Prevention and Management of Common Running Injuries

Presented by

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Objectives

• DIALOGUE AND INTERACTION

• We are not here to preach, we are here to think together and share experiences

• Identify and discuss common running injuries

• Understand what might pre-dispose runners to injury

• Give you insight in how to reduce your injury risk

• How running-specific training and soft tissue therapy can help you.

• Walk away with 2 or 3 new insights

If you can't explain it simply, you don't understand it well enough. - Albert Einstein
Common Running Injuries

- Exercise-related Low Back Pain
- Hamstring injuries
- ITB Friction syndrome
- Knee pain
- MTSS ("shin splints")
- Achilles Tendinopathy
- Plantar Fascialgia
- Morton’s Neuroma
Exercise-related Low Back Pain

Lower back pain can occur as a result of movement patterns used during running

**Contributing factors:**

- Excessive forward tilt of the pelvis
- Lack of lumbar – pelvic rotation
- Lack of movement variability
- Reduced coordination (often due to fatigue)

More information will follow during movement analysis
Hamstring injuries

Hamstring tendinopathy vs. hamstring strains

Contributing factors:

- Excessive/uncontrolled forward tilt of the pelvis
- High speed running – longer strides = higher force
- Previous hamstring injuries
- Hamstring flexibility
ITB Tension/Friction Syndrome

Proposed friction between ITB and outside of the thigbone

Clinical features include:
- Ache over the outside of the knee aggravated by running
- If running consistently pain may come on at the same point on a run
- Longer runs or downhill runs can also aggravate
- Pain on touch
Knee pain: Patellar Tendinopathy + Patello-femoral pain

Pain in the front part of the knee – similar symptoms

Distinguish via:
- Specific location of the pain – ‘behind the kneecap’ vs. ‘below the knee’
- Behaviour of the pain – when does it get worse/better?
- Any associated clicking/cracking and/or swelling
- Ultrasound can assess tissue quality
Medial Tibial Stress Syndrome (MTSS)

Previously known as “shin splints”.

- Pain felt along the middle or distal third of the inner part of the shin bone.

- More focal pain may lead us to investigate whether the runner has sustained a stress fracture.

- Excessive pronation, training errors, shoe design, surface type, muscle dysfunction, fatigue and decreased flexibility may be contributing factors.

- All treatment and rehabilitation plans need to begin with rest from all tibial impact activities and progress through slow, controlled, and graduated running programs over several weeks.
Achilles Tendinopathy

Overuse injury of the Achilles Tendon

- Acute or Chronic
- Pain in midportion or at the attachment to heelbone
- Severity of pain may range from minor inconvenience to profound pain with activity
Plantar Fascialgia

- Overuse condition of the plantar fascia at its attachment to the calcaneus

- Can be linked to patients with low arches, high arches or flat feet

- Also associated with tightness in the proximal myofascial structures i.e. calves, hamstrings and glutes
Mortons Neuroma

- Pain in the ball of the foot, caused by irritation or compression of the nerves of the foot

- Usually affects the nerve between the 3\(^{rd}\) and 4\(^{th}\) toe, sometimes between 2\(^{nd}\) and 3\(^{rd}\)

- Usually responds well to change of footwear, modifying activity with/without painkillers until it feels better and/or orthotic device to relieve pressure.

- Can be caused by tight footwear, flat feet, high arches, bunions or hammer toes or excessive compression
What do you guys think causes injuries?
Some risk factors for above mentioned injuries in runners

