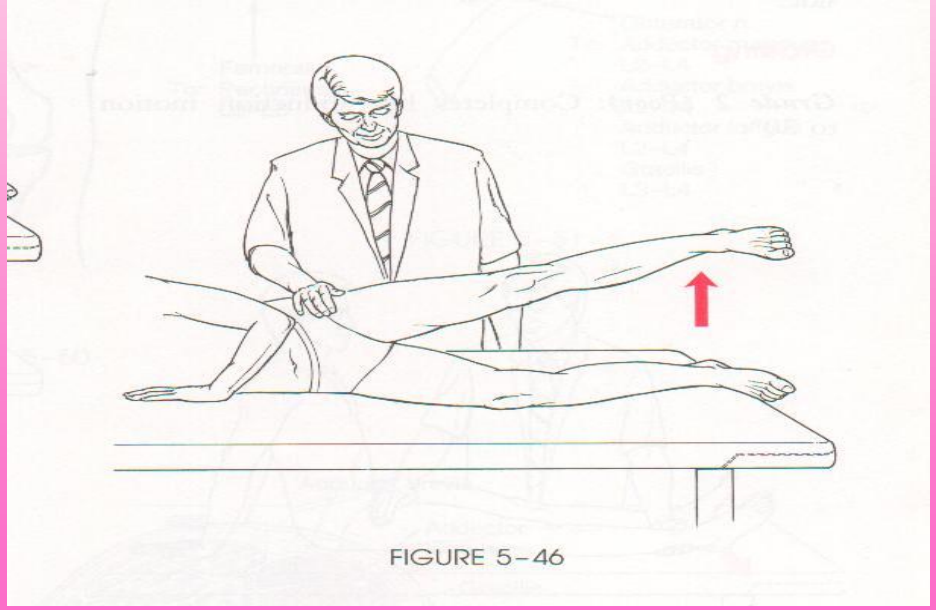


FIGURE 5–46

Hip abduction from flexed position: Tensor of the Fascia Latae: Grade 4-5 « Normal, Good strength »

- Pt. Position: sidelying with lower knee flexed for balance, limb to be tested at 45° at hip joint.
- Therapist applies resistance w. distal hand at the lat. aspect of the thigh & proximal to knee joint, pressing down(+ hold at the end of range for gr.5).
- Command: « Raise your leg up--relax (+hold for gr.5). »

