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Part 2 - Pelvic Stability

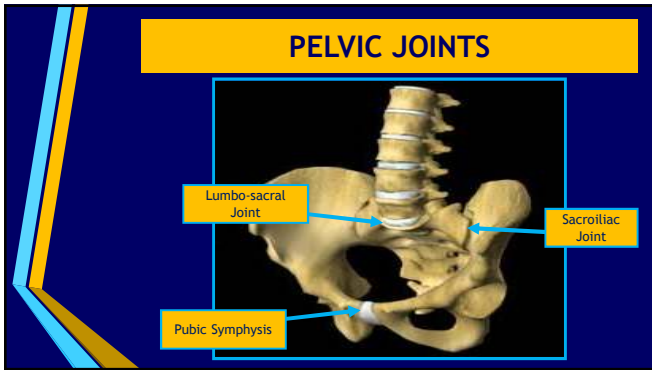
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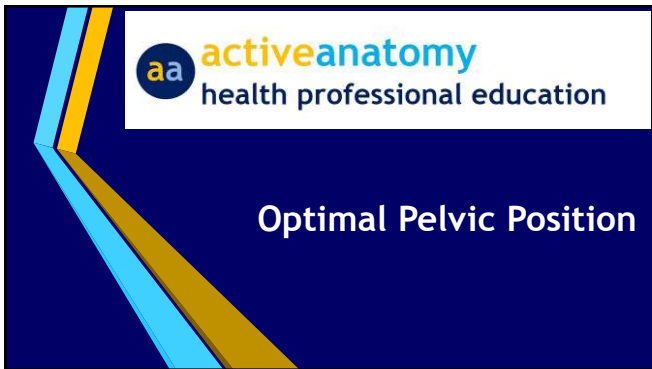
Optimal Pelvic Stability

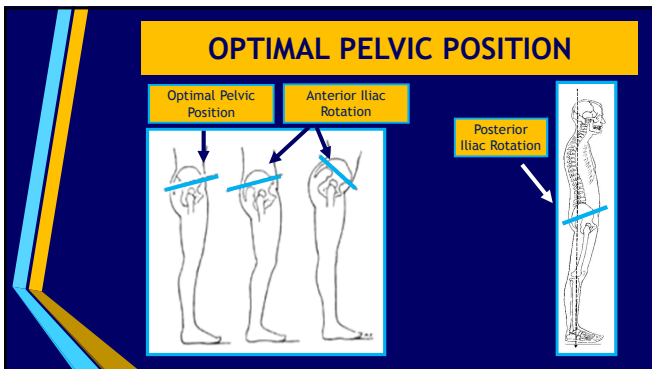
Optimal pelvic stability is totally reliant on optimal core stability.

Quality of movement is essential in reducing risk of injuries.











OPTIMAL PELVIC POSITION


Optimal Pelvic Position

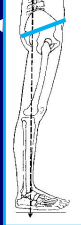


Anterior Iliac Rotation



Posterior Iliac Rotation





The optimal position of the pelvis is reliant on the position of the lumbar spine.


If lumbar spine is in neutral, the pelvis will be in its most optimal position.



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Lateral System

LATERAL SYSTEM



Contra-lateral
Gluteus Medius and
Quadratus Lumborum

LATERAL SYSTEM



Contra-lateral
Gluteus Medius
and Quadratus
Lumborum

Responsible for
keeping pelvis in
an even position
while standing
on one leg

LATERAL SYSTEM



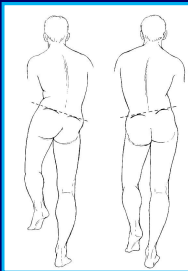
A weak or
dysfunctional
lateral system will
result in excessive
shifting of the
pelvis to one side

LATERAL SYSTEM ASSESSMENT



Weak Lateral Pelvic Stability

WEAK LATERAL PELVIC STABILITY



Trendelenburg Sign

- Weak Gluteus Medius
- Over active Quadratus Lumborum

Dynamic Pelvic Stability

DYNAMIC PELVIC STABILITY
Single leg standing
 Assessment of Gluteus Medius Function & Balance

