Chronic Knee Pain

Vicky Annis suggests what to do if an athlete develops chronic knee pain, the most likely causes and the type of injury it could be, and how to prevent it in the first place.

Terminology breakdown
First, I wish to bring to your attention the word ‘chronic’. This can be a very daunting word in the mind of an adolescent. It is important for coaches to fully understand the meaning of chronic pain. Most authors suggest an injury is chronic if it persists for longer than three to six months.

More recently, chronic pain has been defined as pain that persists longer than the temporal course of natural healing that is associated with a particular type of injury. Unfortunately, chronic pain is often misinterpreted as an injury that is severe and athletes can, therefore, have a false impression regarding their injury. This will have a large psychological impact on an athlete’s training and motivation, and should be monitored carefully by the coach.

The most likely causes
The knee is the largest and most complex joint in the body due to its weight-bearing, stability and shock-absorption requirements. There are two distinct joints of the knee: the Femorotibial joint between the femur and tibia, and the Patellofemoral joint, between the patella and the femur. The knee is a hinge-joint providing flexion and extension and a small degree of rotation. It can successfully provide a combination of mobility and stability by the interaction of ligaments, muscles and complex gliding and rolling movements of the articular surfaces. However, problems such as injury and pain can occur and symptoms begin to develop over time.

The two main causes of chronic knee pain for adolescents are Chondromalacia patella and Osgood-Schlatter Disease.

Chondromalacia patella sits in the category of anterior knee pain, which is commonly reported as a symptomatic area. Athletes will have difficulty squatting and kneeling, and even with simple tasks such as descending a set of stairs.

In chondromalacia patella, the cartilage on the underneath of the patella can ‘soften’ in response to excessive and uneven pressure due to structural changes during rapid growth and muscle imbalances. This softening of the cartilage at the patellofemoral joint is also known as patellofemoral pain or runner’s knee. For mechanical reasons, contact with the medial femoral condyle (inner part of the knee joint) is more commonly affected.

Osgood-Schlatter Disease is, from experience, the most frequently seen chronic knee-pain injury within teenage boys. This does not, however, mean to say that it does not affect girls. Signs and symptoms of this injury include pain during sporting activities requiring tensile quadriceps contraction, such as jumping and running. The tibial attachment of the patella tendon (below the knee cap) becomes inflamed because of the strong pull of the quadriceps coming through this attachment. If not treated or rested in the initial stages, it can take a prolonged period of time to settle; thus chronic pain is initiated. Overtraining youngsters, particularly when they have persistent knee pain, can have large recovery implications.

Coaches can still support their athletes by encouraging active rest and looking at alternative training activities and surfaces that off-load the demands put on the quadriceps.

What type of injury could it be?
There are several common causes of chronic knee pain that I have seen clinically. Generally, they fall within one of the following categories:

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Each of the aforementioned can be looked at briefly by the coach but more specifically by a physiotherapist.

The joints above and below the knee (hip, lumbar spine and the foot) have a huge biomechanical contribution to knee alignment. Excessive internal rotation (knock-knees) and foot pronation, which causes internal tibial rotation, can lead to uneven weight distribution over the knee joint.

Another contributing factor, seen more commonly in girls, is the relationship between the quadriceps and the patella tendon; commonly known as the Q Angle. This is the angle between the quadriceps muscle (primarily the Rectus femoris) and the patellar tendon (Magee, 1987). When assessed correctly, it supplies very useful information concerning the alignment of the pelvis, leg and foot.

Figure 1: The knee joint

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Intrinsic
Extrinsic
• Biomechanical | • Equipment
• Anatomical | • Overtraining
• Muscular | • Training surfaces
• Participating in several sports at once
Q Angles greater than normal will position the patella incorrectly, causing an uneven distribution of weight and will eventually lead to disturbances of the cartilage on the underside of the patella and muscle imbalances (Galea, 1994) and chronic pain.

**Muscle imbalances** are one of the main contributors to knee pain whether in the form of weakness or inflexibility.

Within a physiotherapy assessment, weakness of vastus medialis and a tight iliotibial band (ITB) is frequently experienced and it is important to address these issues.