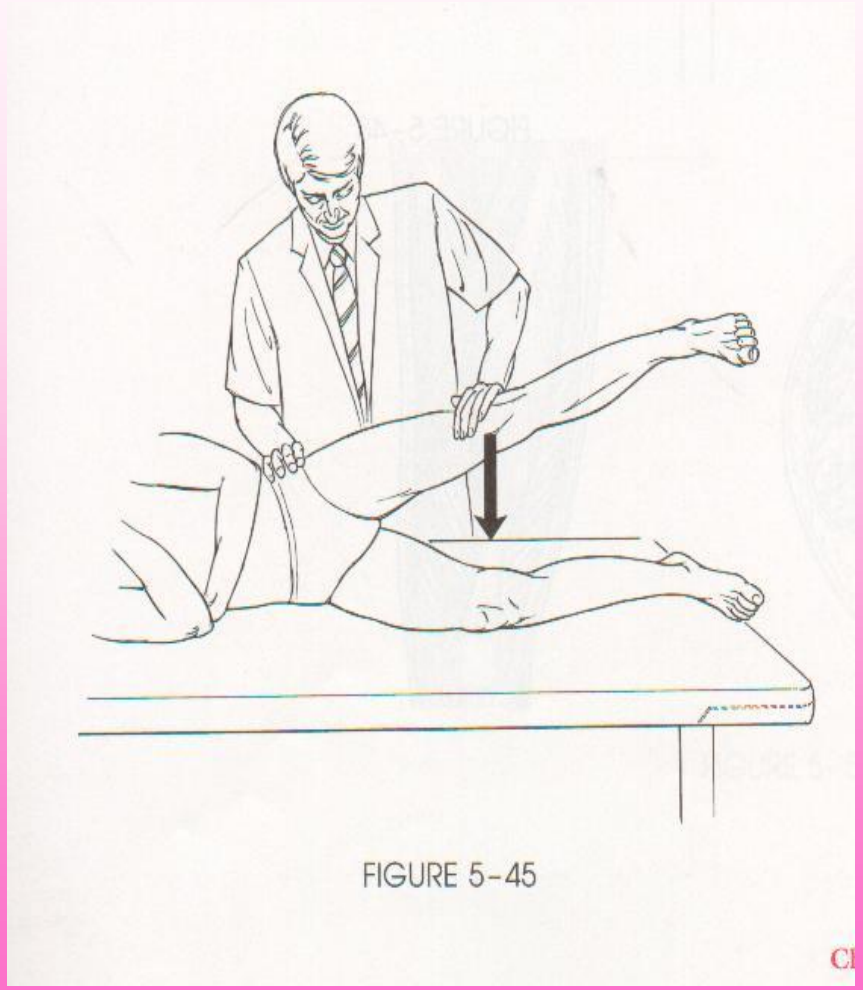


FIGURE 5-45

Hip abduction from flexed position: Tensor of the Fascia Latae: Grade 2 « Poor strength »

- Pt. / sitting with the knees extended, trunk at 45° angle to table and supported by pt. arms behind back.
- Ph.Th. stabilizes w. proximal hand the pelvis.
- Command: « Move your leg laterally (to +- 30°)--- relax.

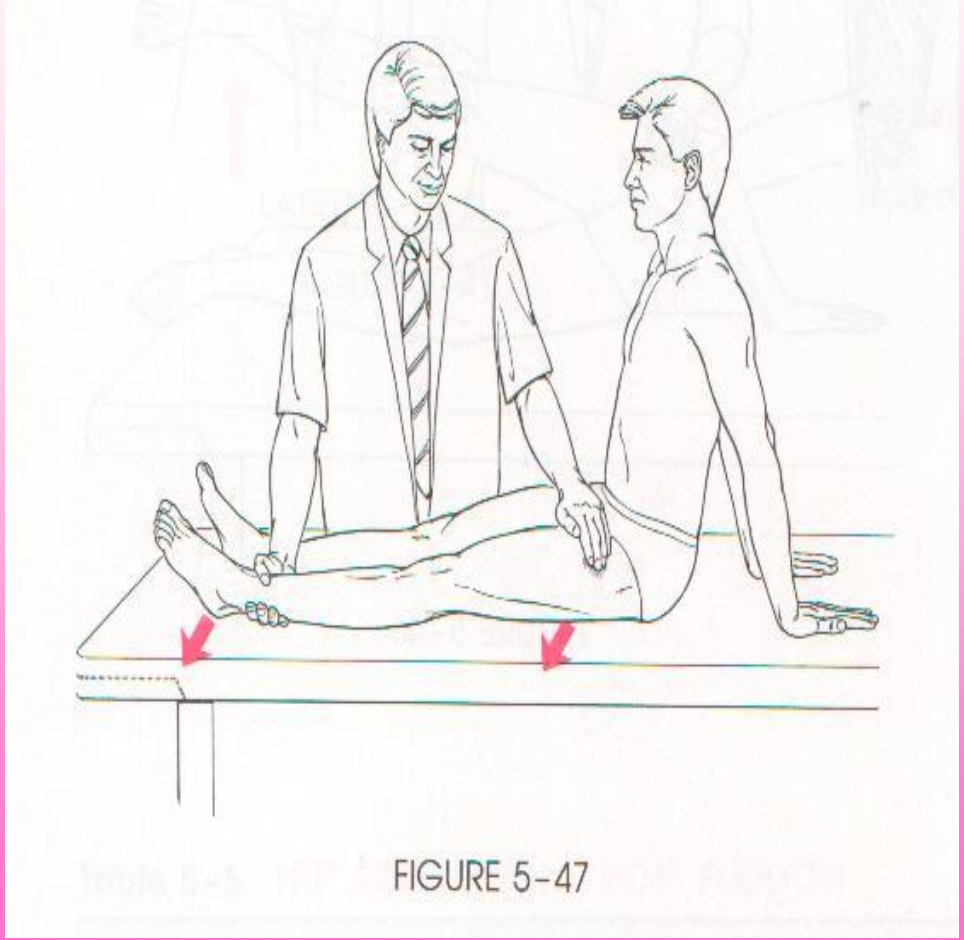


FIGURE 5–47

Hip abduction from flexed position: Tensor of the Fascia Latae: Grade 1 - 0 « Trace – zero strength »

- Pt. Position: same as gr. 2 .
- Palpation below the origin of ms. & at fascial insertion on lat. side of knee joint.
- Command « try to move your leg laterally »

