

# A CASE STUDY: THE TROUBLESOME KNEE

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## THE PATIENT

A 36-year-old male adventure racer was in the beginning of his training phase for an upcoming competition. The competition was the prestigious one-day coast-to-coast race in New Zealand – a multidisciplinary event that includes running, cycling and canoeing (Box 1).

His training regimen consisted of six days training with one day of rest per week. A typical training day would be a mixture of 2–3 hours of kayaking, 2.5–3.5 hours of cycling, 1–2 hours of running, and two hours in the gym. All sessions were fitted around a full-time self-employed job and a young family.

## SYMPTOMS

The patient presented with left anterolateral knee pain. His

This is the first in a series of case studies by leading practitioners. Here we follow the treatment of an extreme sport athlete from first presentation through to the successful completion of a grueling sporting event.

“SYMPTOMS WERE OF A SLOW INSIDIOUS ONSET . . . POORLY LOCALISED KNEE PAIN WITH A DEEP SENSATION”

### BOX 1: THE NEW ZEALAND COAST-TO-COAST RACE

A World multisport championship one-day race from the Tasman Sea to the Pacific Ocean, covering a distance of 243 km across the Southern Alpine of New Zealand.

#### Stage 1

■ Run 3 km ■ Cycle 55 km (takes 1.5–2.5 hours depending on ability)

#### Stage 2

■ Mountain run 33 km carrying a day-pack containing compulsory mountain safety equipment (takes 3–8 hours)

#### Stage 3

■ Cycle 15 km ■ Kayak 67 km (takes 4–8 hours)

#### Stage 4

■ Cycle 70 km

The average age of participants is 36 years, but the oldest participant was 75 and the youngest was 15. Top competitors take nearly 11 hours to cover the distance, and the slowest recorded time was over 24 hours.

For more information see <http://www.coasttocoast.co.nz>

symptoms were of slow insidious onset. He reported poorly localised pain with a deep sensation. There was no obvious mechanism of injury.

The majority of the pain was felt at the end of his training run and he complained of significant post-run aching lasting 1–2 hours. He also experienced mild awareness of the pain when he was on the bike. His symptoms had begun four weeks before and had increased over the last 2–3 weeks. His pain levels, on a scale of 1 to 10, ranged from a best of 3+ to a worst of 6–7.

## ASSESSMENT

Physical assessment began by assessing the lumbar spine and hip movements for any restriction or dysfunction. The movement of his lumbar spine was restricted on right lateral flexion, highlighting a restriction in his left quadratus lumborum. He had a left anteriorly tilted ilium and a right posteriorly rotated sacrum. His left prone knee bend was restricted, indicating shortening of the rectus femoris. This was confirmed on a modified Thomas test (Box 2). A left

## BOX 2: THE THOMAS TEST

Used to test the flexibility of the iliopsoas muscle group.

**Standard version** (see online extras video)

- Patient is supine with one knee flexed and held to the chest at the point when the lumbar spine begins to flex.
- Assess the thigh of the opposite leg to determine if it maintains full contact with the treatment surface.
- This test is positive if the thigh is raised off the table.

**Modified version**

- Patient is supine at the very edge of the treatment table.
- Patient brings both knees to his or her chest.
- In this position, the patient performs a posterior pelvic tilt.
- While the contralateral hip is held in maximum flexion, the tested limb is lowered back towards the floor.

This test is positive for iliopsoas muscle tightness if the thigh is raised off the table. If the knee extends when an extension force is applied to the hip, then the rectus femoris is considered tight.

## BOX 3: THE OBER TEST

Used to assess tightness of the iliotibial band and the tensor fascia lata.

- Place the patient in the side-lying position with the test limb uppermost.
- Extend and abduct the hip joint.
- Attempt to lower (adduct) the leg down toward the table and release it. A positive test is found if the leg remains in the abducted position.

Ober test (Box 3) was also restricted tensionally compared to the right side by 5°.

His hip movements were positive for restriction on the left passive range of movement on internal rotation of about 10 degrees with tensor fascia latae and iliacus as the main culprits.

Other testing included ligament stability tests for the knee, squats double and hopping, Trendelenberg gait analysis and muscle resistive tests for the thigh and hip, but they showed no signs.

The only functional test that reproduced minor signs was single leg squats at parallel.

It was also noted that his left foot was slightly over-pronated compared to his right. He already had orthotics for this and they had recently been reviewed.

## DIFFERENTIAL DIAGNOSIS

The differential diagnosis consisted of:

- Meniscal irritation (suggesting inflammation of the meniscus from a trauma, overuse, or tear, etc.)
- Myofascial pain
- Referred pain from the hip or lumbar spine
- Patellofemoral joint syndrome (PFJ) which includes poorly localised patella pain.

Contributing factors to PFJ include:

- Increased femoral internal rotation
- Increased knee valgus
- Increased tibial rotation
- Increase subtalar pronation
- Inadequate flexibility, patella position, soft tissue restrictions and neuromuscular control of the vasti.

