

## The management of medial recurrent patella femoral knee pain in a 'masters' runner

J Flynn MSc MCSP FHEA Programme Leader - Physiotherapy, University of Huddersfield.

AE Clough MCSP MSc Dip AAPP(sport) PGCE FHEA, FSOMM. Clinical Lead Physiotherapist MSK. Hull and East Yorkshire NHS Trust.

## Case Report

### The management of medial recurrent patella femoral knee pain in a 'masters' runner

This case report presents a familiar problem experienced by competitive runners. It includes the assessment and management of a 'masters' runner, combining musculoskeletal medicine approaches with exercise rehabilitation.

*\*Masters is a term endorsed by many running organisations in the United Kingdom, indicating a runner over the age of 35 years<sup>(1)</sup>.*

### PRESENTATION

A 66-year-old male patient reported to Physiotherapy with recurrent left medial knee pain. The patient had a long history, with the same problem which although intermittent and self limiting, tended to re-emerge when training increased prior to competition. This long history was also marked by multiple failed intervention strategies from various practitioners. On this occasion the current symptoms were attributed to increased down hill running with the pain, rated at  $7/10$  on a numerical rating score (NRS) <sup>(2)</sup>. An addition to his previous presentations was the presence of 'clunking' noises and a feeling of giving way with reported pseudo locking <sup>(3)</sup>. Unlike true locking often associated with a mechanical locking of the knee, pseudo locking refers to temporary locking which can be caused by pain and apprehension but crucially with self adjustment, usually spontaneously unlocks. The patient was unable to train and was apprehensive at accessing full extension, reducing gait and normal ambulation.

### EXAMINATION

**Observation** – there were no obvious signs of bruising, colour abnormalities, muscle wasting or swelling. The patient did however hold the knee in approximately 30 degrees of flexion and was reluctant to fully extend.

**Active range of movement (AROM)** – full physiological flexion. At approximately 20 degrees from full extension the patient reported discomfort, describing pain and discomfort on the under surface of the medial aspect of the patella.

**Passive range of movement (PROM)** – full soft tissue opposition and normal end feel in flexion achieved, apprehension at 20 degrees of full extension but

with patella support, and medial glide applied, full extension and screw home mechanism achieved.

**Neurology** – dermatomes, myotomes and reflexes were normal.

**Intra capsular examination** – sag, posterior & anterior drawer testing of the cruciate ligaments were negative.

**Associated structures** - superior and medial plicae compression and distraction failed to generate symptoms.

**Extracapsular examination** – valgus and varus stress testing of the collateral ligaments were negative.

**Palpation** – fat pad and bursa inspection were all normal. However, during passive extension and palpation of the patella, clunking could be heard with accompanying pseudo locking (meaning false locking often precipitated by pain, reluctance and inhibition) which was consistent with the patient’s history.

**Functional assessment** – unable to perform single knee dip, or single knee deep squat through range on effected left knee.

**Isokinetic measurement** – left peak torque at the knee reduced by approximately 15% compared to right throughout the entire range of flexion. Left peak torque into extension showed similar values to flexion with a 15% deficit in outer and mid range, however a 40% deficit was noted in left inner range extension. Comparison of quadriceps to hamstring torque was significant with a ratio of approximately 80/20.

**Gait** – not assessed.

**Motivation to self manage and recover** – was noted as high which is typical of committed runners.

**Biomechanical alignment** – flexed left knee causing a functional leg length discrepancy with associated lower limb and pelvic asymmetry. Bilateral mild forefoot pronation with accompanying bilateral medial bowing of the tendoachilles when observed in standing (Helbing sign) were equal left and right.

**Footwear** – the patient was an experienced runner and had an in depth awareness of this area. Current running shoes in use were Saucony Omni 14<sup>(4)</sup>.

**Other Investigations** - Nil

## HYPOTHESIS

It was felt likely that the problem was predicated on left medial patellar facet irritation caused by lack of inner range eccentric control when increasing downhill mileage in preparation for competition.

