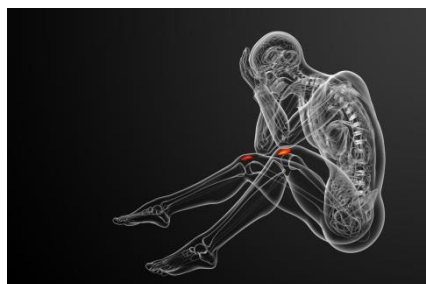




Exploring Patellofemoral Pain Mini Series

**Session One: Assessment and
Treatment of Patellofemoral Pain - Top
Tips to Change Your Practice
Tomorrow**

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Assessment and Treatment of Patellofemoral Pain-Top Tips To Change Your Practice Tomorrow

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Learning Outcomes

- ▶ Explain the aetiology of pain in PFP.
- ▶ Use your subjective examination to signpost your objective examination.
- ▶ Plan a reasoned treatment strategy and confidently give out no more than 3 exercises at once for a targeted effect.

Key Issues

- Cartilage is aneural.
- Subchondral bone can be overloaded before cartilage fails from uneven joint loading.
- The key for PFP is to therefore conceptualise joint loading, PF contact pressures, and the traction, torsion or compression placed on adjacent soft tissues.
- Is the positional problem coming from the trochlea, or the patella, or both?

- Subchondral bone can be overloaded in a pristine knee, eg teenager.
- Pain not always from the joint.
- Move away from the phrase 'maltracking' as this suggests problem is patella. Think about 'malalignment'.

Subjective Examination- top tips

- ▶ Care: No literature on this yet.
- ▶ Remember PFP is an umbrella term, so utilise the S/E to signpost your objective examination.
- ▶ Do this through clinical reasoning!



- Don't just think 'oh yes this sounds like PFP'. Use the subjective to give you a priority list for your physical exam.

Cinema Sign

▶ No issues around:

- ▶ Muscle firing
- ▶ Muscle strength.
- ▶ Shock attenuation
- ▶ Foot biomechanics

▶ Consider:

- ▶ Muscle length, especially quads
- ▶ Sitting posture, especially adduction and TFL/ITB
- ▶ Fat Pad stopping caudad glide patella



- Muscle firing, strength, shock attenuation and foot biomechanics often given high priority but if cinema sign the number one problem, question the relevance.

Pain Walking Uphill

▶ Consider:

- ▶ Calf length
- ▶ Gluteal strength



- Most patients worse with downhill so question what is it about those who have their main problem uphill.
- Tight calf will lead to compensatory excessive pronation or early heel rise.

Pain alters with different footwear

- ▶ Consider:
 - ▶ Higher heel increases PFJ load, increases distal instability.
 - ▶ UG boots, flip flops or similar provide no hindfoot support.
 - ▶ Some shoes offer better shock attenuation than others.

- If footwear changes their pain ask what they wear at home. Often an 'indoor trainer' can be a useful measure.

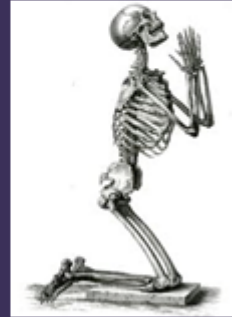
Stairs

- ▶ Pain worst on ascending stairs:
 - ▶ Consider gluteal control, (Brindle, 2003, Cowan 2006)
 - ▶ Consider concentric VM activity.
- ▶ Pain worst on descending stairs:
 - ▶ Consider joint surfaces.
 - ▶ Consider muscle length.
 - ▶ Consider eccentric quads function, (Anderson et al., 2003).

- Ask is your pain worse up or down. Consider the big differences between these two groups.
- If they have an eccentric break on stair descent where they 'drop' through an angle try and watch and see what the angle is. Have in the back of your mind with a specific angle that they may have an osteochondral defect or chondral flap.

Squat and kneel

- ▶ Is it into position, during, or return from?
- ▶ Clarify if you mean gym or functional squat.
- ▶ Kneeling up or back on haunches?



- Is it eccentric, concentric or static. Are they kneeling up on the patella, or is it as they roll through the fat pad/tendon/tuberosity?

Pattern of Pain

- ▶ Pain only during activity think mechanics.
- ▶ Pain only after, especially later or next day think inflammation.
- ▶ Pain that improves with exercise think tendinopathy/muscle length.
- ▶ Sleep disturbance



- Sleep disturbance must be noted as it has an adverse effect on pain modulation.

Crepitus



- ▶ Assess belief system and knock-on behavioural change, (Robertson 2010).
 - ▶ Here are some quotes from my data collection to date.
 - ▶ 'It means my knee is wearing away'.
 - ▶ 'It means I have arthritis'.
 - ▶ 'It's my body's way of telling me to slow down'.