- Contralateral pelvic drop on impact
- Reduced lumbo-pelvic decoupling
- Previous lower limb tendinopathy
- Advancing age
- Waist-to-hip ratio
- Leg-length difference
- Greater ankle dorsiflexion on impact
- BMI
- Training errors
- Arch height of the foot
- Sleep quality
- Muscle power/strength
- Obesity
- Training load
- Reduced Ankle flexibility
- Sudden increase in training intensity
- Anterior pelvic tilt
- Quadriceps strength
- Changes in loading
- Foot alignment
- Muscle power/strength
- Previous injury
- Muscle Endurance
- Reduced Ankle flexibility
- Vertical jump performance
- Hamstring flexibility
- Footwear
- Running technique
- Weight
- Altered joint coordination
- Quadriceps flexibility
- Forward trunk lean
- Fatigue
- Running technique
- Lower limb biomechanics
- Mental fatigue
- Sudden increase in training intensity
- Contralateral pelvic drop on impact
- Dynamic knee valgus
- Extended knee on initial contact
- Anterior pelvic tilt
- Foot pronation
- Fatigue
If we look at all these injuries...

What do most of them have in common?

Which word comes to mind?
“Overuse”

It is not the shocks that cause the injury.

It is how we transmit those shocks.

“Running is very damaging to the joints in the knees, feet, and ankles. Every step you make in your run is forcing your body to absorb the shock of your entire weight, plus some for the added force. If running is the sole source of your exercise, then don't expect to be able to do it forever.”
Time to share

Who of you have been injured before?

What was your injury, and how did you recover from it?
What can we do against overuse injuries?

1. Variation in:
   - Load (total volume of training)
   - Intensity – endurance runs, intervals, ramps, pyramids, sprints
   - Frequency of your runs
   - Distribution / planning of your runs
   - Terrain (tarmac, treadmill, offroad, forest, sand)
   - Running partners?

2. Improve your coordination
Improving coordination

Training/improving coordination is only effective if:

- the exercises overlap with movement patterns used when running

- if multiple muscle groups are trained together (muscle synergies)

- if the exercise is challenging enough

Therefore it is **essential to identify cornerstones of efficient running and your running style**
Running Analysis

Is There a Pathological Gait Associated With Common Soft Tissue Running Injuries? (Bramah et al. 2018)

Figure 1. Two-dimensional representation of forward trunk lean, knee flexion, and ankle dorsiflexion at initial contact. (A) Injured runner; (B) healthy runner.

Figure 3. Two-dimensional representation of contralateral pelvic drop and hip adduction at midstance. (A) Injured runner; (B) healthy runner.
Running Analysis

How do we transmit ground reaction force?

Backside mechanics

- Can predispose to forward lean + forward tilt of pelvis
- Working against ground reaction force

Vs.

Frontside mechanics

- Using ground reaction force to propel yourself forward
- Need pretension to ‘push-off’ – different work for soft tissue structures initially
Running Analysis

Identify Attractors in running – Key elements

“Stable elements with low energy costs”

Why are these elements important?

Attractors are the coordinative foundation of running

Low energy costs = effective

Lower need to generate energy - wasting less energy
Attractors in running

- Foot plant from above
- Swing Leg Retraction
- Hip lock
- Trunk stiffness / positive running
Dafne Schippers 60 meter race
Rehab & Injury Prevention

Train movement patterns – rather than individual muscles!

Before Impact:
Swing Leg Retraction – pull foot back prior to ground contact

Upon impact:
Foot plant from above – plant foot firmly from above

Through Stance phase until toe-off:
Hip lock – preventing drop of the pelvis

As a whole:
Trunk stiffness / positive running –
(keeping your trunk straight, preventing excessive rotation and forward tilt of the pelvis)
How can you train this?
How can you train this?
How can you train this?
How can you train this?
How can you train this?

https://twitter.com/Aquabags/status/1009316633918296064

https://twitter.com/Aquabags/status/1016343313383903232

https://twitter.com/Joep3187/status/946040501882454016
Soft Tissue Therapy

Benefits of Soft tissue Therapy

Pre and Post Event

Frequency and scheduling of Soft Tissue Appointments
Self Management Strategies

- Monitor variables
- Foam rolling
- Ice baths
- Stretching
- Flexibility
FOAM ROLLING
Effect on Performance and Potential Mechanisms

