Haemophilia
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Association

Management of Iliopsoas muscle haematoma: clinical guidance for people with bleeding disorders

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PREFACE

Iliopsoas haematomas in people with bleeding disorders (PWBD) can be limb or life threatening and are associated with morbidity (1,2). Pre-existing guidelines produced to assist in the management of these injuries are relatively brief and non-specific regarding the various stages of recovery (3,4,5). This document follows the responses to a survey completed by chartered haemophilia specialist (HCPA) physiotherapists in the UK and Ireland and is applicable for both adult and paediatric physiotherapists (both new and experienced) working with PWBD. It provides information and best practice advice whilst avoiding being overly prescriptive. A thorough literature search was undertaken and where possible, the recommendations are based on scientific evidence. Physiotherapists should be pragmatic in their approach to managing these injuries using clinical reasoning and empirical understanding where evidence is lacking.

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1. Types of iliopsoas injury

Muscle injury results in bleeding by nature of either a shearing force causing direct trauma to myofibrils (strain or tear) or by blunt force trauma (contusion). Iliopsoas injuries usually involve straining due to the dynamic nature and location of the muscle (spanning the hip and linking the torso with the legs) (10).

Table 1: Predisposing factors for iliopsoas injury

Predisposing factors for iliopsoas injury/haematoma (1 or more of the points below indicate higher risk)	Other predisposing factors to muscle injury (9)
• PWBD with poorly controlled disease or poor adherence to treatment • Poorly informed (or undiagnosed) PWBD presenting late after injury • New diagnosis (or untreated) acquired bleeding disorder • Individuals on therapeutic anticoagulation (6) • Active or sporty individuals • Elderly or frail individuals (6) • Sexual activity (7) • Skeletal immaturity • Adolescence (7) (8)	• Inadequate warm up • Insufficient joint range • Excessive muscle tightness • Fatigue/overuse/inadequate recovery • Muscle imbalance • Previous injury • Faulty techniques/biomechanics • Spinal dysfunction

2. Overview of anatomy

Deep hip flexors:

Psoas major- Origin: transverse processes and lateral surfaces of the vertebral bodies of T12/L1 - L4/L5, with connections to the intervertebral discs. Fascicles are similar length throughout and have unipennate orientation. Fascicles orientated inferolaterally and come together to form a common tendon. This descends over the pelvic brim and shares common insertion with iliacus on the lesser trochanter (11).

Iliacus- fan shaped occupying upper two-thirds of the iliac fossa and lateral aspect of sacral ala. Blends with bundles of quadratus lumborum anteriorly on upper and lower anterior iliac spines and anterior hip capsule. Muscular bundles move lateral to psoas major tendon where they insert distally (11).

Actions:

- The iliopsoas unit functions primarily as a powerful hip flexor but also has important function in femoral external rotation and with lateral bending, flexion, and balance of the trunk. The iliacus and psoas major have been shown to have individual and task-specific activation patterns. The iliacus is important for stabilising the pelvis and for early rapid hip flexion while running. The psoas major is important for upright sitting and stability of the spine in the frontal plane. Variable contribution of each muscle is observed during sit-ups depending on the angle of hip flexion (12).

- The moment arm (greater potential for torque generation), particularly for iliacus increases towards 90 degrees of hip flexion and then begins to fall beyond this (13).

- Bi-articular hip flexors (rectus femoris, sartorius, TFL) have better moment arms than iliopsoas at 0 degrees (14).

- Iliacus and psoas muscle activity increases with increasing hip flexion. They work harder with the hip at 90 degrees and the knee extended due to a) rectus femoris being unable to contribute as much to hip flexion and b) iliacus and psoas needing to work to maintain lumbopelvic position (15).

- Activity during gait - Iliacus has low levels of activity in early – mid stance. This increases in late stance to control anteriorly directed joint forces, eccentrically control hip extension and to gather energy for release during the swing phase. Iliacus activity peaks in early swing before dropping off. Iliopsoas generates hip flexion motion (16).

- During gait when the trunk is reclined, iliacus and rectus femoris activity both increase in stance phase. When the trunk is inclined, iliacus significantly increases during swing phase (17).

- Activity during bilateral squat - iliacus, rectus femoris (and iliocapsularis) increase activity to the peak of the squat in deep hip flexion (16).

- Activity during sitting – psoas major helps maintain the spine in an erect position. Psoas and iliacus are moderately to highly active in a) hyperlordosis with anterior pelvic tilt, b) trunk reclined position (extension occurring at the hip), c) contralateral trunk lateral flexion (leaning away) (15).

