

## DIFFERENTIAL DIAGNOSIS OF MUSCULOSKELETAL PAIN - PART 2

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In [Part One](#) I discussed three case studies, emphasising the importance of taking a subjective history so that a conclusive hypothesis of the diagnosis can be established. With the following case study, I feel that the patient's diagnosis (in relation to her symptoms) is relatively simple, however it is the actual 'cause' that needs to be discussed and analysed during the objective examination.

This is where the difficulty lies in being a Sports Therapist. The reason I say this is because in the past, as a practising Sports Therapist myself, I would have initially treated the area presenting pain without taking into consideration any other relevant areas which might have been contributing to the complaint. I am not saying that you have to be an Osteopath to identify the cause of the pain. What I am saying is that if you have a good understanding of the 'functional' anatomy of certain muscle groups, then it is possible to consolidate all of your objective tests and formulate a realistic plan of treatment.

### The Patient

A 28-year-old female presents with bilateral anterior knee pain, in which the left knee is particularly painful. This has been present for the last 18 months and has progressively got worse over the last 5 weeks. It is aggravated by walking up and down stairs, running, sitting for long periods and driving. This patient currently works as a nanny so she is constantly bending down to pick up children, and is finding this simple task very difficult to do because of the pain. She would like to be able to run a marathon but presently can only run for about 500m before her pain comes on. It is a constant ache most of the time and she has been given quadriceps exercises by a personal trainer (e.g. squatting and leg extension), but this seems to make matters worse. She also participates in an exercise class on a weekly basis and this seems to exacerbate her symptoms too, especially after doing hip abduction exercises.

This patient has consulted her GP, and was advised to take anti-inflammatory drugs and reduce any exercises that were irritating her knees. The GP also mentioned that due to the patient's pain, she would not be able to participate in any running for the near future. The GP recommended a course of physiotherapy but she is still on the waiting list. No medical history to note.

With this specific case study, consider what you feel are the 'tissues' that are causing her pain and the specific condition that might be diagnosed. Possibly you might want to jot down the tests you would conduct, placing emphasis on the underlying 'cause' of her painful symptoms. (A tip: her knee pain is a weak link in the kinetic chain.)

Let's first look at what she is presenting with. She has bi-lateral anterior knee pain, which is exacerbated by going up and down stairs and sitting for long periods, etc. In my experience the hypothesis of the diagnosis is that this patient has patella femoral syndrome (PFS) or simply anterior knee pain. The tissues (which I considered to be responsible for the pain) are around the patella-femoral joint, which is possibly mal-tracking and causing an inflammatory response.

On examination the following tests were positive for the above diagnosis:

- \* Patella tests (scoop, grinding, Clarks)
- \* Passive knee flexion with overpressure on the patella caused pain
- \* Standing and half squat.

With the above clinical findings I confirmed that it was the patella-femoral joint that was responsible for her pain. The problem with this hypothesis is that we are often expected by patients to treat the area of pain, which as you will see in this case study will not be the main issue.

There is much literature on the predisposing and pathological causes of PFS. The authors write about overpronation, increased Q angle, patella alta, muscle imbalance, pelvis obliquity, leg length inequality, etc. My experience in treating PFS considers all of the above factors, but recently I have also had a lot of success with looking at pelvic stability - or rather instability, as is often the case.

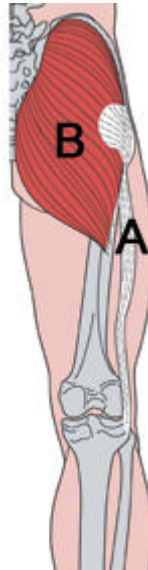
The first plan of my assessment was to see if I could change her symptoms by performing a simple technique to the knee. This involved gliding the patella medially whilst the patient squatted, which immediately reduced her symptoms. This told me that something was causing the patella to track laterally.

I assessed the tensor fascia latae (TFL)/ ilio tibial band (ITB) [see Fig. 1 'A'] with the OBER'S test and found it to have increased tension especially on the left side. Again there is another theory that by 'stripping' the ITB it will release. However if you think about this

logically, why is there increased tension in this structure in the first place? It is more likely trying to stabilise the lateral thigh/ knee because structures or muscles are possibly less active. This led me on to testing the functional ability of the Gluteus maximus (Gmax) / medius (Gmed). I would like to explain the functional anatomy of these muscles before I continue with the objective examination.