Reference: by Behm, D. ECSS 2017
Designed by @LMSportScience

DEMONSTRATED EFFECTS

1. Reduced pain associated with delayed onset muscle soreness
2. Attenuated myofascial pain in both the affected muscle and the contralateral limb (central neural component in pain inhibition)
3. Acute increase in range of motion
4. Reduced muscle tender spots
5. Trivial to substantial effect on subsequent performance via improved neuromuscular efficiency (in contrast to prolonged static stretching)

POTENTIAL MECHANISMS
Not been fully established

May be related to
- Thixotropic factors
- Reflex neural inhibition
- Increased stretch tolerance

PROTOCOLS
1. Higher intensities or pressures of rolling do not augment the improvements in range of motion
2. Durations of rolling of 5–10s have increased range of motion but it seems that longer durations of 30–60s increase range of motion to a greater degree
3. Intermittent rolling after static stretching has been shown to maintain range of motion gains to a significantly greater degree than a single session of stretching with or without rolling
COLD WATER IMMERSION FOR RECOVERY IN SPORT

By @YLMSportScience

1. Potential mechanisms
   Temperature- and pressure-induced changes in blood flow and reduced muscle temperature per se may reduce POST-EXERCISE INFLAMMATION.

2. Positive Outcomes
   Enhances recovery of muscle function
   Reduces DOMS
   Improves perceived sleep quality during intensive periods
   Potential placebo effect

3. Negative Outcomes
   May limit the acute satellite cell response to strength training
   May affect long-term strength training adaptations

4. Conclusion & Practical Implications
   Use cold water immersion to speed-up recovery when repeated performance is required in tournament scenarios or multi-day competition.
   Do not use cold water immersion in the context of training, except when signs of overreaching are reported (e.g., sleep disturbances or very high muscle soreness).
**IMPACT OF STRETCHING ON THE PERFORMANCE AND INJURY RISK OF LONG-DISTANCE RUNNERS**

By Baxter et al., Research in Sports Medicine, 2017

**ACUTE STRETCHING**

1. Can reduce running economy and performance for up to an hour by diminishing the musculotendinous stiffness and elastic energy potential

**CHRONIC STRETCHING**

2. Stretching cannot reduce its longevity or intensity of delayed onset of muscle soreness

3. Stretching shows little significance for endurance runners to chronic injury
Self Management Strategies

• Monitor training load + variables

- Training intensity – Heart rate + RPE scale
- Training mood
- Duration of training
- Surface

<table>
<thead>
<tr>
<th>RPE Scale</th>
<th>Rate of Perceived Exertion</th>
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<tbody>
<tr>
<td>10</td>
<td>Max Effort Activity</td>
</tr>
<tr>
<td>9</td>
<td>Very Hard Activity</td>
</tr>
<tr>
<td>7-8</td>
<td>Vigorous Activity</td>
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<td>4-6</td>
<td>Moderate Activity</td>
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<td>2-3</td>
<td>Light Activity</td>
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<tr>
<td>1</td>
<td>Very Light Activity</td>
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- Max Effort Activity: Feels almost impossible to keep going. Completely out of breath, unable to talk. Cannot maintain for more than a very short time.
- Very Hard Activity: Very difficult to maintain exercise intensity. Can barely breath and speak only a few words.
- Vigorous Activity: Borderline uncomfortable. Short of breath, can speak a sentence.
- Moderate Activity: Breathing heavily, can hold short conversation. Still somewhat comfortable, but becoming noticeably more challenging.
- Light Activity: Feels like you can maintain for hours. Easy to breathe and carry a conversation.
- Very Light Activity: Hardly any exertion, but more than sleeping, watching TV, etc.
Conclusion

Despite being common, running injuries can be preventable and treatable

• Focus on **coordination** (running style) **variation** and **adaptation** to different circumstances

• Keep track of your runs, intensity, mood and general health

• Practicing self management techniques

• Use physiotherapy and soft tissue therapy when you need to
Thank you

Thank you for your time, if you have any further questions or would like more information please contact us.

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“It is not the strongest runner that survives – but the one that is most efficient - wastes the least energy - and is most adaptable to change.”

— Leon C Megginson