Practical Delivery Day 2 / 3

- Subjective Assessment
- Objective Assessment
- Sports Massage Treatment Plans
- Preparation of Client / Area for soft tissue therapy
- Sports Massage Application for the hip / lumbar spine (drawing on all skills taught on day 1)
- Re-Assessment and Client Advice
- Record / Note Taking / Medico-Legal Considerations
- Observation 2 (Ankle / Knee)
- Observation 3 (Hip / Lumbar Spine)



Hip Assessment and Pathology



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Recognising and evaluating sports injuries for sports massage



Aims:

- To understand and implement a clinical assessment of the ankle, knee, hip, shoulder, elbow, wrist/hand and spine (subjective and objective assessment)
- Evaluate relevant pathologies
- Carry out a full subjective and objective assessment within the scope of level 4 and discuss differential diagnosis
- Determine the most appropriate treatment (*within the scope of sports massage / soft tissue therapy*)

Hip – Subjective Assessment Considerations



AGE:

- Young: trauma, biomechanical, Lsp/pelvis, developmental disorders
- **Middle age:** arthritis/inflammatory conditions
- Elderly: femoral neck fracture red flag

PAIN:

- **Onset:** acute = trauma/infection chronic = inflammatory
- *Location:* lateral thigh or hip = bursitis, lateral femoral cutaneous nerve (LFCN) entrapment, snapping hip
- **Post thigh/buttocks** = Lsp/pelvis sciatic nerve (piriformis)
- **Groin/medial thigh =** hip joint/acetabular pathology, muscle, Lsp/pelvis
- Anterior thigh = proximal femur, Lsp, neural
- *Occurrence:* gait/motion hip joint aetiology, pelvis
- Lsp/pelvis = red flag = refer on
- *Night:* tumour, infection = red flag

Hip – Subjective Assessment Considerations



Key Subjective Questions / Reported Symptoms Related to Hip Pathologies:

SNAPPING

- With gait = snapping hip, loose body, arthritis, synovitis
- Activity level/assisted gait = severity of pain

TRAUMA

• Fall, RTA = fracture, dislocation, bursitis

REPEATED ACTIVITY

• Overuse/Biomechanical = Stress fracture

NEUROLOGICAL SYMPTOMS

- Pain/tingling/numbness LFCN entrapment, spinal considerations HISTORY OF ARTHRITIS
- Multiple joint symptoms, systemic inflammatory disease

Hip - Objective Assessment – Recap Process



Always remember the process of the objective assessment is the same for each peripheral joint:

- 1. Observation (Posture +, superficial touch)
- 2. Active range of motion (AROM)
- 3. Passive range of motion (PROM)
- 4. Resisted range of motion (RROM)
- Ligament testing & Special Tests (HIP = True and Apparent Leg length, FABER/FADIR, Trendelenburg, Thomas Test, Obers Test, Stork Test).
- 6. Palpation*
- 7. Muscle Strength / Length Tests
- 8. Functional Tests

Hip - Observation



ADDITIONAL CONSIDERATIONS TO GENERAL OBSERVATION & POSTURE

- Skin discoloration, wounds = trauma
- **Gross deformity =** *fracture, dislocation*
- Lurch posteriorly = glute max weakness

GAIT

- Gait pattern, antalgic = pain? = reduced stance phase
- **Steppage =** excessive hip/knee flexion = foot drop, weak leg muscles? Red flag
- Flat foot = reduced push off
- Wide legged = feet > 4 inches apart = neurological/cerebellar = Red flag
- **Decreased stride length =** less than previous/ normal = pain, joint restriction

Hip - Special Tests



- 1. True and Apparent Leg Length
- 2. FABER/FADIR Tests
- 3. Trendelenburg Test
- 4. Thomas Test
- 5. Obers Test
- 6. Stork Test



True and Apparent Leg Length Discrepancies



TRUE LEG LENGTH DISCPREPANCIES

- An actual measurable skeletal differences in the shape / length of the femur/tibia/fibula. Can also include deformities of the foot and ankle, as well as the pelvis.
- Other causes; congenital growth deficiencies, growth plate fractures or dysfunctions, bone infections or joint dysfunction/injury.

APPARENT LEG LENGTH DISCPREPANCIES

- No physical bony differences and the legs are technically the same length,
- Causes commonly arise from pelvic/spinal asymmetries /dysfunctions that create the appearance of one leg to be longer or shorter than the other.
- Other causes for 'apparent' leg length discrepancies include 'excessive' ankle pronation, knee genu varum or valgum, or soft tissue contractures / muscular imbalances.

Hip - FABER Test

FABER Test

- Stands for Flexion, Abduction and External Rotation combined.
- Used to identify the presence of hip pathology by attempting to reproduce pain in the hip, lumbar spine and sacroiliac region.

Positive (+ve) Test

- Reproduces the patient's pain or demonstrates a limitation in ROM.
 - Pain reproduced in groin = (non-specific)
 - Pain reproduced in buttock = (SIJ pathology)
 - Pain reproduced over Greater Trochanter region = (hip joint pathology)
 - Soft tissue tightness = iliopsoas and/or hip flexor restrictions





Hip - FADIR Test

FADIR Test

- Stands for Flexion, Adduction and Internal Rotation combined.
- Used to identify the presence of hip impingement / anterior labral tear pathology by attempting to reproduce pain in the hip joint.