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The femoral nerve develops within the body of the psoas muscle from the posterior division of L2-L4. It then runs between the psoas tendon and the iliacus muscle beneath the iliacus fascia to the femoral canal (under the inguinal ligament) (18). The fascia overlying the iliacus muscle and the femoral nerve is strong and not easily stretched in the presence of underlying hematoma formation (19). As a result, **femoral nerve compression occurs along the iliopsoas gutter, where it is also at the most risk for ischemia due to the poor local vascular supply**. In addition, the hematoma may track down the iliacus muscle into the femoral canal and compress the femoral nerve against the inguinal ligament, resulting in further ischemia and resultant neuropathy (18)(19).

3. Muscle injuries – initial detection to optimal resolution

The earlier a bleed is detected and a patient receives clotting factor, the earlier a stable clot can begin to form. Even small strains to muscle fibres (20) result in bleeding so an innocuous injury in someone with a bleeding disorder can have significant ramifications if not well managed.

Muscle injury classification and grading systems for severity (21)(22) are available although none are specific for iliopsoas. These grading systems may help to guide clinicians with some patients, particularly more sporty and active individuals however evidence for this is limited.

Three recognised phases of muscle recovery exist and the phases overlap with each other:

- **destruction (acute) phase**

- repair (subacute) phase

- remodelling (post-acute) phase stretching over roughly 21+ days (20).

Timeframes can differ significantly amongst individuals dependent on which structures within the musculotendinous unit have been affected, the mechanism of injury and how promptly treatment was commenced (23). In general, intermuscular haemorrhages take less time to recover than intramuscular haemorrhages (24).

Bleed resolution should occur within 20-40 days (in healthy athletes) (25) but in PWBD there are potentially more variables, and it is more subjective as to how long this might take.

Impaired haemostasis (and delayed clotting factor treatment in people with bleeding disorders) will result in delayed resolution of the acute phase of healing post injury, leading to risk of re-rupture and delay to the regeneration and remodelling of an injured muscle (26). Joint contracture and compartment syndrome are other potential complications (27).

- **14 days of strict caution is therefore appropriate advice for PWBD following a large muscle bleed due to known fusing times of regenerating myofibres (general population) (26).** *This may initially involve bedrest or immobilisation (see phase 1).*

Delayed resolution of haematomas can lead to the formation of unwanted scar or fibrotic tissue which can negatively affect functional recovery. This is often the most meaningful period of recovery to patients. When deemed safe to do so, **graded progression of load and rehabilitation plays a vital role in stimulating muscular regeneration** to aid resolution (28).

It is **important to observe for rarer complications** of poorly managed haematomas including heterotopic ossification within the resolving haematoma (Myositis Ossificans) (27,28) and haemophilic pseudo-tumours (29).

4. Initial presentation and clinical assessment

ENSURE COMMUNICATION BETWEEN EMERGENCY DEPARTMENT (ED) AND HAEMOPHILIA TREATMENT CENTRE/HAEMATOLOGISTS IS CLEAR*. A pathway should be in place to ensure ED staff escalate appropriately when PWBD present with acute hip/groin pain.*

Haemophilia comprehensive care centres are advised to have a documented treatment management plan for Iliopsoas bleeds. Please check your local policy.

Diagnosis:

- Ideally by a haematologist and physiotherapist with experience in haemophilia alongside nursing colleagues:
- Detailed history taking and understanding of the mechanism of injury.
- Appropriate imaging (see phase 1 below).

Table 2: Clinical symptoms and diagnosis of iliopsoas injury/haematoma

Signs and Symptoms	Differential diagnosis
• Hip held in flexion (extension loss)/pain with hip extension • Pain in groin/abdominal/low back region, worse with attempted hip extension • Difficulty with/inability to stand completely upright or lie supine with affected leg straight • Increased lumbar lordosis and scoliosis • Difficulty with/inability to walk • Painful and/or tense to palpate the lower abdomen and/or the iliac fossa (region of psoas and iliacus) • Femoral nerve symptoms (L2,3,4): sensory and/or motor impairment of involved lower extremity • Quadriceps fasciculations • Diminished/absence of patellar reflex • Quadriceps atrophy or muscle inhibition • Complex fluid visible in muscle tissue on appropriate imaging modality • Monitor for symptoms of blood loss/anaemia such as tachycardia, hypotension, and pallor	• Visceral pathology (appendicitis, gallbladder, kidney stones, etc.) • Hip joint bleed • Abdominal muscle bleed • Retroperitoneal bleed • Acute lumbosacral pathology • Hip pathology (arthritis, labral tear, avascular necrosis, tendonitis, bursitis, fracture) • Children/adolescents – consider slipped upper femoral epiphysis (SUFE), hip apophysitis, pelvic avulsion injuries, infection

5. Recovery and rehabilitation

Phases of recovery (including timeframes given) are a guide only. **Both clinicians and patients should feel ready and safe to progress to the next 'phase'**. Generic goals and progression criteria are provided to help support clinicians in their decision making. Acknowledgment is made here to the significant functional variability of PWBD presenting with this injury and the importance of recovery programs being individualised.