DYNAMIC PELVIC STABILITY
Single knee bend

COMPENSATORY PATTERNS

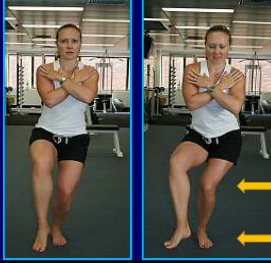
- Trunk shift
- Lumbar lordosis increase
- Excessive QL activation (hitch)
- Increased lateral pelvic shift (dip)
- Loss of optimal leg alignment
- Knee dropping inwards
- Pronating foot
- Balance control

DYNAMIC PELVIC STABILITY
Single knee bend

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DYNAMIC PELVIC STABILITY Single knee bend



COMPENSATORY PATTERNS

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DYSFUNCTIONS AND INJURIES CAUSED BY POOR LEG ALIGNMENT



- Some possible problems resulting from poor leg alignment include:
- Tibialis posterior fatigue leading to shin splints
 - Knee pain, meniscus degradation
 - Bursitis in hip
 - Gluteus medius dysfunction
 - Pain in lateral part of leg

DYNAMIC PELVIC STABILITY



Excessive trunk shift can lead to increased risk of facet joint injuries

DYNAMIC PELVIC STABILITY Calf Rises & Hops



DYNAMIC PELVIC STABILITY



Excellent calf muscle activation, while maintaining optimal pelvic stability, is needed for running and all sports that include sprinting.

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Anterior Oblique System

ANTERIOR OBLIQUE SYSTEM

Contra-lateral
Obliques and
Adductor muscles



ANTERIOR OBLIQUE SYSTEM

Contraction of the
oblique muscles above
the pelvis
And adductor muscles
below the pelvis
Force closure across
pubic symphysis
Maintain stability



ANTERIOR OBLIQUE SYSTEM

Important for postnatal clients



ANTERIOR OBLIQUE SYSTEM

Important for sportspeople



ANTERIOR OBLIQUE SYSTEM

Minimal activation in slow walking and increases with speed of movement



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Anterior Oblique Assessments

ANTERIOR OBLIQUE ASSESSMENT STATIC OBLIQUE HOLD ASSESSMENT FOR ENDURANCE



ANTERIOR OBLIQUE ASSESSMENT



WATCH FOR:

- Body in a straight line?
- Left vs Right?
- Activation of adductor muscles?

STANDING BAND ADDUCTION TEST



- Standing on one leg with the other leg in a resistance band
- Activate adductors to pull band in towards body
- Watch for any compensatory movements such as pelvis rotating, trunk shifting, or knee bending

Posterior Oblique System

POSTERIOR OBLIQUE SYSTEM



Contra-lateral Gluteus Maximus and Latissimus Dorsi

POSTERIOR OBLIQUE SYSTEM



Holding on to the treadmill while walking will reduce activation of the posterior oblique system



POSTERIOR OBLIQUE SYSTEM



The typical posture for pushing a pram also reduces activity in the posterior oblique system.

This can lead to sacroiliac joint pain and lumbar spine pain.

POSTERIOR OBLIQUE SYSTEM



Arm swing is important for posterior oblique system activation.

Carrying bags or babies on one side will create an asymmetrical posterior oblique system, which can lead to sacroiliac joint pain.

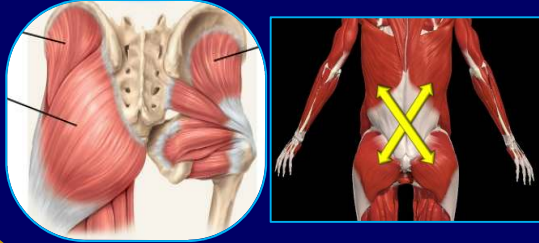
POSTERIOR OBLIQUE SYSTEM

Activating gluteus maximus while doing shoulder exercises increases the force closure on sacroiliac joints.

This will help with pelvic ring stability.



GLUTEUS MAXIMUS & HIP ANATOMY



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Dynamic Assessment - Lower Body Hip Extension

COMMON PROBLEMS WITH SEDENTARY LIFESTYLE

GLUTEUS MAXIMUS

Due to prolonged sitting, gluteus maximus is weak and does not activate properly.

The muscle tends to waste away in clients who have had low back pain.



COMMON PROBLEMS WITH SEDENTARY LIFESTYLE

"Up to eighty per cent of Australians will experience back pain at some point in their lives and 10% will experience significant disability as a result."