Positive (+ve) Test

 Reproduces the patient's pain or demonstrates a limitation in ROM. Can be noted with / without an audible click or apprehension.





Hip - Trendelenburg test

Trendelenburg Test

- To identify weakness of the gluteus medius muscle
- Can also be present in patients with disc herniation

Technique

• The patient/athlete is asked to stand on one leg for 30 seconds without leaning to one side. Note whether the pelvis stays level during the one-leg stance.

Positive (+ve) Test

• A positive Trendelenburg Test is indicated if during unilateral weight bearing the pelvis drops toward the unsupported side.





Hip - Thomas Test



Thomas Test

- To assess hip flexion contractures; more specifically it tests for anterior or lateral capsular restrictions or hip flexor tightness.
- Checks for lordosis which may be a predictor of a tight hip flexor.

Positive (+ve) Test

- If a contracture is present the leg will raise off of the table.
- Lack of full hip extension with knee flexion less than 45° indicates iliopsoas tightness.
- If full extension cannot be reached in this position it may indicate rectus femoris tightness.
- If any hip external rotation is observed it may indicate ITB tightness



Hip / Lower Limb - Obers Test

Ober's test

• To assess for tightness of the ITB and the TFL along the lateral aspect of the hip and thigh, and irritation over the lateral side of the knee.

Positive (+ve) Test

- Tight & restricted ITB = the leg would remain in the abducted position and the patient would experience lateral knee pain.
- Normal ITB = the leg will adduct and the patient won't experience any pain, in this case the test would be negative.





Hip - Adductor Squeeze Test

Adductor Squeeze Test

- To evaluate the strength of the adductor muscles, through the use of a forceful bilateral isometric contraction of the adductor muscles.
- Helpful in differential diagnosis of adductor-related and pubic-related groin pain.
- A position of 45° of hip flexion is the optimal test position for eliciting maximal adductor muscle activity

Positive (+ve) Test

- Reproduction of pain, weakness in adductor muscle activity
- Induces groin pain



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Sacroiliac Joint – Standing Flexion Test



Standing Flexion Test

• To asses the mobility and function of the sacroiliac joint (SIJ).

Positive (+ve) Test

- Normal movement of the SIJ should remain level whilst performing the movement of forward flexion.
- A +ve test can indicate one PSIS follows the forward movement of flexion in standing.

* This test can also be performed in sitting to eliminate leg length discrepancies



Sacroiliac Joint - Stork Test



Stork Test

- To asses the mobility and function of the sacroiliac joint (SIJ).
- (In a normally functioning pelvis, the pelvis of the side being palpated should rotate posteriorly, causing the PSIS to drop or move inferiorly.)

Positive (+ve) Test

- When the PSIS on the ipsilateral side (same side of the body) of the knee flexion moves minimally in the inferior direction or doesn't move.
- A positive test is an indication of sacroiliac joint hypomobility.
- A positive Stork test combined with other positive sacroiliac mobility tests, indicates an valid impairment of mobility and function of the SIJ.



Hip Pathologies

Explanation of conditions related to clinical assessment for the hip:

- Trochanteric bursitis
- Piriformis syndrome
- Adductor strain
- Gilmores groin
- Snapping hip

For each pathology...

*You need to know how a pathology may present to you in clinic, signs and symptoms, what structures are damaged, other anatomical considerations in relation to the pathology, what special tests may be positive in relation to the assessment of the area, the healing phases of soft tissue (Tim Watson paper)...





Hip - Trochanteric Bursitis

Trochanteric Bursitis

Structures affected:

• Inflammation of the trochanteric bursa, '-itis' implicates it has an inflammatory component

Caused by:

• Most commonly from friction of the overlying iliotibial band inducing an overuse, irritable injury, worsening overtime. Inflammation of the bursa can also occur due to trauma (acute bursitis)

Clinical signs and symptoms:

• Pain, swelling and a warm feeling on superficial touch.

Objective Ax will present:

• Pain on active and passive movement of the hip joint. Chronic pain and/or hip tenderness in the lateral aspect of the hip that may radiate down the thigh. Reduction in strength around hip region. Walking, running and stair climbing painful/reproduces pain. Weak hip abductors.

Sport specific considerations:

• Biomechanical considerations inducing friction. Trauma / direct blow to the bursa. Overuse repetitive motion in any sport, or contact sports.



Hip – Piriformis Syndrome

Piriformis Syndrome

Characterised by a combination of buttock / hip pain.

Structures affected:

Piriformis muscle / Often defined as peripheral neuritis of the branches of the sciatic nerve caused by

Caused by:

Abnormal / dysfunctional piriformis muscle.

