In my practice as a physiotherapist in a large sports medicine clinic in Melbourne, many cyclists present to me with a variety of injuries related quite simply to a misunderstanding of what is correct pedal technique.

Commonly, the cyclist presents with an onset of symptoms that is related to trying to increase their pedalling efficiency. Sadly, they have made their pedalling less efficient rather than more, and have often developed an injury in the meantime.

Incorrect pedal technique can cause the following injuries:

- Knee pain.
- Hip flexor (psoas) overuse syndromes.
- Lower back pain.
- Gastric irritation, ie nausea and abdominal bloating. Due to the tension of the psoas muscle on the sympathetic chain—the nerves that supply your internal organs.
- The feeling that despite the hours training, they feel like they are getting slower.

The good news is that with attention to detail during their pedalling action the symptoms disappear as quickly as they appeared.

**Getting Technical**

Pedal technique is as much a skill acquisition as a tennis serve. You wouldn’t see a young tennis hopeful out bashing the ball as hard as possible every shot. They would spend a good deal of their training perfecting their technique, getting a feel for the racquet/ball interface. Cycling should be the same. Getting faster is not always about training harder, but doing quality training and developing a proprioceptive feel for the bicycle and power output through the pedals.

National MTB team coach Damian Grundy says the most important advice for an up and coming junior is not the hours they spend on the bike, but getting a real feeling for the pedal-stroke and their body position on the bike.

The acquisition of skill in developing power output is why a de-conditioned elite class athlete can often hop in to a club level race and blow the ‘fitter’ athletes away. They have spent many years developing their correct motor programs. Their fitness may not be what it should be, but they use what they have in the most efficient way.

**Common Mistakes**

The greatest mistake in pedalling technique lies in the following two commonly quoted statements:
- “Cleats help you generate an upstroke.”
- “Pedalling should be in circles.”

Be very careful about what you are thinking of with these two statements.

In 1997, French researchers put force transducers on the pedals of six cyclists. They measured the force going through the pedal at every two degrees of the pedal stroke. They found that in the back part of the stroke, there was a negative torque on the pedals (an uplift). However, the quantity of this uplift was the same with the subjects with toe cleats and without toe cleats. Hence, they concluded that the leg creating the upstroke (negative torque) at this point was the opposite leg during the down-stroke. Their conclusion was that the hamstring and hip flexor muscles were insufficient to be able to lift the leg at a greater rate than the quadriceps and gluteal muscles on the other side, which push the back crank up by pushing down on the opposite crank.

The same study concluded that the role of cleats is a proprioceptive one—cleats enable us to develop very high forces on the pedal at high cadences without slipping off the pedal (Capmal and Vanwealle, 1997).

In steady state submaximal cycling, the power output across the 360 degree cycle of the pedal stroke is NOT even, and nor should it be.

Firstly, there are muscles that are optimally placed to generate tension at various points of the pedal stroke. The major power generators during the pedal cycle are the ‘antigravity’ muscles, the gluteal (buttocks) and quadriceps (thigh muscles or your ‘quads’).

Secondly, cycling at high cadence is a type of locomotion similar to walking and running. At high velocity, the brain appears to be ‘preprogrammed’ with a particular motor pattern, hence it actually sorts out the best source to deliver power generation between the two legs at any instantaneous point of the pedal stroke. This power will not be equal for each leg at any given time.

Muscles have contractile components. The ability of a muscle to generate tension is dependant upon what is known as its length/tension relationship. Put simply, a muscle that is shortened or lengthened beyond optimum is no longer easily able to develop tension. As an example, try to lift a dumbbell with your biceps muscle (see Illustration 1). The easiest point of lift is at about the 90 degree or right angle position of the arm. At the extremes of range, with the arm stretched out or the arm ‘close packed’ the weight is harder to lift as the muscle is not in its best range of length/tension relationship. Also, the forearm is less efficient as a lever when the biceps attachment is effectively...
Pedalling Pointers

Here are a few Do’s and Don’t’s for developing an optimal pedaling style:

Don’t

- Do one legged pedaling exercises
- Focus on developing an upstroke

Do

- Think of pulling across the bottom stroke with your hamstring muscles (a cycling term is to imagine that you are “scrapping chewing gum off the bottom of your shoe”)
- You will find you automatically tap into muscles that are not being used much and have plenty left in them.

Correct Technique—Focus Shift

Now that I have completely confused you all, I’d just like to clarify a few points:

- Is cycling just pushing like when I was a kid? The answer is NO!
- Pedalling in circles is about smooth transition of power. Not the push/pull of upstroke/downstroke, because that will have a thud or a dead spot that we can feel or hear at the top and bottom stroke.

If you currently don’t think of an ‘upstroke’ then good. What I am asking for is a ‘focus shift’ during the pedal cycle. The part of the pedal stroke that naturally happens is the push phase, especially with the dominant leg. The part that the cyclist needs to focus on is pulling across the bottom-stroke with the hamstring muscles. This will smooth out power generation at the top and bottom sections of the stroke to allow smooth transition between the right and left leg.

Have a think about your pedaling technique and consider the ‘Do’s and Don’t’s’ in this article. The trick is to be comfortable as well as efficient. Most of all enjoy your cycling in this article. The trick is to be comfortable as well as efficient. Most of all enjoy your cycling sport!

Correct Technique versus Incorrect Pedalling Technique

References


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