## PROBLEM LIST – Table 1<sup>(5)</sup>

No.	Description
1.	A lack of awareness and understanding of the pathology and condition.
2.	Aggravated medial facet of left patellar leading to restricted active range of movement (AROM) into terminal extension of the knee with accompanying clunking and feeling of giving way (+/-occasional pseudo locking)

3.	Poor eccentric control demonstrated in the inner range of left knee extension
4.	Decreased bilateral hamstring ratio strength, compared to quadriceps
6.	Decreased cardiovascular function due to enforced lay off period
6.	Risk of aggravating symptoms and potential for similar to develop on right knee

## TREATMENT PLAN

### Early stage treatment (creating an environment for the tissues to heal)

- a) Initially the patellar joint irritation was reduced using relative rest (*patient performs all duties except those that aggravate the symptoms*), ice, <sup>(6)</sup> mobilisations and proprioceptive elasticated taping with a medial drift was applied over a 10-day period<sup>(7)</sup>. This was frustrating for the patient as he was asked to not participate in any running activities over this period, primarily so a therapeutic window of opportunity could be established for further rehabilitation to occur. At the end of this stage the intermittent NRS was low at <sup>3</sup>/<sub>10</sub>.

### Mid stage treatment (regaining confidence, movement and control)

- b) Lack of knowledge and understanding were addressed by explaining in detail the examination findings, referring to anatomical models and offering an overview displaying the intended plan and regression strategy should it be required. This approach is helpful to patients as it firstly offers a realistic and achievable timescale and crucially acknowledges that rehabilitation is not infallible <sup>(8)</sup>. It also demonstrates a level of maturity to the rehabilitation approach which many patients respect, especially those that have visited multiple practitioners over many years. Arguably this approach informs collegiate decision making between the medical practitioner and the patient. <sup>(9)</sup> It arguably has a direct correlation with adherence and is the foundation of self-management. Some would regard this as a primary conduit for patient satisfaction as expectation are explored early and agreed outcomes are established <sup>(10)</sup>.
- c) Varied load resistance (mid to end range extension) was created by laying the patient prone on a treatment bed with a towel positioned under the quadriceps with varying ankle weights until terminal extension was achieved with ease with 15kg. At this stage the gait pattern appeared normal and the patient was in a 'diminution' period with no report of giving way, pseudo locking and full AROM and PROM achievable.

Functional loading was started with single leg dips <sup>(11)</sup>. introduced on both left and right knees. This involved giving the patient a frame of reference (mid point of patella descending in a vertical line ending between the first and second toe. The exercise addresses a control issue and often involves back tracking and teaching gluteal and abdominal control <sup>(12)</sup>. However, the patient was self-conscious of this and was able to recruit these muscles, but still needed significant input to unilaterally load the left knee and accurately single leg dip in a smooth and controlled manner. This exercise which formed part of the patients out of clinic routine took longer than expected to master, approximately 5 days. After this period the patient was able to self-select this exercise and perform with ease.

- d) General quadriceps strengthening was introduced using a step system of resistance on a WattBike (trainer variant) and large diameter (14 inch) wall balls. This also accounted for potential cardiovascular loss while rehabilitation occurred <sup>(13)</sup>. The patient also had access to a cycle ergometer outside of the clinic and was keen to continue and progress the resistance. Whilst this was deemed important, particularly by the patient, care was taken not to over emphasize this exercise as it potentially could exacerbate problems 3 and 4. Wall balls are an excellent through range exercise at the hip, knee and ankle. They are functional as they involve the upper quadrant and using a variety of weights (3kg, 6kg and 9kg), variation and difficulty levels can be achieved at ease. Unlike the cycle ergometer they are easy to implement as all that is needed is a ball and throwing surface. The patient was taught how to use the balls and depending on his progression he was loaned the equipment as necessary. The CrossFit protocol 'Karen' was used as an outcome measure <sup>(14)</sup>.