Clinical signs and symptoms:

Persistent and radiating low back pain, chronic low back pain, numbness, parathesis, affecting functional activities

Objective Ax consider:

Deep-tendon reflex assessment, Lsp, hip, pelvis, sacrum, SIJ, leg length, Trendelenburg may be +ve, piriformis test (FAIR test)





Hip / Upper Leg - Adductor Strain



Adductor Strain

Structures affected:

• Adductor muscles

Clinical signs and symptoms:

• Onset is usually acute and pain localised. Sudden sharp pain in the groin area, either in the belly of the muscle or higher where the tendon attaches to the pelvic bone.

Objective Ax will present:

 Pain on belly of adductor longus, localised tenderness, pain on active / resisted adduction, reduced ROM in hip abduction. Weakness on squeeze test. Pain felt when sprinting or changing direction quickly.

Sport specific considerations:

• Common in sports that involve sudden change of direction.



Hip - Snapping Hip

Lateral (or external) snapping hip

Structures affected:

Two forms = (Internal and external snapping hip)

External - localised at the lateral aspect of the hip, TFL OR abducting fibres of the gluteus maximus, sliding over the greater trochanter.

Internal – The tendon of the iliopsoas muscle as it moves through its normal motion across the bony structures of the hip joint (iliopectineal eminence, femoral head, or lesser trochanter).

Clinical signs and symptoms:

• Usually not painful, produces a characteristic sound of snapping in or around the hip when it is in motion.

Objective Ax will present:

 Tightness of specific soft tissues, (TFL/glute max), weakness in pelvic stability, myofascial tightness,

Sport specific considerations:

• Ballet dancers.





Hip - Gilmores Groin

Gilmore's Groin

Structures affected:

 Longstanding groin pain involving damage to external / internal obliques muscle / tendon. Caused by muscle imbalances and overuse microtrauma.

Clinical signs and symptoms:

 Post exercise, stiffness and soreness, pain when turning in bed, getting out of the car and sudden movements.

Objective Ax will present:

 Pain in the groin increases with running side stepping, twisting, turning, kicking and jumping.

Sport specific considerations:

 Young male sportsmen, common in sports such as football, rugby, hockey or tennis.





Postural Assessment



Objective Assessment – Recap Process



Always remember the sequence of the objective assessment is the same for each peripheral joint:

- 1. Observation (Posture +)
- 2. Active range of motion (AROM)
- 3. Passive range of motion (PROM)
- 4. Resisted range of motion (RROM) (Muscle strength)
- 5. Special Tests
- 6. Muscle Length Tests
- 7. Palpation*
- 8. Functional Tests

General Observation – What are you looking for?







Why is observation of posture important?

The relative arrangement of the parts of the body <u>= Posture</u>

Good posture =

Protects the supporting structures of the body against injury or progressive deformity

Good posture =

Muscles function most efficiently

How can we observe posture?



- Side view (patient in standing)
- Anterior (patient in standing)
- Posterior (patient in standing)
- Sitting (the patient)
- Gait (functional if appropriate)

Posture Plumb Alignment

Plumb Line Alignment - When viewed from the side, the body is observed in relation to a real or imaginary plumb line that hangs just in front of the centre of the ankle joint.

- bisects the ear
- bisects the glenohumeral joint
- runs down the bodies of the lumbar vertebrae
- bisects the greater trochanter of the femur
- runs just behind the centre of the knee
- runs just in front of the centre of the malleoli



Types of Posture Asymmetries



Types of common postural asymmetries / alignments

(side view)

- Lordotic
- Kyphotic-Lordotic
- Flat-back
- Sway-back



Scoliosis Presentation



- Normal spine = curvature in both anterior and posterior directions
- Abnormal curvature = identified as curves presenting toward a lateral direction
- Scoliosis = simply lateral curvature of the spine (actually a complex 3D deformity)
- Causes can be either congenital or acquired (disease or injury), but many have no known causes so muscular imbalances can be questioned.
- Idiopathic scoliosis



Types of muscle spasm – key terms



Spasm – resulting from a painful nerve stimulus, spasm is an involuntary contraction of a muscle or a part of a muscle.

Protective spasm – preventing movement and further irritation of an injured structures, this type of spasm usually occurs secondary to injury originating from underlying structures such as ligament injury.

Segmental muscle spasm – uninjured segment of a muscle presenting as an involuntary contraction, usually occurring due to an injury in the muscle or tendon region.

Adaptive shortening – from a muscle being in a shortened position for a period of time resulting in tightness. This may decrease the overall decrease in muscle length, thus a decrease in ROM.

Stretch weakness – muscles in an elongated condition for a period of time. Postural examples of stretch weakness' are common in gluteus medius and minimum / middle and low trapezius fibres.

Postural Characteristics in Sport





How might posture asymmetries affect execution





DISCUSS each phase in relation to applied anatomy, structure, and posture

- What muscles are contracting, lengthening, think about core control, body positioning, execution....?
- How might postural asymmetries in a static position affect functional movement....?

How might posture asymmetries affect execution?



Additional discussion around the effect of posture on equine riding.

- Consider discussion with your peers on the subject utilising the video.
- Consider the effect of asymmetrical posture on performance
- Consider how sports massage might help with this presentation





Research Informed Teaching – Effects of Posture on Sport Performance (Equine Riders)

- The potential effect of a dressage rider with trunk axial rotation and lateral flexion is the change in weight distribution through the riders' seat.
- Trunk rotation toward the right was a common postural characteristic.
- Potentially riders presenting with these trunk rotational asymmetries deviate away from a central position on the saddle, suggesting trunk asymmetries are transferable to the pelvis.
- Subsequently these changes in pelvic motion produce an uneven distribution of weight through the pelvis.



Physical Therapy in Sport Volume 16, Issue 2, May 2015, Pages 154-161

Original research

Postural characteristics of female dressage riders using 3D motion analysis and the effects of an athletic taping technique: A randomised control trial

Alexander, J., et al (2014). Postural Characteristics of female dressage riders an the effects of an athletic taping technique: A randomised control trial. Physical Therapy in Sport. 16, 2:154-161.

http://www.sciencedirect.com/science/article/pii/S1466853X14000790
Posture and Links to Pathology

- Evidenced based practice is available that suggests certain postural deviations, characteristics and asymmetries may result in abnormal function and joint pathologies.
- For example, postural deviations throughout cervical and thoracic spine may affect the normal function of the glenohumeral joint.





Summary



- Analysis of posture important in differential diagnosis
- Often linked to the onset of /or predisposing pathologies
- Postural adaptation occurs and thought to enhance performance – but is it just adaptive to performance and therefore unsupportive of 'ideal alignment' so are muscles performing most effectively..... ?
- Postural deformities / malalignment may make athletes more susceptible to injury
- Some sports are naturally asymmetrical, some require optimum symmetry
- Postural assessment aids planning of Rx, and the function of soft tissue structure in a static state

Lumbar Spine Assessment and Pathology



Red Flags – Related to lower back pain - Recap

- Onset age < 20 or > 55 years
- Non-mechanical pain (unrelated to time or activity)
- Thoracic pain
- Previous history of carcinoma, steroids, HIV
- Feeling unwell
- Weight loss
- Widespread neurological symptoms
- Structural spinal deformity







Objective Assessment – Recap Process



- 1. Observation (Posture +, superficial touch)
- 2. Active range of motion (AROM)
- 3. Passive range of motion (PROM)
- 4. Resisted range of motion (RROM)
- 5. Special Tests / LLTT
- 6. Palpation*
- 7. Muscle Strength / Length Tests
- 8. Functional Tests



Lumbar Spine - Objective Assessment



The objective examination helps the therapists to support or refute information gained from the subjective examination.

- Referral of symptoms or presence of neurological symptoms = clear / rule out lower limb pathology.
- Symptoms that occur in the lower limb may originate in the lumbar spine.
- Further investigation may support assessment of lower limb to rule out problems within the lumbar spine producing referral symptoms. (Unless history of peripheral trauma).
- Examination procedures = Sitting Standing Prone
- Pain provocation movements should be performed last in the assessment.



Applied Functional Anatomy







- Shape of the disc corresponds to that of the vertebral body.
- Disc adheres to vertebral body by cartilaginous end plate.
- Pain sensitive structures around an intervertebral disc = ALL/PLL, vertebral body, nerve root, facet joint cartilage
- Injury to the disc = prolapse / extrusion / sequestrated

Muscular Influences - Pelvis / Lumbar / Sacrum

- The pelvis plays a key role in good posture of the spine.
- Ideally the pelvis should be in neutral in standing.
- ASIS should be slightly lower than the PSIS.
- Abdominals, hip flexors, hip extensors and back extensors must be 'balanced'







Effects of Leg Length Discrepancies on Posture

- Note the presence of 'scoliosis' of the side with the shorter limb
- A = Normal
- B = short left femur
- C = short left tibia
- D = pronation of left foot



Observation Lumbar Spine

- A detailed postural observation is key.
- Common postural faults seen in the lumbar spine?
- What other consideration should you have in respect to the clinical presentation of the lumbar spine?





Postural Lateral Shifts



- Examine in habitual posture
- Acute LBP = antalgic posture
- Involuntary postural observations
- Are they able to hold a neutral pelvis?



Does the patient demonstrate a lateral shift?

- = straight lateral movement scoliosis?
- ✓ Lateral shift usually more mechanical dysfunction
 ❑ Leg length?

Muscular Response to Mechanical LBP Pelvic Crossed Syndrome

POSTURAL / STATIC MUSCLES

 ✓ Respond to pathology with tightness (spasm or adaptive shortening)

DYNAMIC / PHASIC MUSCLES

✓ Respond to pathology with atrophy.

**Pathologies that affect both types of muscles (Static and Phasic) can lead to a pelvic crossed syndrome.





AROM – Lumbar Spine



- Assess the available ROM in standing
- Quality of movement
- Hinging
- Hypermobility
- Instability
- Hypomobility
- Stiffness

Active Movements of the Lumbar Spine

- Forward flexion (40° to 60°)
- Extension (20° to 35°)
- Side (lateral) flexion, left and right (15° to 20°)
- Rotation, left and right (3° to 18°)
- Sustained postures (if necessary)
- Repetitive motion (if necessary)
- · Combined movements (if necessary)

Combined AROM Lumbar Spine



- A = lateral flexion in flexion
- B = lateral flexion in extension
- C = rotation and flexion
- D = rotation and extension



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Lumbar Spine Assessment – PROM & Overpressure

Passive ROM

- Difficult to produce in the lumbar spine
- Due to the weight of the body

Overpressure – end of range

- If AROM movements are full range and pain free then overpressure may be applied at the end of some available range
- This is a small oscillatory movement
- Applied to feel the quality and end-feel of the movement and the range of further movement
- Pain response should also be noted
- In the lumbar spine overpressure can be applied to the individual vertebrae.

Passive Movements of the Lumbar Spine and Normal End Feel

- · Flexion (tissue stretch)
- Extension (tissue stretch)
- Side flexion (tissue stretch)
- Rotation (tissue stretch)

Lumbar Spine - Resisted ROM (Isometric)



- Test in a neutral seated position first
- Must be resisted and isometric = no movement occurs
- The therapist should communicate with the patient "Don't let me move you".
- Test flexion, extension, side flexion and rotation.



Lumbar Spine Palpation

PALPATION POINTS INCLUDE:

- ASIS
- PSIS
- Iliac Crest
- Spinous processes
- Transverse processes
- Soft tissue palpation





Neurodynamic Testing – Dermatomes



- Myotomes Relationship between the spinal nerve and muscle.
- Dermatomes innervation of skin from spinal nerve segment.
- Test <u>myotomes</u> by isometric testing for C1-T1 = weakness may indicate lower motor lesion from prolapsed disc or reduction in space.
- Test <u>dermatomes</u> for normal sensation on the skin surface (single spinal segment) for C1-T1.



Lumbar Spine Dermatome Distribution







Myotomes of the Lumbar / Sacral Region



- Test muscle power for possible neurological weakness
- Client in supine assess individual myotomes
- Place test joint in a neutral position
- Apply a resisted isometric resistance pressure
- Hold contraction for 5 seconds
- Test both sides simultaneously to compare a weakness if possible / safe / effective only
- Dorsiflexion = provocative manoeuvre for stretching of neurological tissue
- Complete testing in supine before moving to prone to reduce movement of client on the plinth

Myotomes of the Lumbar and Sacral Spines

- L2: Hip flexion
- L3: Knee extension
- L4: Ankle dorsiflexion
- L5: Great toe extension
- S1: Ankle plantar flexion, ankle eversion, hip extension
- S2: Knee flexion

Myotomes of the Lower Limb



Myotomes of the Lower Limb

Nerve Root	Test Action	Muscles
L1–L2	Hip flexion	Psoas, iliacus, sartorius, gracilis, pectineus, adductor longus, adductor brevis
L3	Knee extension	Quadriceps, adductor longus, magnus, and brevis
L4	Ankle dorsiflexion	Tibialis anterior, quadriceps, tensor fasciae latae, adductor magnus, obturator externus, tibialis posterior
L5	Toe extension	Extensor hallucis longus, extensor digitorum longus, gluteus medius and minimus, obturator internus, semimembranosus, semitendinosus, peroneus tertius, popliteus
81	Ankle plantar flexion Ankle eversion	Gastrocnemius, soleus, gluteus maximus, obturator internus, piriformis, biceps femoris, semitendinosus, popliteus, peroneus longus and brevis, extensor digitorum brevis
82	Hip extension Knee flexion	Biceps femoris, piriformis, soleus, gastrocnemius, flexor digitorum longus, flexor hallucis longus, intrinsic foot muscles
S3	Knee flexion	Intrinsic foot muscles (except abductor hallucis), flexor hallucis brevis, flexor digitorum brevis, extensor digitorum brevis

Reflexes (patella/achilles/babinski)



- A = Patella (L3) Sitting position
- B = Patella (L3) Lying position
- C = Medial Hamstrings (L5) Supine Lying position
- D = Lateral Hamstrings (S1, S2) Prone Lying position
- E = Achilles (S1) Sitting position
- F = Achilles (S1) Kneeling position
- G = Posterior Tilbial (L4, L5) Prone Lying position



Special Tests Lumbar Spine



- Sacroilliac fixation assessment
- Neurodynamic Tests (LLTT)
- Quadrant Test
- Slump test
- PSLR (Passive Straight Leg Raise)

You may want to include the following tests (see Hip / Sacroiliac Joint slides):

- Standing Flexion
- Sitting Flexion (Piedallu's)
- *SIJ Compression/Gapping*
- Trendelenburg Test

Extended Reading Special Tests



Special tests can be distributed into subcategories:

Neurological Lumbar instability Joint dysfunction Muscular tightness Key Tests Performed on the Lumbar Spine Depending on Suspected Pathology*

٠	For neurological dysfunction:
	Centralization/peripheralization
	🔥 Cross straight leg raise test
	A Femoral nerve traction test
	A Prone knee bending test or variant
	🔽 Slump test or variant
	🗸 Straight leg raise or variant
٠	For lumbar instability:
	? H and I test
	Passive lumbar extension test
	🛕 Prone segmental instability test
	P Specific lumbar torsion test
	A Test for anterior lumbar spine instability
	A Test for posterior lumbar spine instability
٠	For joint dysfunction:
	8 Bilateral straight leg raise test
	One-leg standing (stork standing) lumbar extension test
	A Quadrant test
•	For muscle tightness:
	90-90 straight leg raise test
	A Ober test
	A Rectus femoris test
	A Thomas test
•	Other tests:
	2 Sign of the buttock

SIJ - Sacroilliac Fixation Assessment (Gillet test)

- To assess for abnormal movement of the Sacroiliac Joint
- Normal function = the pelvis of the side being palpated should rotate posteriorly, causing the PSIS to drop or move inferiorly
- +ve test = the PSIS on the ipsilateral side of the knee flexion does not move or moves minimally in the inferior direction.
- +ve Test = sacroiliac joint hypomobility













Lumbar Spine - Slump test

PRO PERFORMANCE

- To detect altered neurodynamic or neural tissue sensitivity
- Reproduction of pain as tension is applied
 - 1. Slump the back
 - 2. Maintain chin in neutral
 - *3. Apply overpressure to the shoulder*
 - 4. Actively flex cervical spine
 - 5. Overpressure to the cervical spine
 - 6. Actively straighten the knee
- +ve test = pain extends from the back in to the leg via the sciatic nerve



Passive Straight Leg Raise (PSLR)



Structures Involved:

Sciatic nerve

Neural tension test that used to rule in or out neural tissue involvement as a result of a space occupying lesion

Test Procedure:

Test can be modified in side lying for patients that cannot lie supine.

In supine = hip medially rotated and adducted, and the knee extended

clinician lifts the patient's leg by the posterior ankle with the knee in an extended position

+VE:

+ve = reproduction of neural tightness and pain symptoms

physical signs of disc herniation (back pain) Neurological compromise (leg pain)



Lumbar Spine - Quadrant Test



Structures tested

 This test causes maximum narrowing of the intervertebral foramen and stress on the facet joint (same side as rotation occurs).

Procedure

- Examiner behind patient
- Patient extends the spine
- Examiner controls the movement
- Overpressure applied in extension whilst patient side flexes and rotates to the side of pain

+VE Test

+ve = symptoms are reproduced



Standing Flexion Test

Structures Tested

Sacroiliac synovial joint (minimal movement - nutation and contranutation)

Tests Sacroiliac joint dysfunction is altered mobility within the structural relationship (sacrum- ilium)

Test Procedure

Therapist standing behind patient Thumbs on PSIS Patient performs forward flexion from csp down Knees are extended PSIS should move equally

+VE Test

+ve = reduced mobility in the affected joint The PSIS that moves further is the affected side, this means an articular restriction is present between ilium and sacrum.





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Seated Flexion Test

Structures Tested

Sacroilliac synovial joint (minimal movement - nutation and contranutation) Tests Sacroilliac joint dysfunction is altered mobility within the structural relationship (sacrum- ilium)

Test Procedure

Therapist standing behind the seated patient Thumbs on PSIS Patient performs forward flexion from csp down Knees are extended PSIS should move equally

+VE Test

+ve = reduced mobility in the affected joint The PSIS that moves further is the affected side, this means an articular restriction is present between ilium and sacrum.





Extended Reading - Outcome Measures for LBP



There are many outcome measures suggested for the assessment of low back pain (LBP), such as:

- Oswestry Disability Questionnaire (ODI)
- The Roland-Morris Disability Questionnaire (RMDQ)
- STarT Back Screening Questionnaire
- Patient Reported Outcome Measures (PROMs)

oswestry low back pain questionnaire

name	address	date
date of birth age		
occupation		
how long have you had b	ack pain? years months	weeks
how long have you had le	a pain? years months	wooks

please read:

this questionnaire has been designed to give the doctor information as to how your back pain has affected your ability to manage in everyday life – please answer every section, & mark in each one

only the one box which applies to you. we realise you may consider that 2 statements in any 1 section relate to you, but please just mark the box which most closely describes your problem

section 1 - pain intensity

- I can tolerate the pain I have without having to use pain killers
- the pain is bad but I manage without taking pain killers
- pain killers give complete relief from pain
- pain killers give moderate relief from pain
- pain killers give very little relief from pain
 pain killers have no effect on the pain and I do not use them

pain killers have no effect on the pain and 1 do not use then

section 2 - personal care (washing, dressing, etc)

- I can look after myself normally without causing extra pain
- I can look after myself normally but it causes extra pain
- it is painful to look after myself and I am slow and careful
- I need some help but manage most of my personal care
- I need help every day in most aspects of self care
 I do not get dressed, wash with difficulty and stay in bed

section 3 - lifting

- I can lift heavy weights without extra pain
- I can lift heavy weights but it gives extra pain
- pain prevents me from lifting heavy weights off the floor, but I can manage if they are conveniently positioned, eg on a table
- pain prevents me from lifting heavy weights but I can manage light to medium weights if they are conveniently positioned
- I can lift only very light weights
- I cannot lift or carry anything at all

section 4 - walking

- pain does not prevent me walking any distance
- pain prevents me walking more than 1 mile
- pain prevents me walking more than 1/2 mile
- pain prevents me walking more than 1/4 mile
- I can only walk using a stick or crutches
- I am in bed most of the time and have to crawl to the toilet

section 5 - sitting

- I can sit in any chair as long as i like
- I can only sit in my favourite chair as long as i like
- pain prevents me from sitting more than 1 hour
- pain prevents me from sitting more than 1/2 hour
 pain prevents me from sitting more than 10 minutes
- pain prevents me from sitting more than 10 minutes
 pain prevents me from sitting at all
- comments

section 6 - standing

- I can stand as long as I want without extra pain
- I can stand as long as I want but it gives me extra pain
- pain prevents me from standing for more than 1 hour
- pain prevents me from standing for more than 1/2 hour
- pain prevents me from standing for more than 10 minutes
 pain prevents me from standing at all
- pain prevents me nom standing

section 7 - sleeping

- pain does not prevent me from sleeping well
- I can sleep well only by using tablets
- even when I take tablets I have less than six hours sleep
- even when I take tablets I have less than four hours sleep
- even when I take tablets I have less than two hours sleep
 pain prevents me from sleeping at all
- pain prevents me from sleeping at all

section 8 - sex life

- my sex life is normal and causes no extra pain
- my sex life is normal but causes some extra pain
- my sex life is nearly normal but is very painful
- my sex life is severely restricted by pain
- my sex life is nearly absent because of pain
- pain prevents any sex life at all

section 9 - social life

- my social life is normal and gives me no extra pain
- my social life is normal but increases the degree of pain
- pain has no significant effect on my social life apart from
- limiting my more energetic interests, eg dancing etc
- pain has restricted social life and I do not go out as often
- pain has restricted my social life to my home
- I have no social life because of pain

section 10 - travelling

- I can travel anywhere without extra pain
- I can travel anywhere but it gives me extra pain
- pain is bad but I manage journeys over two hours
- pain restricts me to journeys of less than one hour
- pain restricts me to short necessary journeys of less than 1/2 hour
- pain prevents me from travelling except to the doctor or hospital
- from: Fairbank J C T, Couper J, Davies J B & O'Brien J P Physiotherapy 1980; 66: 271-73

Lumbar Spine Pathologies



- Disc Herniation
- Spondylolysis
- Spondylolisthesis
- Facet Joint Dysfunction/Syndrome
- Rib Fracture

For each pathology, you need to be aware of:

- Mechanism / movement pattern for injury
- Clinical Presentation (signs and symptoms)
- Link to neurological symptoms
- ROM available
- Type of pain = what does this indicate?
- Aggs / Eases

Disc Herniation

Structures affected

- Disc and surrounding structures
- **Clinical presentation**
- Depends on the stage of the pathological process / stage of disc herniation

Signs / Symptoms

- Poorly localised tenderness / limited ROM / minor neurological changes
- Pain / paraesthesia / muscle weakness / combination
- Pain aggravated by movement

Differential Diagnosis

 Non-specific back pain / acute soft tissue strain / disc prolapse / inflammatory diseases



- What you need to know:
- 4 stages of disc herniation
- Anatomy of a disc
- Effects of various stages of disc herniation

Stages of Disc Herniation





Potential Effects of Disc Herniation

- A = Herniation of disc between L4 and L5 compressing 5th lumbar root.
- B = Large herniation of the L5-S1 compromising nerve root crossing the disc (1st sacral nerve root) and the nerve root emerging from the same foramen (5th lumbar nerve root).
- C = Massive central sequestration of the disc at L4-L5 level – involves all of the nerve root in the cauda equine = bladder and bowel paralysis.





Disc herniation clinical presentation and pain distribution



- Patients often present with a lateral shift moving away from the side of pain
- Voluntary / involuntary
- Alleviates nerve root irritation
- A = herniation lateral to the nerve root = lateral shift away from sciatic pain
- B = herniation is medial to the nerve root = lateral shift is toward the side of sciatica

ITD
Lumbar Nerve Root Syndromes



Root	Dermatome	Muscle Weakness	Reflexes/Special Tests Affected	Paresthesias
Ll	Back, over trochanter, groin	None	None	Groin, after holding posture, which causes pain
L2	Back, front of thigh to knee	Psoas, hip adductors	None	Occasionally front of thigh
L3	Back, upper buttock, front of thigh and knee, medial lower leg	Psoas, quadriceps—thigh wasting	Knee jerk sluggish, PKB positive, pain on full SLR	Inner knee, anterior lower leg
L4	Inner buttock, outer thigh, inside of leg, dorsum of foot, big toe	Tibialis anterior, extensor hallucis	SLR limited, neck-flexion pain, weak knee jerk; side flexion limited	Medial aspect of calf and ankle
L5	Buttock, back and side of thigh, lateral aspect of leg, dorsum of foot, inner half of sole and first, second, and third toes	Extensor hallucis, peroneals, gluteus medius, ankle dorsiflexors, hamstrings— calf wasting	SLR limited to one side, neck-flexion pain, ankle jerk decreased, crossed-leg raising— pain	Lateral aspect of leg, medial three toes
S1	Buttock, back of thigh, and lower leg	Calf and hamstrings, wasting of gluteals, peroneals, plantar flexors	SLR limited	Lateral two toes, lateral foot, lateral leg to knee, plantar aspect of foot
S2	Same as S1	Same as S1 except peroneals	Same as S1	Lateral leg, knee, heel
\$3	Groin, inner thigh to knee	None	None	None
S4	Perineum, genitals, lower sacrum	Bladder, rectum	None	Saddle area, genitals, anus, impotence

