

PATELLO-FEMORAL SYNDROME/JUMPERS KNEE REHABILITATION PROTOCOL

Patello-femoral pain (PFP) is the most common knee disorder. It is particularly common among adolescent girls and active individuals. The patient commonly presents with anterior knee pain that worsens with stairs, prolonged sitting/flexion, and kneeling or squatting activities. Common complaints are pain when attempting to rise after sitting and watching a movie or after a long drive. The patient may also experience swelling after activities and may complain of a "popping" sensation with ambulation.

The patella functions to aid in knee extension by acting as a pulley system to increase the angle of the moment arm of the quad tendon. Normally, as the knee flexes from 25-130° and the patella moves along the trochlear groove, it tilts medially approximately 11° and laterally rotates 6-7°. If normal patellar motion is restricted or excessive, the patella can translate out of its groove and degeneration of the patellar facets can occur. This can lead to significant pain and dysfunction. Predisposing factors that can lead to alteration in normal patello-femoral movement can include the following: trauma, osteochondritis dissecans, malalignment, tightness of the hamstring, IT band or lateral retinacula, external tibial torsion, weakness or delayed firing of the VMO, and increased Q angle.

Various conservative measures can and should be taken when addressing PFP including exercise for stretching and strengthening, bracing, taping, and orthotics. All should be considered when evaluating the patient and issuing treatment. If exercise is prescribed, the primary focus should be on quad retraining and strengthening. Biofeedback and muscle stim are helpful tools to regain neuro-muscular quad control. VMO activity is critical due to its angle of insertion and resultant pull on the patella. Studies utilizing normalized EMG values have shown that no specific exercises can be utilized to preferentially recruit the VMO over other parts of the quad. Because of this, a generalized quad strengthening program is in order.

The therapist needs to be aware of the knee angles that increase joint reaction forces on the PF joint. For closed kinetic chain activities such as the leg press, maximum joint reaction forces occur when contact between the patello-femoral surfaces is the greatest (60-90°). On the other hand, maximum joint reaction forces during open kinetic chain activities such as knee extension occur when contact between patello-femoral surfaces is the least (30-0°). With increased knee flexion, there is a concomitant increase in contact area between the patella and femur. This is important because the increased contact area serves to disperse the forces on the PF joint. On the other hand, even though contact forces are less at smaller flexion angles, the contact area is also less. Because of this, patients with degeneration at the articular surface will probably experience pain with open kinetic chain knee extensions from 30-0°.

It is important to differentiate between PF instability and PF arthritis in order to give the proper exercise prescription. Patients with PF degeneration will have pain with deep knee flexion closed chain activities whereas patients with instability will typically have pain at end range extension. Both groups should perform exercises in a pain-free range but this range will differ based on the diagnoses. Patients with PF arthritis may only be able to tolerate closed chain activities from 0-45°. On the other hand, those with instability need to exercise in deeper ranges of flexion (>30°) where the femoral condyles help to stabilize the patella.

This rehabilitation protocol has been developed for the patient with general tenderness around the knee cap which may increase in intensity with daily and sporting activities. The symptoms will often decrease with rest and are frequently bilateral. Sporting activities, especially running, stairs, sitting with knees flexed for a long periods of time, and deep squatting activities may intensify the pain. Early intervention of strengthening and stretching is recommended to decrease pain and assist in returning to activity. The protocol is divided into phases. Each phase is adaptable based on the individual patient and special circumstances. Progress through the phases as pain, range of motion, swelling and strength allow.

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The **overall goals** of the rehabilitation protocol are to:

- Control pain and swelling
- Regain normal knee range of motion
- Establish appropriate stretching and strengthening exercises
- Regain normal proprioception, balance, and coordination for daily activities
- Achieve the level of function based on the orthopedic and patient goals

Physical therapy is an important intervention to assist the patient in early rehabilitation in attaining a level of fitness to return to functional activity without pain. It is extremely important for the supervised rehabilitation to be supplemented by a home fitness program where the patient performs the given exercises at home or at a gym facility. Physical therapy for PF syndrome/jumper's knee varies in length on factors such as:

- Structure(s) involved: infrapatellar tendon, patellar cartilage plica, or patellar tracking
- Acute versus chronic condition
- Lower extremity flexibility
- Lower extremity biomechanics: pronated foot, leg lengths
- Performance or activity demands
- