

## **TOPIC OUTLINE 2 – UPPER THIGH, HIP AND PELVIS.**

### **Introduction.**

The hip bone consists of three parts, the PUBIS, the ILIUM and the ISCHIUM which meet in the acetabular fossa.

### **Joints of the Pelvis.**

The two hip bones are joined anteriorly at the symphysis pubis by a fibrous cartilage with a hyaline coat known as the inter pubic disc. The integrity of this joint is reinforced by the superior and the arcuate pubic ligaments.

The sacroiliac joint is an articulation formed by the auricular surface of both the sacrum and the ilium of the hip bone. The joint surfaces are covered by fibrous cartilage and a taut, highly innervated joint capsule. The capsule is strengthened by the sacroiliac ligaments and the stability of the joint is enhanced by the iliolumbar ligament as well as the sacrotuberous and sacrospinous ligaments.

The femoral – acetabular joint, also known as the hip joint is one of the largest and most stable joints in the body and is formed by the head of the femur articulating in the acetabular fossa. It is classified as a multiaxial ball and socket synovial joint.

Due to the anatomy of the joint, patients rarely present with specific hip pain unless a pathological process or direct trauma occurs.

If the hip joint exhibits pathology, the lesion is usually immediately perceptible during walking.

As pain from the hip can be referred to either the sacro-iliac joints or the lumbar spine, it is important, unless the case history shows evidence of direct trauma or pathology, that these joints are examined along with the hip.

Unless the patient presents with direct trauma to the hip or a congenital hip dysfunction (ref: - orthopaedic notes hip) the most common hip condition an Osteopath will encounter is Osteo-Arthritis. (OA).

## **Initial Regional Inspection.**

This regional inspection is shared with that of topic outline 1.

Factors to consider during the inspection should include:-

- Gait, antalgic, Trendelenburg.
- general ease of movement
- levels of iliac crests, gluteal folds, PSIS ( pelvic obliquity)
- Scars, surgical/traumatic
- Atrophy especially gluteals
- Swellings, hernias or enlarged lymph nodes
- Spinal curves, adaptations – scoliosis, lordosis

( REF; Passor, Musculoskeletal physical examination competences list 2000 - 2001)

Once a full regional observation is carried out, both a bony and soft tissue palpation is carried out allowing a diagnosis to be formulated.

## **Palpable Structures – Bony Structures.**

The palpable bony structures in this topic are:-

- Iliac crest
- Iliac tubercle
- Anterior Superior Iliac Spine (ASIS)
- Pubic tubercle
- Pubic symphysis
- Greater trochanters
- Ischial tuberosities
- Sacro-iliac joints

The bony palpation of the upper thigh, hip and pelvis commences with the patient supine with their head supported by a pillow.

### **Iliac Crest.**

The iliac crests are palpated from the PSIS to the ASIS. As you palpate assess for the continuity of the bony ridges and any tenderness reported which may be due to muscle dysfunction as it is an extensive site for muscular attachments.

The levels of the iliac crests are assessed, both visually and through palpation.

### **Iliac Tubercles**

As your palpation of the iliac crest moves anteriorly, a thickening of the bone is palpated, ( at the point at which the crest drops inferiorly) which is the iliac tubercles.

The tubercles are found on the widest point of the pelvis and are important sites of muscle attachment.

### Anterior Superior Iliac Spine ( ASIS)

The most anterior aspect of the iliac crest is marked by the presence of prominent bony protuberances, the ASIS. These serve as useful landmarks for assessing the levels of the pelvic crests as well as important sites of muscular attachments.

They also represent the lateral attachments of the inguinal ligaments.

### Pubic Tubercles & Symphysis.

The pubic tubercles form the lateral margins of the pubic symphysis. Pelvic restrictions can manifest as tenderness in the symphysis due to torsional strain that occurs in an uneven pelvis.

These structures are located in the lower abdominal wall, just above the genitals. The palpation therefore, MUST be specific and respectful, with the patient aware of why these structures are being palpated and consent obtained.

The practitioners hand is placed on the umbilicus, with the heel of the hand on the navel and the fingers pointing towards the head. Pressure is applied with the heel of the hand, gradually palpating inferiorly until the pubis is contacted.

The contact with the heel of the hand is maintained, and with the other hand the pubis is palpated. By locating the pubis as described, a firm contact has been maintained reducing the discomfort for the patient.

Once the pubis is located, the symphysis is found as the central point of the pelvis. Either side of the symphysis ( palpated as a groove) a bony protuberance is palpated – the pubic tubercles. Levels, tenderness and excessive distance between the tubercles are assessed, which could indicate a separation of the pubis – pubic diastasis.

### Greater Trochanters

The patient is side lying, with their knees flexed.

A contact is made with the ASIS and the practitioner palpates laterally and posteriorly over the upper thigh. The greater trochanters are located superficially on the lateral thigh.

Once the location has been identified, assessments are made of pain, swelling and tenderness which may indicate dysfunction.