Phase 1 – Acute bleed

Table 3 - Recovery Phase 1: Acute bleed/inflammation

Phase 1	Specific instructions/ precautions	Goals
Acute bleed/ inflammatory **Days (guide): 0-4**	- Hospital admission is often required due to factor correction requirements and risk of early re-bleed. - Bed rest advised **until haemostatically stable (estimated first 0-72 hours)** (24) with hip in position of comfort (usually hip flexion supported with pillows). - Pain, swelling and muscle shortening are often markers of acuity **however they are not always clearly present on initial assessment**. Iliopsoas swelling/haematoma is often too deep to be noticed on physical assessment (24). - The extent of the bleeding does not always correspond to the symptoms experienced (24). - Careful monitoring of neurology is important. - Manual therapy and exercise therapy is contra-indicated in this phase (24). **Radiological management:** Urgent diagnostic imaging on presentation if suspicion is a bleed* – MRI as gold standard (30), CT scan is more readily available as an urgent request, ultrasound by skilled radiographer if MRI/CT are unavailable. ***Delayed access to imaging should not delay factor replacement therapy if clinical suspicion is a bleed.** **Suggested treatment:** <u>Haemostatic:</u> Treating haematology team to decide as per individual. Patients with haemophilia:	1. *Arrest bleeding, optimise haemostasis/clot formation* 2. *Control pain* 3. *Minimise inflammation and oedema* 4. *Neurovascular stability*

- Treated similarly to surgical patients: up to a 50% trough for 10–14 days followed by high-level prophylaxis (FVIII/FIX) to accompany activity progression (31).
- In patients with inhibitors, regular doses of rFVIIa or FEIBA should be administered until clinical improvement is observed (31).

WFH guidelines state: (31)

	Hemophilia A				Hemophilia B			
	Lower-dose practice pattern		Higher-dose practice pattern		Lower-dose practice pattern		Higher-dose practice pattern	
Type of hemorrhage	Peak factor level (IU/dL)	Treatment duration (d)	Peak factor level (IU/dL)	Treatment duration (d)	Peak factor level (IU/dL)	Treatment duration (d)	Peak factor level (IU/dL)	Treatment duration (d)
Joint	10-20	1-2[a]	40-60	1-2[a]	10-20	1-2[a]	40-60	1-2[a]
Superficial muscle/ no NV compromise (except iliopsoas)	10-20	2-3[a]	40-60	2-3[a]	10-20	2-3[a]	40-60	2-3[a]
Iliopsoas or deep muscle with NV injury or substantial blood loss								
Initial	20-40	1-2	80-100	1-2	15-30	1-2	60-80	1-2
Maintenance	10-20	3-5[b]	30-60	3-5[b]	10-20	3-5[b]	30-60	3-5[b]

Physiotherapy:

- Toe-touch weight bearing for limited mobility to bedside commode or wheelchair only (if safe).
- Avoid stretching iliopsoas and limit contraction i.e. avoid (functional) movement against resistance (24).
- Active range of motion exercises of **uninvolved** muscles/limbs.
- Guidance on safe mobility of affected leg during bed transfers i.e. using the unaffected leg to assist lifting.
- Patient may be more comfortable rolling on to their side prior to sitting.
- Neurological assessment at regular intervals.
- Consider safe use of cryotherapy or TENS to reduce pain (24).

Phase 2 – Sub acute haematoma – Early rehabilitation

Table 4 - Recovery Phase 2: Sub acute haematoma

<table>
<tr><th>Phase 2</th><th>Specific instructions/precautions</th><th>Goals</th></tr>
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<td>Sub acute haematoma/ proliferation (Early rehab)

Days (guide): 4-21</td>
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- This phase is characterised by an increase in muscle length and reduction in pain (24).
- The early clot which has formed is still fragile therefore caution is recommended when encouraging early contraction/stretching (24).
- Reduction of swelling will occur too, however improvements in this area may be slower or more subtle to assess than pain and muscle length (24).
- Following a period of bed rest a traffic light system could be helpful for monitoring pain response to new activity (32)*:

<table>
<tr><td>Green</td><td>pain score 0-2 ‘GO’</td></tr>
<tr><td>Amber</td><td>pain score 3-5 ‘ATTENTION’</td></tr>
<tr><td>Red</td><td>pain score 5-10 ‘STOP’</td></tr>
</table>
* Pain which is subjectively improving may be more informative than NPRS/VAS score.

