

Compensatory movement due to tightness hip
region muscles and lack of motor control

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Abstract

The society requires prolonged sitting posture in the work place. There are common tightness regions in client's body. Because of slouch sitting position, A few clients showed iliopsoas & deep hip extensor tightness and lack of motor control on their own pelvic motion. It causes overactivation in superficial muscles than deep and stabilizer muscles such as transverse abdominals, pelvic floor and diaphragm. This makes the client unable to feel core activation effectively during pilates private session. The clients only felt distal muscles soreness such as arms and legs rather than deep core muscles. In order to activate the proper muscles that a instructor is looking for, simple and effective posture assessments and stretch method are needed before jumping into core strengthening exercises. Plus Everybody has different learning process. Depend on the clients, instructors are required to choose most effective cueing among visual, tactile and audible methods to improve the client's motor control ability about their own pelvic motion to turn on proper muscles without compensatory strategy.

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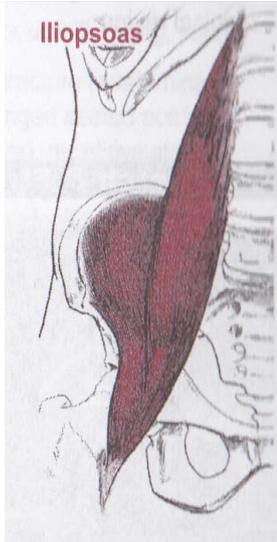
Anatomical description

The hip joint is one of the largest and most stable joints in the body. The hip joint is a multi-axial ball and socket joint which has maximum stability. In addition, the hip has a labrum, which helps to deepen and stabilize the joint. It has a strong muscles which control its actions and capsule. There are 3 major ligaments which support hip joints(the iliofemoral, the ischiofemoral, and the pubofemoral ligaments).

Active movements of the Hip

- Flexion(120 deg)
- Extention(15 deg)
- Abduction(30-50 deg)
- Adduction(30 deg)
- Lateral rotation(40-60 deg)
- Medial rotation(30-40 deg)

Muscle picture & name	O,I,N,A
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Iliopsoas

- Origin :

Psoas Major

TPs of L1-L5, vertebral bodies of T12-L5 & intervening intervertebral discs

Iliacus

Inner surface of iliac fossa & sacral ala

- Insertion

Psoas Major

Lesser trochanter of femur

Iliacus

Lesser trochanter of femur

- Nerve

Psoas Major

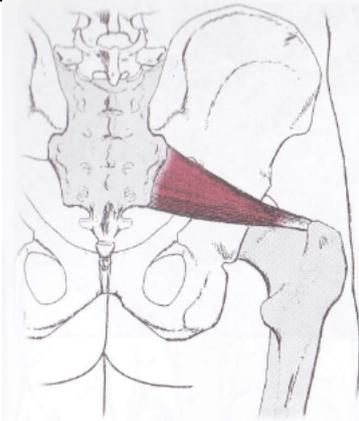
Lumbar plexus ventral rami(L1,2,3)

Iliacus

Femoral nerve(L2,3)

- Action

- 1) Flexion & Lateral rotation of hip
- 2) Flexion & latera flexion of spinal joints
- 3) Anterior pelvic tilt



Piriformis

- Origin

Anterior Sacrum(occasionally scarotuberous ligament)

- Insertion

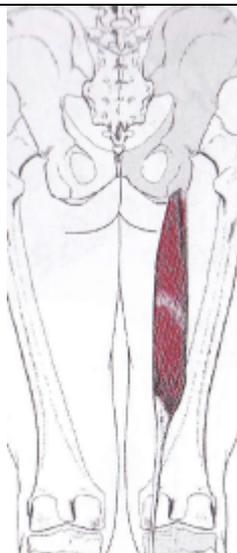
Greater trochanter(superiomedial surface)

- Nerve

Nerve to piriformis(L5,S1,S2)

- Action

1)Lateral rotation & horz. Abd. Of hip 2)hip abduction of hip when thigh is flexed



- Origin

-Semitendinosus

Iliotuberosity

-Semimembranosus

Ischial tuberosity

-Biceps Femoris

(longhead) ischial tuberosity

(shorthead) lateral lip of linea aspera

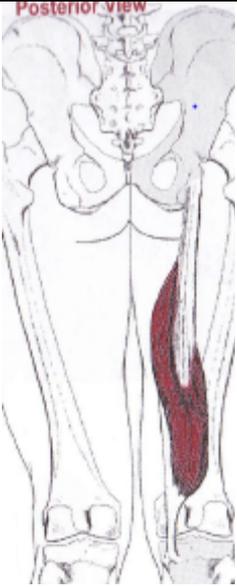
- Insertion

-Semitendinosus

Proximal anterior medial tibia(pes anserine)

-Semimembranosus

Medial tibial condyle(posterior medial aspect)