### **Later treatment (specific functional strength)**

- e) Eccentric Hamstring strengthening using an adapted Technogym hamstring curl machine was introduced. The patient was instructed to sit on the machine and a heavy latex power band was attached to the boom bar so the concentric component of the exercise could be reduced / eliminated with specific attention placed on the eccentric component of the exercise.
- f) Split squats <sup>(15)</sup> were utilised to add a dynamic component to the rehabilitation. This exercise challenges the patient's strength (mid to inner range knee extension), control and cardiovascular status. As with all exercises care was taken not to exacerbate symptoms and the usual warning of post exercise soreness were given, particularly with regard to delayed onset muscle soreness (DOMS) <sup>(16)</sup>. Again this exercise was easily recreated by the patient outside of the clinic environment and involved very little equipment.

### **Final stage (normalisation to selected activity)**

- g) Decline straight line treadmill running using a Woodway ELG55 allowed a controlled recreation of some of the stresses incurred during this type of activity. Unlike many treadmills, this variant allows decline running and acted as a staging point prior to full impact road running. This achieved two aims, 1) it demonstrated to the patient that declined running following rehabilitation could be achieved pain free and 2) the patient was ready to make the transition back to road running where the impact and environmental forces are arguably different, unpredictable and in most cases increased.
  
- h) Decline non camber and a camber road run tests were performed as a final component of this patient's rehabilitation. A known route was selected for this test (Ordnance Survey Reference: 413000, 410300) as this was a road which is part of the targeted competition route used by the patient. This was repeated on 3 occasions over 7 days and there was no adverse effect. On the final occasion, this test was tagged onto a build up run of 8 kilometers to add fatigue and realism.

### **DISCUSSION & OUTCOME OF THE TREATMENT**

The treatment approach was carefully structured and explained fully to the patient.

- a) Early stage treatment (creating an environment for the tissues to heal)
- b) Mid stage treatment (regaining confidence, movement and control)
- c) Later treatment (specific functional strength)
- d) Final stage (normalisation to selected activity) <sup>(17)</sup>

The purposeful stages were deliberately sequenced to limit regression and ensure the foundations and necessary pre-requisites were in place as crucially the rehabilitation needed to consider the multiple failed attempts the patient had experienced prior to this regime. This often involved 'time out' periods where the stages, outcome and exercises within the regime were re-explained to the patient. This approach over time, served to shift the locus of control and to some degree restore confidence. The clinical imperatives of time limits and waiting list initiatives often compromise this approach in a busy service. Although little empirical evidence exists to date, many Physiotherapists and Doctors would we believe, recognise this dilemma.

Throughout the rehabilitation, the exercises and instructions given were purposely reduced so the patient had time to practice and master them. This

helped the patient avoid becoming overwhelmed, which can lead to non compliance <sup>(18)</sup>. All the exercises taught involved equipment that the patient had access to outside the clinic or could be reproduced with ease in the home with the loan of inexpensive consumables. All exercises had transferability between stages to prevent accommodation, and had varying levels of overload and complexity. All exercises were specific for the presenting symptoms.

The presentation of left medial facet joint irritation is by definition global and is a sub division of anterior knee pain (AKP). The common pathologies that are thought to contribute to AKP are listed in the table below which has been adapted from a systematic review by Waryasz and McDermott,<sup>(19)</sup>.

Articular	Connective tissue	Myofascial	Other
Articular cartilage injury	Hoffa's disease	Patellar instability/subluxation	Saphenous neuritis
Patella arthritis	Plica Synovialis (medial & lateral)	Vastus medialis insufficiency	Prior surgery
Tibiofemoral joint arthritis (medial & lateral compartments)	Quadriceps tendinopathy		Symptomatic bipartite patella
Tibiofibular joint arthritis	Infrapatellar tendinopathy		
Sinding-Larsen-Johansson Syndrome	Iliotibial (IT) band syndrome		
Referred pain from the lumbar spine or hip joint	Prepatellar bursitis		
Loose bodies	Pes anserine bursitis		
Osteochondritis dissecans	Pellegrini-Stieda syndrome		
Osgood-Schlatter disease			
Patella stress fracture			