- Patients voicing very catastrophic beliefs and fear avoidant behaviour.
- Patients avoiding physio exercises if crepitus present.

Crepitus-what to do?



- ▶ Educate regarding crepitus, i.e.
 - ▶ Normal phenomena
 - ▶ Does not correlate with severity of pathology.
 - ▶ Pain is abnormality but crepitus may remain post R/O pain.

Crepitus is:

- Bubbles of gas popping, patella clunking in trochlea, or fluid passing through uneven retropatella cartilage.

Shopping Bag of Risk Factors Analogy



- ▶ One or two risk factors may be possible without pain.
- ▶ Factors coming together creates shopping bag of risk factors.



- This analogy helps patient understand insidious onset. Patients will often have several risk factors, some of which can be removed, eg tight quads, others remain eg flat feet.

Power of Observation

- ▶ Quiet Standing:
 - ▶ Pelvic position
 - ▶ Femoral position, ie anteverted etc.
 - ▶ Relative muscle bulk
 - ▶ Calf bulk
 - ▶ Knee hyperextension
 - ▶ Effusion/oedema, including Hoffa's fat pad.
 - ▶ Patella position
 - ▶ ITB prominence/tone/bracing by VL-sway weight on/off.
 - ▶ Foot position.

- Not an exhaustive list but a good starting point.

Anteversion/retroversion



- Not always demonstrated as toe in or out as can compensate at the knee

Tibial Rotation/Torsion

Tibial Rotation-
Structural/Functional?



Tibial Torsion. Condyles
Aligned



- I.e. is the tibia rotated relative to the femur or is the joint aligned and its actually torsion from the tibia. Rapid torsion proximally will lateralise the tuberosity and give a large TTTG. This overloads the lateral facet of the patella.

VMO wasting



- Particularly prevalent after trauma or surgery when the pain and or effusion decreases the firing capability of the vmo.

Calf Size

- ▶ Disproportionately large calves suggests overuse.
- ▶ Mental note to focus on hip flexor strength.



- If the calf is big and tight it may be overworking. This may be because the hip flexors are weak or lazy.

Hyperextension



- ▶ Fat pad impinges.
- ▶ Lazy quads posture.
- ▶ May indicate poor terminal extension control.

- It's not just the amount of hyperextension but the speed of acceleration through into hyperextension. Flicking back can cause a mini trauma to the fat pad which over multiple times can cause irritation.

Oedematous fat pad

- ▶ Note massive fat pad.
- ▶ No caudad glide possible.
- ▶ Resultant apparent patella alta.




- Remember the fat pad goes all the way up to the joint line and attached onto the menisci.


Pelvic control-frontal plane

- ▶ Change with single stance.
- ▶ Pt aware?
- ▶ Can they correct?
- ▶ Do they have associated hyperextension?
- ▶ Note pelvic tilt, hand support, brace with other leg.



- If they have poor patterning can they correct?





Qualitative analysis of single leg loading

Date: _____ Patient: _____

Condition: _____

QALS	Task: Single leg squat. Single leg one down. Single leg hop for distance.	Left		Right		Bilateral	
Arm strategy	Excessive arm movement to balance						
Trunk alignment	Leaning in any direction						
Pelvic plane	Loss of horizontal plane						
	Excessive tilt or rotation						
Thigh motion	NWB thigh moves into hip adduction						
	NWB thigh not held in neutral						
Knee position	Patella pointing towards 2 nd toe (noticeable valgus)						
	Patella pointing past inside of foot (significant valgus)						
Steady stance	Touches down with NWB foot						
	Stance leg wobbles noticeably						
				Total			

Lee Herrington PhD MChP
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- You can photocopy and use this chart but please leave the acknowledgments on. Thanks to Lee Herrington for kind permission.
- This is quick and easy and allows some objectivity.

Ready to signpost?



Cinema Sign

- No issues around:
 - Muscle firing
 - Muscle strength.
 - Shock attenuation
 - Foot biomechanics
- Consider:
 - Muscle length, especially quads
 - Sitting posture, especially adduction and TFL/ITB
 - Fat Pad stopping caudad glide patella



Oedematous fat pad- patella can't descend.



- Note how the patella can't descend in knee flexion. Try marking the superior border of the patella in long sitting and then again sat on the edge of the plinth. In my experience there should be about 2 cm of descent.

