

## **Anterior Knee Pain in the Basketball Athlete**

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### **Introduction**

When Medical Professionals hear that a basketball player is complaining of anterior knee pain, the first diagnosis that many think of is “jumpers knee” or “patella tendonitis”. However, the patella tendon is only one of many anatomical structures that may be pathological and that causes anterior knee pain. The anatomical structures most likely to generate a person’s reported pain in the anterior patello-femoral region are: Anterior synovium, infrapatella fat pad, subchondral bone, and medial and lateral retinaculæ. (Biedert & Sanchez-Alfonso, 2002). There are other diagnoses that also may cause anterior knee pain including Osgood Schlatter Disease, Osteochondritis Dissecans, Sindling-Larsen-Johannson Disease, Patella Tendinitis, Patella Subluxation, Patella Maltracking, Bursitis, and Chondromalacia Patella.

Patello-Femoral pain syndrome is a common diagnosis which may occur as an isolated entity or in concert with other knee pathologies (Bronstein & DeHaven, 1998). When a basketball athlete is diagnosed with “Patello-Femoral Pain Syndrome (PFPS)” there is no identification of the pathological anatomical structure and/or the potential cause of the athlete’s pain. The medical professional should perform a comprehensive examination in order to not only determine which tissues are involved but the results of the examination should also determine the etiological factors that cause the basketball player’s complaint of anterior knee pain.

The most common description of anterior knee pain in the basketball athlete is insidious in onset. The pain is generally increased with prolonged sitting (“movie sign”) and with performing stairs and jumping and landing (Bronstein & DeHaven, 1998).

### **Examination: Quadriceps Angle (“Q-angle”)**

Many health care professionals were taught to measure the Quadriceps “Q” angle when examining an athlete who complains of anterior knee pain. The normal Q-angle for males is 11 degrees and 14 degrees for females (Herrington & Nester, 2004). However, several research journal articles have shown that measuring the Q-angle may not be reliably correlated with patella position or patient’s discomfort. Biedert & Warnke, 2001, found that there was no significant correlation between Q-angle value and patella position (tilt and displacement) compared to CT scan and X-ray.

Livingston, 1999 in a review article, concluded that there was no correlation with Q-angle measurements and the magnitude of discomfort. Smith et al, 2008 in a systematic review of 10 articles, determined that there was considerable disagreement on the reliability and validity related to clinical Q-angle measurement. The difficulty with measuring the Q-angle is in determining the actual center of the patella, the center of the tibial tubercle and the center of the anterior superior iliac spine. Overall, in general measuring Q-angle in individuals with visibly close to normal alignment does not need to be done.

Individual athletes with increased frontal knee tibio-femoral plane alignment, Genu Varum (Bow-legged) and Genu Valgum (Knock-Kneed), will exhibit increased stresses and strains on the medial or lateral side of the knees respectively as compared to an individual with normal alignment (Yang et al., 2009).

Individuals may also have excessive acetabular or femoral torsion as well. Excessive femoral anteversion may also result with athletes exhibiting “squinting patellas”. Medical professionals should note these observations as they may play a role with abnormal gait mechanics as well as abnormal performance of functional tests.

### **Examination: “Patella Grinding Test”**

Health care professionals are typically taught the “patella grinding” test while in college, in order to determine if an athlete has Chondromalacia Patella. However, many of the common special tests performed for patello-femoral pain lack sensitivity when correlated with pathological operative findings (Malanga et al., 2003). In many instances a positive patella grinding test is not associated with chondromalacia patella. Thus, there is an increased need for taking a good history, utilizing palpatory skills and analyzing the athlete’s gait and functional exercises to help determine pathological tissues and the etiology.

### **Flexibility**

A common therapeutic exercise intervention for athletes including basketball players whom complain of anterior knee pain is stretching of the hamstrings. However, shortened Quadriceps and Gastrocnemius were factors significantly associated with anterior knee pain (Witvrouw et al., 2000). Thus, emphasis should be placed upon the examination of Quadriceps and Gastrocnemius flexibility along with targeted interventions to increase the flexibility if needed. As with all types of exercises, proper technique is essential and there is a need to stretch the biarticular rectus femoris without adding increased stress to the low back region.

**Strength**

In a 7 year follow up for individuals with reported knee pain it was determined that the smaller the strength differences in the quadriceps left to right, the better the outcome. Radiological or MRI changes did not have a clear association with outcome (Natri et al., 1998). Thus, there should be an emphasis on determining not only quadriceps strength but the need for left to right strength assessment.

**Intervention**

Certified Athletic Trainers and Physical Therapists have commonly utilized eccentric quadriceps strengthening for athletes who complain with anterior knee pain and have been diagnosed with patella tendonitis. A relatively recent review article by Woodley et al, 2007, determined that eccentric exercise was effective with individuals with chronic patella tendonopathy. However, if the pathological tissues are more than the patella tendon, eccentric muscle exercise may actually create more inflammation and reported pain for the injured basketball athlete which may prolong the rehabilitation process. A relatively recent review article by Woodley et al, 2007, determined that eccentric exercise was effective with individuals with chronic patella tendonopathy. This has also been the author's personal clinical experience over the last 20 years working with a wide range of athletes from various sports including basketball.

Individuals with complaints of anterior knee pain were given physical therapy intervention including quadriceps muscle retraining, patellofemoral mobilization, patella taping and daily home exercise over a six week period. The outcome was that the interventions were efficacious for the alleviation of patello-femoral pain (Crossley et al, 2002). The aforementioned article was a randomized, double-blinded, placebo controlled trial.

The majority of athletes whom complain of anterior knee pain have a very good outcome with an appropriate individualized rehabilitation program. Occasionally, there may be some individuals that need surgical intervention, for example those with recurrent patella subluxations and/or dislocations even after a comprehensive rehabilitation program.

**Biomechanics and Rehabilitation Considerations with Therapeutic Exercise**

In order to optimize the rehabilitation process for a successful outcome, knowledge of the biomechanics of the lower extremity is essential. Over the past 10 years, it appears that “Closed Chain/Functional Exercises” have found favor with health care professionals and strength and conditioning specialists. However, in the rehabilitation process, there are times in which attempts should be made to “isolate” or increase the demands of certain muscles in an open chain situation. As soon as an athlete performs, for example, a closed chain squat exercise such as a squat exercise, there is muscular activation of the erector spinae, gluteus maximus, hamstrings, hip internal and external rotators, calf and foot muscles as well as the quadriceps.

An understanding of the muscular activity of the squat, leg press, and open chain knee extension exercises is crucial in order to understand the various patello-femoral exercises and muscular activity (Escamilla et al., 1998). Knowledge of the functional demands of therapeutic exercise and changes during various ranges of motions is needed in order to develop an individualized program. Abnormal gait mechanics can also play a role in knee pain and change the stresses and strains within the knee.

**Summary**

The basketball athlete is a unique athlete with unique physiological and biomechanical demands. There are many factors to consider in developing a rehabilitation program for basketball athletes who complain of anterior knee pain. A comprehensive examination is needed to determine pathological anatomical tissues and potential etiological factors that caused the condition.

Feasibility, Time, Compliance, Need for supervision, Prior Experience, Knowledge of Nutrition, Anatomy, Physiology, Biomechanics, Sport and Position Demands, Psychological Factors, etc., etc. are included into the factors to develop an individualized, effective, efficient and successful rehabilitation program (Canavan, 2005). A proper program will not only help the athlete with pain reduction/elimination but will also help prevent future injuries and may help improve performance as well.

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