The patella is held in position by ligaments, tendons and muscular attachments. Vastus medialis supports the patella medially, iliotibial band laterally (outside) and the quadriceps muscles superiorly (top). They all pass over the patella forming the patella tendon and insert onto the tibia tuberosity, found below the patella. If the iliotibial band is tighter or stronger than the Vastus medialis, the patella will move subtly laterally (outwards). This will disturb patella tracking (the position of the patella in relation to the femur) and possibly become symptomatic.

**Growth** has a huge impact on the length of a muscle. During growth spurts, the bones tend to grow at a quicker rate than the muscle. The coach may see a reduced degree of flexibility within her athlete and she should see it as her responsibility to encourage good-quality daily stretching to help elongate the muscle. As previously mentioned, this is commonly seen in boys who suffer from Osgood-Schlatter Disease.

An important observation to make as a coach is whether the athlete is wearing the correct footwear and using the correct equipment. There are thousands of trainers available with different degrees of cushioning, control and support, depending on the individual’s foot function. Visting a specialist sports shoe shop is highly recommended. Foot pronation (flat foot) can cause internal rotation of the tibia and disrupt the patella positioning. An arch support and/or specific lower leg strengthening and stretching exercises may improve lower extremity biomechanics by preventing overpronation and correcting the alignment of the patella.

**Methods of prevention**

Ideally, an athlete should see a physiotherapist before any problems arise in order for potential injury risks to be identified and avoided. This tends to be forgotten. There are certain problems aforementioned that a coach will be able to identify but a professional opinion should also be sought.

In the incidence of acute knee pain, there should be temporary activity modifications and possible quadriceps strengthening work depending on symptoms. Normal procedures for acute soft-tissue injuries (including, rest, ice, elevation and compression) should also be applied. This will be most effective in the first 24 to 48 hours of experiencing knee pain.

As mentioned earlier, quadriceps tightness and iliotibial band (ITB) can be inherent to further problems (eg Osgood-Schlatter Disease and Chondromalacia patella). Athletes need to be taught how to stretch specific muscle groups and the ITB so they can do the stretches correctly at home. Static stretching post-training helps re-educate the muscle spindle and, therefore, the length of the muscle so it can return to its normal state and efficient contraction.

Biomechanical factors, if acknowledged, can also have an effect on chronic knee pain. Orthotics can help correct foot alignment, which in turn affects knee alignment and Q Angles.

A very common muscle imbalance affecting the knee occurs between Vastus medialis, which is usually weaker than the opposing Vastus lateralis muscle (see Figure 1). A lack of strength of imbalances in the hip can also accentuate internal rotation (knock knees). Sometimes, the coordination of these muscles has become abnormal. Strengthening will require special focus on the timing of muscle contractions. Closed-chain exercises (such as wall squats) performed to only 30 degrees of flexion are currently recommended for Vastus medialis (Johnson et al. 1999). A physiotherapist will be able to further advise you on specific exercises designed for individual sports.

Overall, in young athletes, prevention is much better than dealing with injuries that become established due to inappropriate management or a lack of understanding about the causes. Young people in sports are contending with the physiological and biomechanical effects of growth throughout their musculoskeletal system and the demands placed on them by training and competition. Much of this is beneficial to their physical and psychological development and the coach plays an important role in helping these athletes to reach their potential as injury-free as possible. Therefore, when having preventative strength, conditioning and stretching regimes built into programmes, be vigilant in recognising when young athletes are showing signs of change in mechanics and movement, and refer promptly for professional assessment if and when problems start to arise.

**Acknowledgement** Carol Young, Lecturer, University of Bradford.

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**References**

Galea (1994) Need to find!!


**Further reading**


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**Profile**

**Vicky Annis** graduated from the University of Bradford and has worked at the Carnegie Sports Injuries Clinic, in Leeds, since 2006. She is the Physiotherapist for the Leeds Metropolitan University Men’s Football Club and the Assistant Physiotherapist at the adidas Eyewear Triathlon Camps.