	<p>-Biceps Femoris</p> <p>Head of fibula</p> <ul style="list-style-type: none"> ● Nerve <p>-Semitendinosus</p> <p>Sciatic nerve, tibial division(L5,S1,S2)</p> <p>-Semimembranosus</p> <p>Sciatic nerve, tibial division(L5,S1,S2)</p> <p>-Biceps Femoris</p> <p>(long head) Sciatic nerve, tibial division(L5,S1,S2)</p> <p>(short head) common peroneal division(S1, S2)</p>
	<ul style="list-style-type: none"> ● Action <p>-Semitendinosus</p> <p>Flexion of knee, extension of hip</p> <p>Medial rotation of knee(tibia) when knee is flexed</p> <p>-Semimembranosus</p> <p>Flexion of knee, extension of hip</p> <p>Medial rotation of knee(tibia) when knee is flexed</p>
<p>hamstring</p>	<p>-Biceps Femoris</p> <p>Flexion of knee, extension of hip(long head only)</p> <p>Lateral rotation of knee(tibia) when knee is flexed</p>

<Case study>

- Name: Shiho

- Age: 33
- Limitation

Rectus abdominalis MMT 3-/5, piriformis and hamstring tightness

Lack of control pelvic motion

- Rehabilitation treatments: general health(good), enjoy ocean sport such as scuba diving

Block system

1. Warm up
 - 1) pelvic curl
 - 2) spine twist supine
 - 3) chest lift
 - 4) chest lift with rotation

: Using block between client's knees increase motor control and activating core muscle as well. Shiho didn't feel core activation until 3 session so I decided to use assistance device to facilitate core muscles. I spent considerable time to make Shiho find neutral pelvis secondary to tightness of hamstring/deep hip extensor and lack of motor control. By using tactile cue and demonstration, she started to show improvement of pelvic control over the time.

2. Foot work

(Cadillac)

- 1) Parallel heels
- 2) Parallel toes
- 3) V position Toes

4) Open V heels

5) Open V toes

6) Calf raises

7) Prances

8) Prehensile

9) Single leg heel

10) Single leg toes

: Rather than performing foot work in Reformer, Shiho was able to feel extra stretch on her back of legs while doing foot work in Cadillac. It gave her more chance to stretch her tight muscles.

3. Abdominal work

(reformer)

1) Hundred prep

2) Hundred

: These exercises were great methods to activate her core and abdominal muscles. Since the tightness of her back line, she benefits from being supported her legs by me. She felt proper muscle activation when I supported her legs slightly.

4. Hip work

(Reformer)

1) Frog

2) Circles down

3) Circles up

4) Opening

: It is actually easy exercises but she couldn't understand neutral pelvic position while moving her hips at the beginning. The more she got private sessions and learned how to control her pelvis, The more she was able to keep neutral pelvis alignment during hip work. Compared to Cadillac and Wunda hip work, it has less chance to compensate her pelvis. That is the reason why I choose this exercises.

5. Spinal Articulation

(Cadillac)

1) Monkey original

2) Tower prep

: The reason why I select those exercises is it gave her hamstring stretch. Keeping tail bones down on the mat and straightening legs were required that core control and hip flexibility. She couldn't put her sacrum on the Cadillac when setting monkey original position. At lease she could feel hamstring and deep hip extensor muscles. That is why I choose this exercises.

6. Stretches

(reformer) Hamstring stretch group

1) Standing lunge

2) Kneeling lunge

: Those two exercises were excellent method to stretch her hamstring. She really

liked this stretch so I put those two stretches every sessions.

7. Full body integration F/I

(reformer) Upstretch group

- 1) Upstretch 1
- 2) Elephant
- 3) Upstretch 2
- 4) Long stretch
- 5) Upstretch 3

: Upstretch group is also amazing way to stretch hamstring/deep hip extensor while activating abdominal/ core muscles. At the beginning, she couldn't hold the carriage in due to super tightness of hamstring. So I gave her home exercises such as figure 4 stretch. She was able to participate in this exercises after 3rd private sessions.

8. Arm work

(reformer) Arm sitting series

- 1) Chest expansion
- 2) Biceps
- 3) Rhomboid
- 4) Hug-a-tree
- 5) Salutes

: Shiho kept table top position with putting tail bone down and making neutral

pelvic motion. She was able to learn proper pelvic alignment while moving arms.

9. Full body integration A/M

10. Leg work

1) Side split

: She was able to control her pelvic better in standing position rather than sitting. To facilitate neuromuscular system, I have her stand up and find neutral pelvis while moving her leg to her side.

11. Lateral flexion/rotation

1) Mermaid

: The reason why I choose this exercise is that she had tightness on her lateral line as well. It helped indirectly to make a flexibility on her general body.

12. Back extension

(wunda chair)

1) Swan on floor

: Due to her hamstring tightness, her back extension muscles were showed weaker. So I choose this exercise to enhance the activation of back extensor.

Conclusion

Shiho couldn't feel core activation until 3rd private session. When I asked her to feedback, she always complains of legs and arms soreness after exercises. So I assess her posture and muscles length. That assessment showed that She had considerable local tightness on her proximal hamstring and deep hip extensor

muscles. Once she started home exercises such as figure 4, she started to feel more glute and core working. Also her body especially pelvic region didn't connected to her mind. She had difficulty in control her pelvic selectively. Those two factors restricted her to activate core muscles. After 3 private sessions with home exercises, she started to show better hip flexibility and motor control on her pelvic.

Bibliography

Book

Dr. Nikita A. Vizniak. Evidence-Informed Muscle Manual 2nd edition. Prohealthsys, 2018.

Orthopedic Physical Assessment II 5th edition. Saunders, 2017