- Medical Journal of Australia



<https://www.mja.com.au/journal/2009/190/9/back-pain-national-health-priority-area-australia>

GYM EXERCISES FOR GLUTEUS MAXIMUS



These types of exercises for strengthening gluteus maximus do not guarantee the muscle is doing its job as a stabiliser in the posterior oblique system.

DYNAMIC ASSESSMENT LOWER BODY HIP EXTENSION



ORDER OF MUSCLE RECRUITMENT

1. Gluteus Maximus
2. Hamstring
3. Lumbar Erector Spinae

DYNAMIC ASSESSMENT LOWER BODY HIP EXTENSION



- Ask client to lie in prone position
- Place one hand on their back, fingers on glut max muscle, with the other hand on their hamstring
- Cue client to keep legs straight, then lift leg slightly up on floor
- Take note of the order of recruitment of muscles

PRACTICAL

EXERCISES FOR GLUTEUS MAXIMUS

- Bridge lifts in neutral
- Ball bridge
- Bridge lat pulldowns
- Prone leg lifts
- Ball leg lifts
- Ball leg lifts with band pull-down



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Deep Longitudinal System

DEEP LONGITUDINAL SYSTEM



The deep longitudinal system stores energy via good propulsive gait mechanisms.

A heel strike activates the muscles which provide force closure across the pelvis and allow you to efficiently propel yourself forward.

DEEP LONGITUDINAL SYSTEM



Sacroteruberous Ligament
Biceps Femoris
Peroneals
Tibialis Anterior

- Heel strike to run
- Adequate hamstring length

DEEP LONGITUDINAL SYSTEM

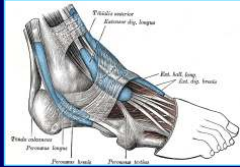


Heel strike in walking / running:

- Hamstring activated
- In dorsiflexion, stretching tibialis anterior and peroneal muscles

DEEP LONGITUDINAL SYSTEM

Dorsiflexion is essential for effective recruitment of DLS



DEEP LONGITUDINAL SYSTEM

Hamstring shortening which results in less than 70 degrees of straight leg raise will compromise stride length.

This in turn will affect energy stored in DLS, as well as increase the energy required for walking and running.



DEEP LONGITUDINAL SYSTEM

Walking in plantar flexion requires much more effort.



DEEP LONGITUDINAL SYSTEM



Key points to consider:

- Good calf flexibility for dorsiflexion
- Heel strike - particularly for walking
- At least 70° straight leg raise
- Strong peroneal muscles and tibialis anterior for ankle stability



Phases of Training For Optimal Pelvic Stability

INITIAL PHASE LIAISE WITH A HEALTH PROFESSIONAL



- Perform a good postural assessment
- Dynamic assessment of every exercise your client does in the gym
- Assess core stability
- Assess single leg stability
- Ensure obliques, lumbar endurance, and transversus abdominus are all functioning correctly

PELVIC STABILITY: Over 6-12 Months

First Phase

- Start non-weight bearing - isometric contractions are easier to begin and will not aggravate any injuries
- Isolate and activate all inner unit muscles in various postures
- Activate the muscles responsible for pelvic stability in isolation - all the muscles listed in the outer unit systems.

Second Phase

- Combine muscles above and below pelvis in a particular system. Train each system individually, and in conjunction with good inner unit or core activation.
- 90% of exercises should be fully supported, slow controlled movements.

Third Phase

- Start incorporating some weight bearing - i.e.: sitting and standing resistance to exercises. Functional exercises, without excessive speed or agility required.

Final Phase

- Progress to standing functional exercises, bringing in single-leg loaded exercises, lateral movements, plyometric exercises.