There is a dichotomy for therapists and patients around the exact causative component(s) at fault. Specific diagnosis can in some instances provide reassurance for a patient and direct the therapist but the authors feel that given the previously mentioned global contributing and potentially overlapping causes, the patient previous long standing history and failed previous rehabilitation the presentation required a more practical approach, highlighting the symptoms rather than the structure(s) when dealing with this case. The programme of rehabilitation was designed around the presenting problems, but also crucially addressed the reasons why these have lead to the presenting problems. The predominant factor in this case appeared to be a lack of eccentric control when down hill running was engaged giving rise to be a long standing, repetitive medial facet joint irritation.

Throughout the four stages of this rehabilitation regime the patient progressed well. Minor set backs included adjustment and re-teaching in how some of the exercises were to be performed to gain maximum benefit. However, this phenomenon occurs with many patients so was expected. Early progression was good and after the symptoms had eased with early stage treatment, mid and later stage treatments were complete around five to six weeks. At this point the patient was virtually pain free, in that the presenting pathology had

appeared to have resolved and the only report was ? post exercise soreness. The final stage of this rehabilitation was achieved over a further 3 weeks and upon discharge the patient was pain free, had full AROM, better control in the inner range of extension and all isokinetic measurements had improved. The one exception was the quadriceps/hamstring ratio which was marginally improved but given the time period, it would be unrealistic to see a significant change. It would, however, remain an overall maintenance goal for the patient for the future.

## **CONCLUSIONS**

The authors feel that Physiotherapists and Doctors who work in musculoskeletal medicine are key in recognising, developing and prescribing exercise rehabilitation <sup>(19)</sup>. Their unique background, throughput and expertise in history taking, biomechanics, pathology and rehabilitation gained in most cases from working in the National Health Service (NHS) where they are exposed to patients with complex comorbidities, often managed by broad multidisciplinary teams is priceless. This wealth of skill and continual training is accumulated over time through professional training and mechanisms such as peer or line review. and regulated by a central boards such as the Health and Care Professions Council (HCPC) or the British Medical Association (BMA). With the emergence of exercise and rehabilitative practitioners the public have a bewildering array of choice. Far too often, and the authors accept the subjectivity of this comment, patients who seek exercise prescription receive limited, non specific and occasionally detrimental advice. To that end Physiotherapists and Doctors who work in musculoskeletal medicine should seize back this centre ground and assume the role of gate keepers to improve the standard of exercise prescription rather than investing time in remedial work and poorly advised programmes. An analogy would be the prescription of broad spectrum antibiotics for a known infection where the organism is known. Although the authors recognise some preliminary work has been done <sup>(20, 21)</sup>, it may be that specific organisations which represent Physiotherapists and Doctors in Musculoskeletal Medicine such as the Chartered Society of Physiotherapy (CSP). BMA and the British Institute of Musculoskeletal Medicine (BIMM) need to strategically include this within their ongoing development and shaping of the professions.

The authors recognise this is a single case study and although interesting and akin with the approach many would take in rehabilitation, the outcome of the treatment should be considered in light of this. Additionally, one of the authors is a keen recreational runner as well as holding a specific interest in strength, conditioning and rehabilitation. Some of the testing equipment used has potential access issues, particularly Isokinetics.