- Avoid passive stretching into hip extension and rapid, forceful movements involving hip flexion.
- Careful monitoring of neurology, posture and function is important (33).
- Be aware of patients’ baseline function considering pre-existing haemophilic arthropathy – modify goals and progression criteria appropriately.
- Massage therapy should be avoided as well as other adjuncts such as dry needling/acupuncture, shockwave and laser (24).

Radiological management:

- Obtain baseline imaging if previously unable to.
- Repeat ultrasound if able – any evidence of clot formation could guide rehabilitation progress (specialist MSK sonographer required).
</td>
<td>
1. Normalise gait with assistive devices – TTWB to FWB
2. Prevent rebleed – assessment (including ultrasound if available)
3. Minimise muscular atrophy
4. Increase hip ROM and lumbopelvic mobility
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	Suggested treatment: <u>Haemostatic:</u> Treating haematology team to decide as per individual. <u>Physiotherapy:</u> - Encourage gentle active contraction of iliopsoas whilst monitoring pain response (24) (start with isometrics). - **Day >10-14** – Begin low resistance functional exercises focused on strength and proprioception. - Consider gentle antagonistic contraction (reciprocal inhibition) (24) of gluteal muscles, hamstrings, trunk extensors whilst avoiding passive stretching. *Example exercises:* (33) 1. Side-lie knee flexion (pelvis neutral) 2. Supine gluteal squeeze 3. Isometric iliopsoas contraction in supine (pillows under knees) 4. Quad sets (isometric quadricep contractions) 5. Small range bridges – half to 2/3 (avoid stretching past neutral hip extension) 6. Pelvic tilts (in mid-range) 7. Isometric hip external rotation in side-lying 8. Isometric hip abduction in side-lying	

Phase 3 – Mature haematoma – Progressive rehabilitation

Table 5 - Recovery Phase 3 - Mature haematoma and progressive rehabilitation

Phase 3	Specific Instructions/ precautions	Goals
Mature haematoma/ remodelling (Progressive rehab) **Days (guide) >21**	- During the post-acute phase, the haematoma continues to be resorbed. Subsequently muscle length and strength should return to pre-bleed function (24). - Be aware of patients' baseline mobility and function considering pre-existing haemophilic arthropathy – **modify goals, exercises, and progression criteria appropriately.** - Pain levels to remain manageable during or after activity. If useful, use traffic light system alongside other assessment tools to monitor. - Focus on safe, progressive loading of iliopsoas to equal or greater than pre-bleed capacity (24). - Monitor for patterning with overactivation of rectus femoris, sartorius or hip adductors. - Use eccentric lengthening of iliopsoas rather than passive stretching if hip extension is limited. - Address accompanying impairments: assess lumbo-pelvic control and deficits in trunk and/or gluteal muscles (33). **Radiological management:** Review imaging advised (ideally with MRI) **6-8 weeks post injury.** Utilise available modalities if MRI unavailable. **Suggested treatments:** <ins>Haemostatic:</ins> Treating haematology team to decide as per individual. - **Increase in load demand during rehabilitation may indicate patient remains on enhanced prophylaxis/treatment regime to accompany activity progression.** <ins>Physiotherapy:</ins> - A low load progressive iliopsoas strengthening programme should be utilised involving lumbo-pelvic and hip musculature with the aim to return to pain free function.	*Goals of Phase:* *1. Normal gait pattern* *2. Maximise hip ROM without over stretching* *3. Progressive lower limb and trunk strengthening to at least pre-bleed level* *4. Protect clot through to full resolution* *5. Readiness for activity/sport specific rehabilitation if appropriate*

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Gait - Progress hip extension and dynamic load on iliopsoas with careful increase in stride length, speed and cadence.
In exercise prescription consider the effects of:
- Range of motion
- Contraction mode
- Lever arm length
- External (including gravitational) loads

Example exercises: (33)
Standing exercises progress from supported forward leaning to unsupported upright. Add resistance appropriately.
1. Hip flexion - heel lifts in standing (forefoot remains in contact with the floor)
2. Hip flexion - heel and knee lifts in standing (foot leaves the floor)
3. Hip flexion - full range in standing
4. Hip flexion - high sitting active hip flexion (heel slides)
5. Hip flexion – in upright sitting with neutral pelvis
Functional progression ideas (as able):
1. Double leg squat (start small)
2. Offset squat
3. Bridging progressions, double leg, offset leg, single leg short lever, single leg long lever
4. Single leg balance exercises
5. Single leg squat (start small)
6. Step ups with increasing hip flexor activity/load
If shortening of iliopsoas present - eccentric lean backs for hip flexor lengthening or eccentric lowering of the leg in high sitting (33)
Dynamic progressions with aim to return to sport: (sport/activity specific modifications to suit individual if/when appropriate)
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