Treatment Fat Pad

- ▶ Reduction of oedema key.
- ▶ Ice massage
- ▶ Avoidance hyperextension.
- ▶ Terminal Extension Control.
- ▶ Stabilise hypermobile patella
- ▶ Avoid unwanted rotation.
- ▶ Tape

- Oiled skin for ice massage.
- Vertical tape in the popliteal fossa applied with the knee slightly flexed.

Tape to off load fat pad- care PFJ contact pressures

- ▶ Aiming to take compression off fat pad.
- ▶ Allows 'window' for fat pad to settle.
- ▶ Care-may increase PFJ contact.
- ▶ Care in patella alta



- Not in patella alta as the patella already high riding. In that scenario tape either side of the patella to provide a sling.

Modified Thomas Test

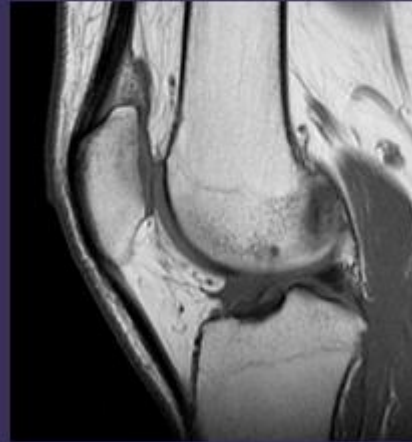


- ▶ Note flat L spine.
- ▶ Assess effects of passive knee flexion.
- ▶ Assess effects of passive adduction.
- ▶ Loss of hip extension results in increased knee flexion moment, and weaker gluts.

- You can also add in passive hip adduction to look at the effect of tensioning the TFL. If this brings on their pain it is a very useful clue as to what you should target!

Quadricep Tightness

- ▶ The tighter the quadriceps the greater the vector compressing the PFJ, particularly in flexion



Quadriceps Stretch

- ▶ Seat behind useful for older/very tight patients.
- ▶ Ensure knees together and pelvis not anteriorly tilted.
- ▶ Can combine with hold-relax.



- If the patient is tight at 50 degrees on the modified Thomas test then there is no way they can do a heel to buttock stretch without pelvic asymmetry.

TFL/ITB



- ▶ Cannot stretch ITB itself, but TFL and Gmax origin.
- ▶ Tight complex leads to patella tilt +/- or tibial ER in knee F, (Amis et al, 2008)
- ▶ Also consider compression/friction effects distal ITB.

- Note the patella and tibial attachment.
- Note the thickness of the ITB!

Ober's test-TFL

- ▶ Mean Normals 20.3/21.4.
- ▶ Mean PFP pt 17.3/14.9 degrees, (Hudson et al., 2009).
- ▶ Note knee flexion, top limb 90 degrees, bottom limb 45 degrees.
- ▶ NB Not assessing length of ITB, (Willett et al., 2016)



- You may find it easier to lie the patient supine, fix the pelvis and assess the range of hip adduction, You can then assess if it alters the patella tilt. If it does it implicates the TFL/ITB complex.

TFL

- ▶ Keep body upright.
- ▶ Pelvis square, ie left hemipelvis in this picture forwards



- Some patients just don't feel the stretch. Then try something else!

Gluteus maximus insertion in to ITB

- ▶ Not ideal if knee irritable.
- ▶ Foot nearer the pelvis for stronger stretch



- This position is also good for hold relax.

Foam Rollers???



- No decent literature yet. Intuitively would you be looking to use your hands on the lateral thigh? If so they may be a good candidate. I suspect the effect is on the VL tone.

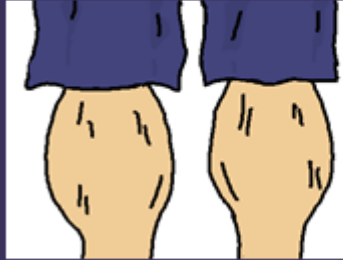
Pain Walking Uphill

- ▶ Consider:
 - Gluteal strength
 - Calf length
- ▶ Pain worst on ascending stairs:
 - Consider gluteal control, (Brindle, 2003, Cowan 2006)
 - Consider concentric VM activity.



Calf Size

- ▶ Disproportionately large calves suggests overuse.
- ▶ Mental note to focus on hip flexor strength.



Calf tightness

- ▶ Calf tight leads to:
 - Early heel raise.
 - More knee flexion.
 - Excessive pronation.
 - Consider functionality and relate to soleus/gastrocnemius, eg skiers
 - Remember link with hip flexors



- Skiers use their soleus very hard to correct their position on the skis all day long, and constantly in some knee flexion.