There was also the possibility of a combination of the above pathologies.

## TREATMENT

Initial treatment began with soft tissue massage and trigger-point therapy to bilateral quadratus lumborum muscles. This was followed by:

- Muscle energy technique – to correct ilium and sacrum.
- Myofascial tension technique (MTT) – to the left gluteal fascia (to improve the Ober test) and to the thoracolumbar fascia bilaterally (shear/tensional load was applied to the area of greatest myofascial restriction).
- Soft tissue massage and myofascial tension technique – to the left tensor fasciae latae and cross-fibre mobilisations to iliacus (to improve internal rotation of the left hip).
- Myofascial tension technique – to the left rectus femoris to improve prone knee bend and Thomas test range of movement.
- Trigger-point therapy and soft tissue therapy – to the left vastus lateralis to reduce functional signs for the one-legged squat (trigger-point therapy treatment consists of specific longitudinal gliding and stroking to the site of the trigger point; treatment to trigger points on the muscle belly reduces tensile load to the attachment sites).
- Trigger-point therapy – to the left popliteus for tibial extension.
- Soft tissue massage and trigger-point therapy to the tibialis posterior (for over-pronation of the left subtalar joint).

## OUTCOME

Following the first treatment, a marked improvement was noted for 4 or 5 days at a drop of symptom score to 1 out of 10. The second treatment gave the same result, but unfortunately there was a full return of symptoms when the patient went running. At this point it became clear that the treated muscles had a significant relationship to the condition, given the change in symptoms. However the return of symptoms indicated that there was some underlying problem so the patient was referred on to a Gonstead chiropractor for assessment and treatment of any spinal or lumbopelvic structural restriction. They adjusted the S2 which indicated the posteriorly rotated sacrum (Box 4).

Then the patient was referred to an exercise physiologist for functional testing of the lumbopelvic area. This testing was undertaken using real-time ultrasound to assess endurance strength. The results were interesting as there was a fatigue pattern on the left gluteus medius on endurance load.

Further investigation revealed that he had recently competed in a half iron-man endurance race where he had modified his road bike to a time-trial configuration with no professional setup.

This adaptation resulted in an extended forward position of his body. The time between the modification and racing in this new position was only 1 week. Such a short period

## BOX 4: GONSTEAD CHIROPRACTICS

Developed in the USA by Dr Clarence S. Gonstead (1898–78), this form of chiropractics deals with the spine – anatomically and physiologically – as one highly integrated neuromusculoskeletal complex. It is based on the concept that changes in one area of the spine, whether functional or organic, can and do produce biomechanical and neurophysiological changes in other areas of the spine.

“IT SHOULD ALWAYS BE AN ABSOLUTE PRIORITY TO TRY AND OBTAIN ANY AND ALL INFORMATION FROM YOUR ATHLETES WHEN THERE IS CHANGE IN THE INTENSITY OR DURATION OF THEIR TRAINING”

allowed little time for his body to adapt to the new extended forward position, hence the endurance load of the gluteus medius was compromised and the price was paid once off the bike and loaded in the run!

### SUMMARY

The following interventions were used for this patient:

- Three soft tissue treatments.
- Two sessions with an exercise physiologist.
- One session with a chiropractor.
- Change of bike (set new bike time trial).

Particular problems faced by this patient included:

- Myofascial sling overload to running sequence particular to his hip abductors due to the increased training load, intensity and bike setup.
- Combination of structural restriction, soft tissue adaption and endurance fatigue.
- Gluteus medius fatigue and overload of subsidiary muscles.

It should always be an absolute priority to try and obtain any and all information from your athletes when there is change in the intensity or duration of their training, or physical factors like their footwear, the surface they are training on, or their bike setup. Such factors can become the hidden mechanism for overuse or biomechanical injuries.

So how did this patient do in the race? He competed without any knee pain and finished twelfth overall in the elite category, which was a remarkable achievement, particularly as this was his first attempt. A great result all round.



#### THE AUTHOR

Stuart Hinds is a lecturer in remedial soft tissue techniques at Victoria and RMIT Univeristy in Australia. Stuart has been involved with elite cycling (national and international) and a range of athletes from all professional levels of sport. Stuart was part of the massage service for the International Olympic Committee at the 2000 Sydney Olympic Games as well as the soft tissue services for the Australian Olympic Team in the 2004 Athens Olympic games. He is the soft tissue therapist for the Geelong Football Club and has just returned from the Beijing Olympics.



Launch the extras by clicking on the images



Thomas test - Standard version (note: the video begins badly but corrects after a few seconds) - the video is credited to YouTube user [akues82](#)



Modified Thomas test - with thanks to Dr Mike (YouTube user [PostRehabSpecialist](#)) who demonstrates the use of a modified Thomas test in a rehab setting - this same test is used to test for iliopsoas tightness



The Ober test - used to assess the tightness of the iliotibial band and the tensor fascia lata - with thanks to YouTube user [bigesor](#)

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