Differential diagnosis muscular strain / disc herniation



Differential Diagnosis of Lumbar Strain and Posterolateral Lumbar Disc Herniation at L5 to S1

	Lumbar Strain	Lumbar Disc (L5 to S1)
History	Mechanism of injury: flexion, side flexion and/ or rotation under load or without control	Quick movement into flexion, rotation, side flexion, or extension (may or may not be under load)
Pain	In lumbar spine, may be referred into buttocks May increase with extension (muscle contraction) or flexion (stretch)	In lumbar spine with referral into posterior leg to foot (radicular pain) Increases with extension
Observation	Scoliosis may be present Muscle spasm	Scoliosis may be present Muscle guarding
Active movement	Pain especially on stretch (flexion, side flexion, and rotation) Pain on unguarded movement	Pain especially on extension and flexion Side flexion and rotation may be affected
	Limited ROM	Limited ROM
Resisted isometric movement	Pain on muscle contraction (often minimal pain) Myotomes normal	Minimal pain unless large protrusion L5–S1 myotomes may be affected
Special tests	Neurological tests negative	SLR and slump test often positive
Sensation	Normal	L5-S1 dermatomes may be affected
Reflexes	Normal	L5-S1 reflexes may be affected
Joint play	Muscle guarding	Muscle guarding

Lumbar Spine - Spondylolysis

Structures involved:

Considered to be a stress fracture caused by mechanical stress at the pars interarticularis.

Commonly **L5** due to repetitive hyperextension, increases contact between caudal edge of the inferior articular facet of L4 and the pars interarticularis of L5.

Clinical Presentation:

Gradual or acute onset (usually due to repetitive load and stress)

Recent or history of local trauma

Intense pain = affects ADL and performance

Focal low back pain with radiation into the buttock or proximal lower limb

Symptoms can increase during lumbar extension or rotation

Children can present a postural deformity or abnormal gait pattern

Pain through lumbar FROM

Common in:

Young athletic population.

Increased risk in gymnasts, football players, cricketers, swimmers, weight lifters and divers





Lumbar Spine – Spondy ...









ADVANCED Ankylosing Spondylitis



(Vertebra become inflamed and back feels stiff and sore)

(More severe form where vertebrae fuse together)

SPONDYLOLYSIS



Pars Interarticularis)

(Stress fracture and sliding of vertebra)

SPONDYLOLISTHESIS

SPONDYLOSIS



(Degeneration of the vertebra often referred to as arthritis)

Lumbar Spine - Spondylolisthesis

Structures involved:

- Translation of one vertebra over the adjacent caudal vertebra
- Anterior / posterior translation
- Fractured pars interarticularis of the lumbar vertebrae
- Iliolumbar ligament between L5 and the sacrum, are stronger than those between L4 and L5, the vertebral slip commonly develops in L4.
- Type I Congenital / Type II Isthmic or spondylolytic/ Type III degenerative







Lumbar Spine - Spondylolisthesis

Clinical Presentation

Atrophy of the muscles

Tense/spasm hamstrings

Disturbance in patterns / coordination and balance / reduced spinal ROM

Neurological symptoms

Dull pain in lumbosacral region post exercise, especially with lumbar extension

Symptoms vary as a function of mechanical loads (from supine to erect position)

Pain worsens throughout the day

Radiation into the posterolateral thighs is also common

Further Investigation

Radiological assessments are suggested to help confirm diagnosis and determine grade / prognosis of spondylolisthesis. Most commonly used clinical imaging is X-ray, CT and MRI

Additional Outcome Measures

Can include Oswestry Disability Index (ODI)





Facet Joint Dysfunction/Syndrome



Background

A dysfunction at the level of the posterior facet joints of the spine

Changes at the level of the posterior facet joints can influence the disc and vice versa

Capsular tears

Irritation

Commonly L4-L5 or L5-S1

Soft tissue structures affecting position of vertebrae

Clinical Presentation

Local pain, <extension locally affected joints, unilateral abnormal lateroflexion

Antalgic posture

Pain on hyperextension

Local stiffness (static and dynamic muscles)

Referred pain

INCREASES PAIN:

- Extension
- Rotation
- Prolonged standing
- Sudden movements
- After rest
- Lateral flexion towards affected side
- Returning from flexed position
- Movements in general

DECREASES PAIN:

- Walking
- Lying with knees bent
- Supported flexion
- Lateral bending towards healthy side
- Varying activity