## REFERENCES

1. Association of Running Clubs (ARC). Rules for Competition Road, Cross Country and Trial Running. [Internet] 2010 [revised 12 July 2010; cited 13<sup>th</sup> June 2016]. Available from: [http://www.runningclubs.org.uk/ARC\\_rules.pdf](http://www.runningclubs.org.uk/ARC_rules.pdf)
2. Brevik H, Borchgrevink PC, Allen SM, Rosseland LA, Romundstad L, Brevik Hals EK, Kvarstein G. Assessment of Pain. *British Journal of Anaesthesia*. 2008 May; 101(1):17-24
3. Griffith CJ, LaPrade RF. Medial Plicae Irritation: Diagnosis and treatment. *Current Reviews Musculoskeletal Medicine*. (2008) March: 1(1):53-60
4. Saucony. Omni 14. [Internet] 2016 [no revised and citing not given] Available from: [http://www.saucony.com/UK/en\\_GB/omni-14/18963M.html?dwvar\\_18963M\\_color=S20270-2#cgid=mens-running&start=1](http://www.saucony.com/UK/en_GB/omni-14/18963M.html?dwvar_18963M_color=S20270-2#cgid=mens-running&start=1)
5. Flynn J. The Importance of Accurate and Reflective Musculoskeletal Problem Lists; Musculoskeletal Lecture Notes Version 8. [Unpublished Lecture Notes] University of Huddersfield; Notes provided at Lecture given 2015 November 15.
6. Bleakley CM, Glasgow PD, Philips P, Hanna L, Callaghan MJ, Davison GW. Guidelines on the Management of Acute Soft Tissue Injury Using Protection Rest Ice Compression and Elevation. Association of Chartered Physiotherapists in Sports Medicine (ACPSM). Sheffield: 2011.
7. McConnell J. Management of Patella of Patellofemoral Problems. *Manual Therapy*. 1998 March; 1(2):60-66
8. French S, editor. *Physiotherapy a Psychological Approach*. Oxford: Butterworth Heinmann; 1992.
9. Rowe R, Calnan M. Trust Relationships in Health Care – the New Agenda. *European Journal of Public Health*. 2006 January; 16(1):4-6
10. Schaefer J, Miller D, Goldstein M, Simmons L. *Partnering in Self-Management Support: A Toolkit for Clinicians*. Cambridge, MA: Institute for Healthcare Improvement; 2009. Available at: [www.IHI.org](http://www.IHI.org).
11. Hutson MA, Ward A. *Oxford Textbook of Musculoskeletal Medicine*. 2<sup>nd</sup> ed. Oxford: Oxford University Press; 2016
12. Kisner C, Kolby LA. *Therapeutic Exercise foundations and Techniques*. 6<sup>th</sup> ed. Philadelphia: FA Davis Company; 2012
13. Comfort P, Abrahamson E. *Sports rehabilitation and Injury Prevention*. 1<sup>st</sup> ed. Chichester: Wiley-Blackwell; 2010
14. The CrossFit Journal Articles. The New Girls. *Crossfit Journal*. 2004 November: 27;1-2
15. Beardsley C. Split Squat. *Strength and Conditioning Research* [Internet] 2016 [revised – not known; cited 13<sup>th</sup> June 2016] Available from: <https://www.strengthandconditioningresearch.com/exercises/split-squat/>
16. Armstrong RB. Mechanisms of Exercise-Induced Delayed Onset Muscle Soreness: a Brief Overview. *Medicine and Science in Sport and Exercise*. 1984;16(6):529-538
17. Flynn J. Structuring Your Rehabilitation Approach; Musculoskeletal Lecture Notes Version 8. [Unpublished Lecture Notes] University of Huddersfield; Notes provided at Lecture given 2015 December 10.
18. Dreeben O. *Patient Education in Rehabilitation*. 1<sup>st</sup> ed. Massachusetts; Jones and Bartlett: 2010



19. Waryasx GR, McDermott AY. Patellofemoral Pain Syndrome (PFPS): a Systematic Review of Anatomy and Potential Risk Factors. Dynamic Medicine. [Internet]. 2008 [cited 2016 October 29]; 7:9 Available from: Biomed central
20. Arthritis Research Campaign (ARC). Promoting the Role of Physiotherapists as Exercise Prescription Specialists. [Internet] 2013 [revision not known; cited 13<sup>th</sup> June 2016]. Available from: <http://www.csp.org.uk/news/2013/03/05/arc-2013-promoting-role-physiotherapists-exercise-prescription-specialists>
21. Clough A, Jackson A. Making a Difference for the Next 100 Years - Stop Sleepwalking into Obscurity. A personal Reflection. International Musculoskeletal Medicine. 2015 January;37(2):86-89