### Ischial Tuberosities

With the patients knees flexed to 90° ( to expose the Ischial tuberosities, as gluteus maximus is superficial to this structure) the greater trochanters are located. Palpating in a postero-inferior direction from the greater trochanters a bony structure should be palpated half way in the gluteal soft tissue of the buttock. The Ischial tuberosities are the site of the hamstring muscle attachments and may be tender to palpate.

### Sacroiliac Joints.

The patient is side lying and the PSIS's are located. The contact is moved medially until a soft tissue sulcus is palpated. To aid the palpation a passive flexion/extension of the hip is carried out. Tenderness may indicate a sacroiliac dysfunction.

## **Palpable Structures – Soft Tissue Structures**

The femoral triangle

- Adductor longus
- Sartorius
- Inguinal ligament
- Iliopsoas
- Pectineus
- Femoral Artery
- Femoral Vein
- Femoral Nerve
- Lymph nodes

Muscles

- Adductor magnus & brevis
- Quadriceps
- Tensor fascia lata
- Abdominals
- Gluteals
- Hamstrings

Sciatic Nerve

Bursae

- Trochanteric
- Ischial

### The Femoral Triangle

The femoral triangle is an area of the upper thigh named because of the important vessels that pass through it. To make the palpation more accessible, the patient is supine with the sole of the foot of the leg to be examined lying in contact with the medial aspect of the opposite leg, approximately level with the knee.

The borders of the femoral triangle are formed by:-

Medial border – Adductor longus muscle

Lateral border – Sartorius muscle

Superior border – Inguinal ligament

Floor – Part of adductor longus, iliopsoas and pectineus

Contents- Femoral nerve, artery & vein. Lymph nodes and vessels

The palpation begins with the medial and lateral borders of the triangle from their insertions to their attachments. To aid in the palpation pressure is applied to the medial aspect of the flexed knee, making the muscles more apparent.

The inguinal ligament runs from the ASIS to the pubic tubercle. The ligament is palpated from lateral to medial assessing for any swellings ( possible hernias) and tenderness ( strains).

As you palpate the inguinal ligament you may palpate “pea” sized nodules, which could be enlarged lymph nodes. These may indicate a recent or current infection in the lower limb, pelvis or groin.

Approximately half way along the inguinal ligament, the pulse of the femoral artery can be palpated. The pulse is assessed for rate, rhythm and amplitude. The pulse is compared with the other side, as well as with the radial pulse, assessing for vascular occlusions or aneurysms.

The femoral nerve and vein also run in the femoral sheath but are not easily palpable. Deep in this region is the floor of the femoral triangle. The floor is made up of part of the already palpated adductor longus muscle but also the iliopsoas tendon with its bursa and more medially pectineus.

### Muscles

#### Adductor Magnus & Brevis

These muscles are medially located on the thigh, the muscle bulk is palpated along the medial aspect of the thigh to the knee. These muscles are a common cause of pain in athletes, and can be referred to as a “groin strain”. Palpation is carried out to assess for symmetry, tenderness and wasting.

## Quadriceps

The quads. are palpated from the ASIS & AHS ( Rectus femoris) distally down the thigh to the knee. Assessments are made for symmetry, tenderness and wasting.

## Tensor Fascia Latea

This muscle originates in the region of the iliac tubercle and extends towards the greater trochanter, it is the main component of the soft tissue mass anterosuperior to the greater trochanter.

This muscle is not often involved in hip pain, however can contribute to irritation of the knee through the iliotibial tract.

## Abdominals

The abdominal muscles are palpated as a group. They insert on to the pelvis from the iliac crest, pubic bones and also contributes to the inguinal ligament.

They are palpated bilaterally from the flanks. Superficial palpation is carried out to assess for tone and fibrosity and possible hernias.

## Gluteals

The patient is in the prone position. The muscles of note are the gluteal medius and piriformis. The gluteal muscles are palpated from the attachments on the posterior pelvis to their common insertions on the femur. Symmetry, tenderness and muscle wasting are noted.

## Hamstrings

The hamstrings are initially assessed prone. Palpate the muscle from insertion to origin assessing for tone, tenderness and symmetry. Once the initial palpation has been conducted, the patient is side lying with slight flexion in the knees.

This side lying position allows the stretch of the hamstrings to be relaxed. A similar palpation is carried out from origin to insertion. Common injuries include strains or possible tears due to poor stretching before sport.

## Sciatic Nerve

The sciatic nerve is best palpated with the patient side lying, with their hips and knees flexed to 90°. This hip flexion exposes the sciatic nerve.

Irritation of the sciatic nerve could be a result of a disc injury, piriformis syndrome or a misplaced injection, therefore care must be taken when palpating as this region could be extremely tender.

The sciatic nerve lays approximately half way between the greater trochanter and the Ischial tuberosity. The nerve is cord like and approximately ½ an inch in diameter. Palpation of the nerve may cause pain radiating into the lower extremity.

### Bursae

A bursa can be defined as a “fluid filled sac” over lying a superficial bony structure. Its function, when inflamed is to protect the underlying bony structures.