### Gluteus Maximus [Fig.1 'B']

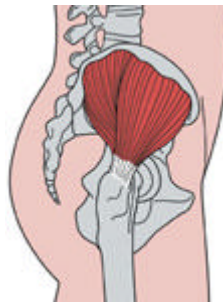
This is a large muscle with a multitude of attachments from the pelvis to the femur. We get taught in our studies that it is a powerful hip extensor but we might not understand its function during motion. For example, as we step upwards, the Gmax has an external rotation and an abduction influence on the femur to help control the knee alignment, whilst powerful hip extending will propel the body upwards. If the Gmax is weakened then the knee will be observed to deviate medially, which will then predispose the knee to pain.



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### Gluteus Medius [Fig.2]

This muscle is the main stabiliser of the pelvis as well as an abductor of the hip. When you stand on one leg, the Gmed should be the main muscle responsible for pelvis stability. If it is weakened then the pelvis might be observed to tip down on the opposite side. This might appear as a trendelenberg gait in motion. If the Gmed has become weakened then possibly the TFL might become overactive due to compensation and exert an increased force towards the knee.



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The patient when tested did exhibit obvious deviation of her knee and pelvis, which concluded weakness in the gluteal muscles.

Another possible cause of the weakness in the Gluteal group is that the opposite muscle group (antagonist) has become overactive and subsequently held in a shortened position (hypertonic). This muscle, if you have not already guessed it, is the Psoas. If this muscle has become tight, possibly through neurological inhibition, this can influence the weakness in the gluteal group. The Psoas was functionally tested for apparent length via the Thomas test and was found to be positive bi-laterally.

We also have to take into account the role of the Vastus medialis (VM) and its oblique fibres (VMO). We know that this muscle has a control function to the knee as it helps maintain the patella tracking within the trochlear groove of the femur. We also have knowledge that this muscle becomes inhibited and subsequently atrophies if pain and swelling are present. When this was tested and observed on the patient it was demonstrated as being weak.

So, to summarise the clinical findings:

- \* Weakness of Gluteus maximus/ Gluteus medius
- \* Over activity/ tightness of Psoas/ Tensor fascia latae
- \* Weakness of Vastus medialis/ oblique.

There are many physical therapists who will read this article and say "What about this structure" - e.g. the role of the adductors/hamstrings, an anterior rotated innominate, hyperlordosis, etc. Of course other structures would be of influence with regards to the patient, but I have explained what I found clinically, and justified my findings with the patient's presenting symptoms. If after a period of time my patient had no reduction of symptoms, then I would review my initial examination and consider which other structures are of relevance and change my plans accordingly.

## **The Treatment Plan**

The treatment plan involved a simple re-education of the exercises my patient was already doing but with specific focus on the technique. Initially I had my client doing prone hip extension exercise to re-educate the firing of the Gmax. I asked the patient to simply squeeze the Gmax and lift the leg an inch off the floor and to repeat on the opposite leg. The next exercise had the patient lying on her side: with knees and hips bent to about 45 degrees, the patient was instructed to keep the feet together, take the knees apart and when she could feel the pelvis rotate posteriorly, she was to hold this position for about 10-15 seconds. (This would be increased to 45-60 secs over the next week.) This activates the posterior fibres of the Gmed. The third exercise was doing a half squat using a small step. The patient was advised to bend the knee approximately 10-15 degrees with the patella being guided towards the second toe to control alignment of the joint. She would then squeeze the inner quad and was told to lock the knee into extension and hold for the count of 2 and repeat 10-12 reps on each leg for 2 sets. However, this exercise can commonly give some discomfort to the knee because of general gluteal weakness or incorrect technique, etc. (I have on occasion taped the knee medially whilst performing this exercise and it has been shown to reduce the symptoms.)

The above exercises have been indicated to strengthen some of the weakened soft tissue but I also advised the patient to lengthen the Psoas muscle to complement the treatment paradigm.

This patient over the next three weeks had a progressive exercise programme consisting of squatting, lunging, stepping etc. She was also advised on stretching techniques, concentrating on the Psoas, rectus femoris and hamstrings. Each follow-up session the patient had a considerable reduction of symptoms and within four weeks was able to run 5km without any pain. This patient has no difficulty with performing any of her daily tasks within her working environment.

## **Conclusion**

It can be seen from this specific case study that a holistic approach to the objective examination is required. If this patient's treatment had focussed mainly on her symptoms then I have no doubt it would have helped the pain she was experiencing at the time, but the long-term benefits would have been minimal.

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