Frontal Plane

- ▶ When a hip adduction moment is created, it results in a valgus moment at the knee.
- ▶ This overloads the lateral patella facet.
- ▶ PFPs pts demonstrate 26% less abductor strength compared to age-matched subjects, (Ireland et al., 2003)

- Hip adduction is a very common poor movement pattern seen especially in females. Look out for it during stair climbing/descent and running in particular.

Gluteus medius

- ▶ Acts as an abductor.
- ▶ Needs tonic performance.
- ▶ Failings compensated by TFL.
- ▶ Hypertrophied TFL tightens and pulls ITB proximally.
- ▶ Resultant lateralisation of patella

- In runners you may want to assess this post running as the result may be very different.

Horizontal Plane Control

- ▶ Key here to view trochlea position relative to patella.
- ▶ Cadaveric study shows peak lateral PF contact pressure occurs at 30° hip IR and 60° knee flexion, (Lee, 1994).
- ▶ PFP pts demonstrate 36% less ER strength versus age-matched subjects, (Ireland, 2003).

- This is often particularly poor in those with anteverted hips: double trouble!

Gluteus Maximus in the Horizontal Plane

- ▶ GMax often overlooked!
- ▶ **Primary ER beyond 25°**, (Delp, 1999).
- ▶ Decelerates femoral IR during gait, (eccentric role).
- ▶ Many activities PFP pts C/O are >25° hip flexion, eg. Sit to stand/ stair ascent/ return from squat.

- Visually do they seem to internally rotate their femurs for ages during gait? If so this is undesirable.

Practical Assessment

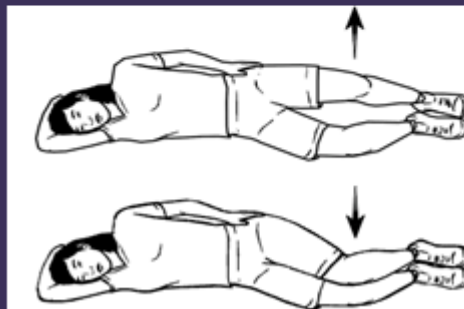
▶ Static resisted hip abduction:



- Feel for over activity in TFL, and keep the resistance going for 10 seconds. This will give you a better feel for their tonic performance too.

Hip External Rotation

- ▶ Static resisted and active 20 and 90 degrees hip flexion.
- ▶ Palpate TFL/gmed/gmax
- ▶ Observe for pelvic movement, shaking, muscle firing fading off.



- Static resisted at 20 degrees: you are testing Pgmed.
- Static resisted at 90 you are testing Gmax. To test in between means you are getting a bit of both.

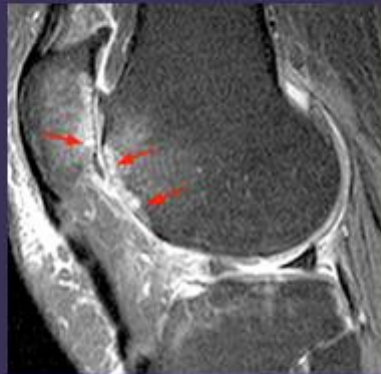
Pain on Stair Descent

- ▶ More likely to suggest joint degradation.
- ▶ Which part of movement?
- ▶ May demonstrate eccentric 'break'.



- You have to watch them!

Bone Oedema



- Patients with more advanced joint change including bone oedema such as that seen here are often worse on stair descent.

McConnell Taping-medial glide-could add in tilt, and/or inferior pole elevation.



- If there is some fat pad oedema you can do this same technique but across the top half of the patella to elevate the inferior pole slightly.

Shock Attenuation

- ▶ Heel inserts
- ▶ Shoes
- ▶ Indoor trainers
- ▶ Walking poles



- Basic but very effective especially for patients with bone oedema.

Q brace-Callaghan et al., 2015.

- ▶ MRI to monitor bone oedema in lateral PFJ.
- ▶ Mean 7 hrs per day.
- ▶ 6 weeks correlation reduction in pain and bone marrow oedema.



- I have had excellent results with this brace in patients with bone oedema in their lateral PFJ.

Pacing

- ▶ Stair Use
- ▶ Gardening
- ▶ Crouching/kneeling
- ▶ Consecutive days
- ▶ Training principles
- ▶ Load management!

Conclusions

- ▶ Use S/E to signpost O/E
- ▶ Observation incredible helpful
- ▶ Try and break down and prioritise O/E.
- ▶ Be bold not diffuse with exercise prescription.

Now you have completed the webinar....

- You are bang up to date. Consider remaining so with my clinical commentary, (x4/year)
- Email me for references.
- Blogs, masterclasses, patient resources see:

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– Thank you.

– Any feedback welcomed!!

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- Any questions that you think of after the webinar just drop me an email!