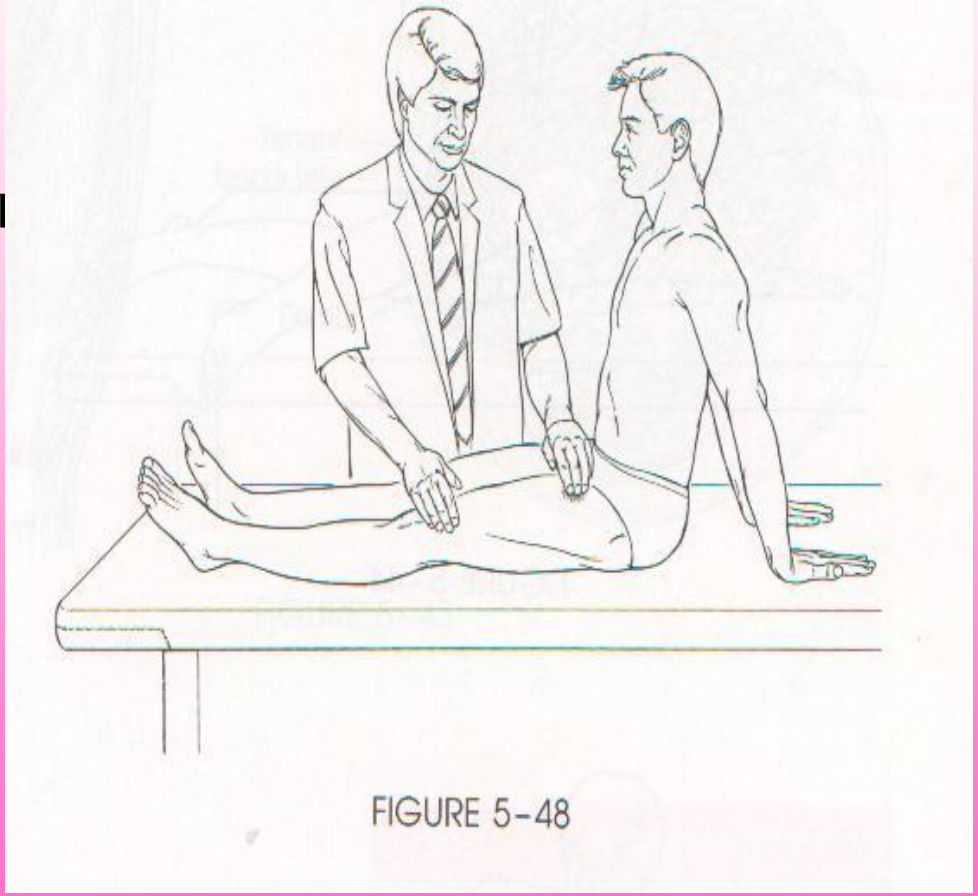
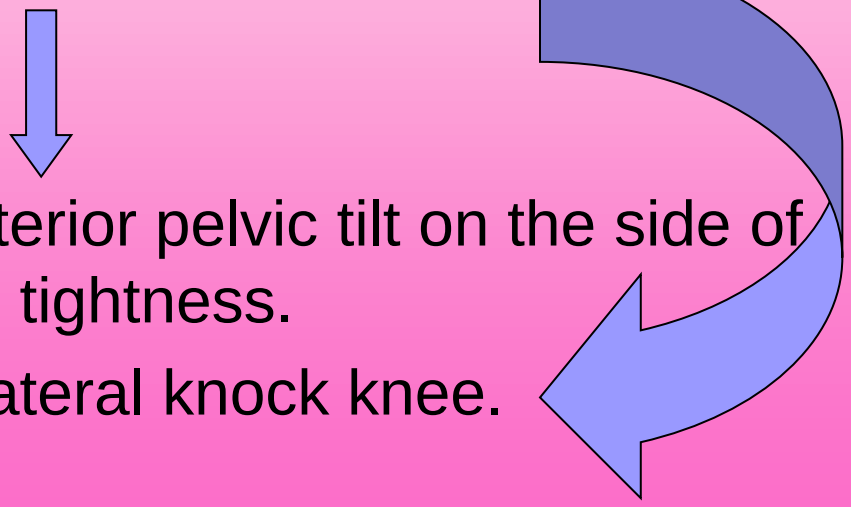


FIGURE 5-48

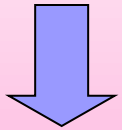
Hip abduction from flexed position: Tensor of the Fascia Latae: Effects of weakness/ shortness.

- **Weakness:** in standing, there is trust in the direction of a bow-leg position (genu varus), & the extremity tends to rotate laterally from the hip.
- **Shortness:** (effect depends if bilateral or unilateral)



- Anterior pelvic tilt on the side of the tightness.
- Bilateral knock knee.

- Effect of contracture:



- Hip flexion and knock knee position.

Thank You