Patellofemoral Pain: Control the Track

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Anterior knee pain is one of the most common complaints of athletes seeking treatment from sports medicine professionals. Patellofemoral pain is often used as a catch all term referring to a variety of pathologies that can cause pain in the front of the knee, but for our discussion today we will be focusing on some biomechanical issues that can easily be bought under control with proper coaching and exercise.

The patellofemoral joint is comprised of the patella (knee cap) and is articulation with the distal part of the femur (thigh bone), known as the trochlear groove. As we bend our knees (picture a squatting motion) the patella rides downward in this groove and as we extend (standing up from a squat) the patella rides upward. There is also some rotation and tilting of the patella that occurs as well. Many sports medicine professionals describe this mechanism as a train (patella) moving along a track (trochlear groove of the femur).

For years, much of the focus had been on the train (patella), with interventions such as taping, bracing, and a heavy emphasis on quadriceps strengthening for rehab. Although this has been beneficial for some, many athletes do not respond to this method of treatment or suffer a return of pain or injury down the road. Perhaps we are missing something if we focus too much on the patella itself.

More recently, researchers have begun to place more emphasis on the track (femur) and how it is moving under the patella as we do our functional activities (1,2). When we do functional movements such as running, squatting and lunging, the movement of our knee is controlled heavily by the muscles of our hips. Proper strength and control of these muscles is crucial in preventing the knees from collapsing inward as we jump, land, and cut. This “knock kneed” position is called an increased valgus moment and can cause the train to jump off the side of the track and can also be a risk factor for ACL injuries. If the hips are not strong enough to provide proper control of the femur, even basic activities like walking and running can cause the patella to rub excessively on the outside of the trochlear groove. This can lead to pain, decreased performance, and eventually cartilage damage.

By training the hip muscles to control the complex movements of the femur, we can allow the patella to ride in the optimal position along the track throughout functional movements. Exercises that strengthen the gluteal muscles are especially helpful. Here are two examples that can be used even in the early phases of treatment.

Lateral Band Slides: This focuses in on the gluteus medius, which controls the eccentric ADDuction component of the valgus moment. The athlete takes a big step with the lead leg, then a small step with the trail leg as he or she moves sideways against the resistance of a band or tube. Remember to keep the trunk upright and not leg the trail leg drag along the ground.

Bridge with Theraband for Hip ER: This exercise focuses on the gluteus maximus, which controls the eccentric flexion and internal rotation of the hip. The athlete performs a bridge but maintains his or her hips in external rotation by keeping tension on a Theraband which is wrapped around the knees.

By focusing on the surrounding musculature, and not just the patella, we can provide more functional and efficient rehabilitation for out athletes. Remember to include work for the core and balance to ensure that the entire kinetic chain, from the foot to the low back, is functioning at its peak.

References:

1. Mascal CL, Landel RF, Powers CM. Management of patellofemoral pain targeting hip, pelvis, and trunk muscle function: 2 case reports. JOSPT 2003; 11(33) 642-660.
2. Ireland ML. Willson JD, Davis IS. Hip strength in females with and without patellofemoral pain. JOSPT 2003; 11(33) 671-676.