#### Trochanteric bursa

With the patient side lying, the greater trochanter is located. If a bursa is present the area may be inflamed, feel oedematous and be tender on palpation.

#### Ischial Bursa

Palpation of this bursa is similar to that of the trochanteric bursa. As the hamstring muscles all attach to the Ischial tuberosity, palpation must be accurate to differentiate between an inflamed bursa and a muscle injury.

Once all the structures have been palpated, if indicated, active and passive testing is carried out.

### **Orthopaedic testing .**

As with all orthopaedic testing we are evaluating range of movement of the joint and reproduction of the symptoms, but if the patient reports pain, testing must stop. In a patient with hip problems they may find it difficult to stand and perform your active testing, therefore the Osteopath must have the ability to adapt the examination.

Assessments of the asymptomatic hip is made first as a bench mark for the patients normal ease, quality and range of movement allowing an objective comparison with the symptomatic hip.

### **Normal Range of Movement.\***

- Active Flexion, 90° with the knee extended, 120°+ with the knee flexed
- Passive Flexion, 140°+ dependent on knee position.
- Active Extension, 20°
- Passive Extension, up to 30°
- Active Abduction 45°
  
- Passive Abduction 45°

- Active Adduction 30°
- Passive Adduction 30°
- Internal Rotation 35°
- External Rotation 60°

Ref :- The Physiology of the Joints, I.A. Kapandji, Vol. 2 Lower Limb.

\* Range of movements is subjective, and only a guide- with the hip, factors to consider is exercises to increase mobility( gymnastics, ballet, yoga etc....)

### **Active Movements.**

The active examination is carried out standing, allowing the patient support, but as an adaptation can be assessed supine or side lying:-

- Flexion
- Extension
- Abduction
- Adduction
- Internal/External rotation.

### **Passive movements.**

SUPINE.

- Abduction
- Adduction
- Flexion
- Internal/External rotation
- Circumduction.

PRONE.

- Extension
- Trochanteric roll.

N.B. when assessing both active and passive hip movements, care must be taken to assess “ pure” hip movements avoiding lumbar spine involvement.

Once active and passive examinations have been concluded, if indicated special tests should follow.

### **Special Tests**

There are three tests for the hip which assess for degenerative changes.

#### ***Faber-Patrick Test.***

This is a historic test, and suggestions made that flexion and external rotation are the 1<sup>st</sup> vectors to be compromised with arthritic changes are inaccurate, as extension and internal rotation are usually compromised first.

The Faber aspect of the test assesses for the integrity of the femoral head with its articulation in the acetabulum. It tests for arthritic changes in the hip.

The patient is supine.

The patient's knee is flexed and the lateral malleolus is placed onto the opposite knee. ( above the patella).

The practitioner supports the pelvis allowing the **F**lexed, **A**Bducted and **E**xternally **R**otated ( Faber) leg to drop-out as far as comfortable.

If pain is reported in this manoeuvre, it is possible that the hip joint is affected with O.A.

\*Historically, it has been suggested that in an arthritic hip joint the primary planes of motion affected are flexion, abduction and external rotation, hence the test.

It is also important to remember that a groin strain or a restricted sacro-iliac joint will also produce pain on the Faber test. The Patrick aspect of the test assesses for a sacroiliac dysfunction. With the patient in the "Faber" position, pressure is applied on the medial aspect of the knee, with the patient offering resistance. Pain over the sacroiliac joint is suggestive of dysfunction. The test is used in conjunction with a detailed case history and full clinical examination in order to formulate a diagnosis.

The test is recorded as to what the patient reports and to the degree of abduction of the knee. (how far the knee drops).

### ***Thomas Test.***

The Thomas test assesses for hip dysfunction, notably muscle ( psoas) flexion contractures of the hip.

The patient is supine, and flexion of the hip is induced. The practitioner notes the degree of flexion, whether the straight leg remains on the couch or also flexes, and while palpating the lumbar spine assessing for movement.

With O.A. of the hip, an adaptation is a flexion contracture. The Thomas test not only assesses hip degeneration but also muscle contracture of the pelvis complex. (Raising of the straight leg into a flexed position).

The practitioner also palpates the lumbar spine assessing for movement as pure hip flexion is required. If movement is felt in the lumbar spine the test is invalid.

The test is recorded as to what the patient reports as well as the degree of hip flexion, and alteration of the straight leg.

### ***Trendelenburg Test.***

The Trendelenburg test assesses for the strength of the gluteus medius muscle, which may be compromised with hip degeneration. (O.A.)

The patient is asked to stand on one leg, and raise the knee of the other leg to 90 °. ( provide support if necessary).

A positive test is recorded if the pelvis “drops” on the unsupported side. ( the side of the raised leg).

If the pelvis drops it suggests that gluteus medius on the supported side is weak due to poor use/ antalgic posture or lack of neurological innervation.

The Trendelenburg Test is not always practical in a clinical environment as many patients with muscle weakness/ degenerative hip pathology will not be able to stand on one leg, while raising the other knee to 90°.

The test is recorded as “positive” to which muscle is not functioning.