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**Hip & Pelvic Stability
Exercise Progressions**

Clams

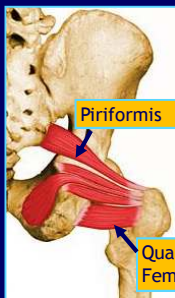
CLAMS



- Hips bent, knees forward and feet in line with body
- Raise top knee up and out at the same time as if lengthening the femur out of its socket
- Make sure deep hip external rotators are being activated

EXTERNAL HIP ROTATORS

Superior Gemellus
Inferior Gemellus
Obturator Internus
Obturator Externus



Gluteus medius
posterior fibres

Quadratus
Femoris

CLAMS HIP POSITIONS



- Hip flexor muscles also work as external hip rotators
- An alternate position to perform the clams exercise is with the hips extended, feet behind the body and knees bent
- Maintain neutral spine position

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Banded Clams

BANDED CLAMS



- Ensure your client is activating quadratus femoris and deep hip external rotator muscles before using gluteus medius, and not relying on hip flexor muscles



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Pelvic Bridge



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Pelvic Bridge with Band



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Pelvic Bridge on Ball

Wall Ball Hold

WALL BALL HOLD



- Focus on gluteus medius exterior fibres, lateral system and control of pelvic stability
- Position ball close to knee, keep hips square and in even alignment

WALL BALL HOLD




- Use leg closest to wall to push against the ball
- The stance leg becomes loaded and works hard to stabilise
- Your client should feel a strong contraction of the glut med posterior fibres on the stance leg
- Hold for 10-30 seconds for each repetition

WALL BALL HOLD




- Watch for signs of fatigue such as poor pelvis alignment, or abduction of the outside leg
- Your client should feel a strong contraction of the glut med posterior fibres on the stance leg



Wall Ball Hold with small squat

WALL BALL HOLD WITH SMALL SQUAT



- Complete 10 repetitions each side x 3 sets
- The deeper the squat and faster the movement, the more difficult the exercise will be
- Watch your client's posture and ensure core is activated

Wall Ball Hold with calf rise

WALL BALL HOLD WITH CALF RISE



- Keeping the stance leg straight, maintaining pressure on the ball, and using inside arm for balance, rise up on to the toe
- This exercise requires calf strength, ankle stabiliser strength, VMO and quadriceps working together, glut med and max working on the stance leg
- Core and upper body posture is also required to successfully complete this exercise

Wall Ball Hold with turnout

WALL BALL HOLD WITH TURNOUT



- Foot of the stance leg turned out slightly to increase focus on deep hip external rotators
- Keep hip square in even alignment
- With knee on ball, push out into external rotation
- Hold for 10-30 seconds
- The client should feel activation in the deep gluts into quadratus femoris before gluteus medius

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Lateral System Focus Exercise Progressions

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Side Leg Raises

SIDE LEG RAISES

- Lying on side with head resting on arm or hand for support
- Top arm supporting on floor - can also be used to ensure there is no side crunching or movement during leg lift
- Bottom leg bent, top leg straight, moving only the hip in the hip socket



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Wall Ball Hold with running action

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Single Leg Bridge

SINGLE LEG BRIDGE



- Advanced exercise that loads glut med and max on stance leg
- Client must master bridge and bridge with band first
- Stretch hamstrings before this exercise

SINGLE LEG BRIDGE



- This exercise can be completed with one leg straight for the entire exercise, or beginning with both feet on the ground, completing a pelvic bridge and then extending one leg

Step Ups and Downs

STEP UPS AND DOWNS



- Focus on keeping pelvis in alignment
- Ensure knee stays over second toe throughout exercise to maintain leg alignment
- Activate core and maintain upright posture

Single Leg Squats

SINGLE LEG SQUATS



- Full-length squat requires good gluteus medius strength, good leg alignment, achilles flexibility into dorsiflexion, and great core control

SINGLE LEG SQUATS



- Add challenge to the exercise by adding an unstable base
- Any equipment that increases need to control balance and proprioceptive feedback can be used as an effective tool

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**Posterior Oblique System Focus
Exercise Progressions**

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Flitter / Prone Swimming

FLITTER / PRONE SWIMMING



- Using opposite arm and leg together to engage the posterior oblique system via the latissimus dorsi muscles, thoracolumbar fascia, and gluteus maximus muscle

FLITTER / PRONE SWIMMING



- Ask client to lie in prone with arms above head, slightly more than shoulder width apart, with feet and legs extended
- Ask client to slowly lift opposite arm and leg at the same time


FLITTER / PRONE SWIMMING



- Ensure core is activated and client is breathing throughout exercise
- Faster movement increases the challenge and requires greater control


FLITTER / PRONE SWIMMING

- Watch for excessive back extension or upper trapezius hitching




FLITTER / PRONE SWIMMING

- Watch for excessive back extension or upper trapezius hitching
- Encourage adductor activation by ensuring legs stay in parallel



FLITTER / PRONE SWIMMING

- Watch for excessive back extension or upper trapezius hitching
- Encourage adductor activation by ensuring legs stay in parallel
- Remember hip extension is 10-15 degrees, so do not lift the legs too high



Prone Superman on Ball

PRONE SUPERMAN ON BALL



- Position ball under pelvis and abdominal area - this picture shows ball a little too high up the body



- Having feet wider apart provides a more stable base of support - closer together adds challenge to the exercise

PRONE SUPERMAN ON BALL



- The unstable surface makes the flutter exercise more difficult



- To add intensity, add in a resistance band and include a pull-down to increase the engagement of the posterior oblique system

Four Point Opposite Arm & Leg Transfers

Pelvic Bridge

PELVIC BRIDGE

- Lie on the ground in neutral spine, heels and feet hip-width apart
- Palms of the hands flat on the floor with arms by the sides
- Engage core, push through palms of the hands keeping neck and shoulders relaxed



PELVIC BRIDGE

- Engage gluteus maximus muscles without too much hamstring activation to achieve a pelvic tuck under
- Maintain core activation and slowly lift the hips up to a bridge position
- Breathe in at the top, then out as you slowly roll down



PELVIC BRIDGE



- Lifting the arms to perform a bridge removes the lat activation, making you more unstable in the lumbar spine, sacrum and pelvis
- Reducing the base of support means greater core control and balance is required

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Pelvic Bridge on Ball

PELVIC BRIDGE ON BALL



- Position ball under head and shoulders - keep these relaxed during the exercise
- Keep feet flat on the ground
- Have hips off the ball and engage gluteus maximus muscles to lift hips away from the floor

PELVIC BRIDGE ON BALL

Work contralateral latissimus dorsi and gluteus maximus muscles



Right gluteus maximus stabilises while left latissimus dorsi is working

PELVIC BRIDGE ON BALL



In any variation of this exercise in which the feet are on the ground, incorporate the anterior oblique system as well by engaging the adductor muscles.

During the pelvic bridge exercise, squeeze on a small ball or cushion between the knees.

PELVIC BRIDGE VARIATIONS



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Ball Walkouts

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**Lat Pulldowns
with glut max activation**

LAT PULLDOWNS WITH GLUT MAX ACTIVATION



Activating the gluteus maximus muscles during a lat pulldown improves the force closure across the sacroiliac joints and activates the posterior oblique system.

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Standing Squat with pulldown

STANDING SQUAT WITH PULLDOWN



Performing this exercise on an unstable surface will increase the challenge for your client.

Standing Band Hip Extension with pullbacks

STANDING BAND HIP EXTENSION WITH PULLBACK



- Activate both lats when pulling back with both arms
- Engage the glut max muscle while performing hip extension movement
- To focus on one side of the posterior oblique system, extend opposite arm and leg

Back Lunge with Band Row


Anterior Oblique System Focus Exercise Progressions

Supine Oblique Crunch


ANTERIOR OBLIQUE SYSTEM FOCUS




- Exercises for the Anterior Oblique System often activate both the oblique muscles and the adductor muscles
- This combination of muscle groups increases the force closure across pubic symphysis



Supine Oblique Pulses



Ball Lifts in Sidelying



Oblique Crunch with Ball Roll

Supine Tabletop Pulses

SUPINE TABLETOP PULSES



- Known by pilates practitioners as the “hundreds” exercise
- Bring both legs to tabletop with a ball or magic circle squeeze
- Lift up into a crunch, then perform small pulses of the arms by the side while breathing in for five counts, then out for five counts

Seated Ball Leg Transfers

SEATED BALL LEG TRANSFERS



- If your client is not activating the anterior oblique system, the leg will go out to the side during this exercise
- Remind your client to activate core, obliques and adductors while lifting the leg up

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Side Supports

SIDE SUPPORT



- Performing a side support on the elbow and knees is a good exercise to begin the side support progressions
- Once your client can successfully complete the knee position, progress to the full side support position with both legs extended

SIDE SUPPORT



Add challenge and adductor activation to the side support exercise by adding a ball squeeze between the knees or feet

SIDE SUPPORT



• Abducting the top leg reduces the amount of stability across the pelvis

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**Standing Adduction
with upper body twist**
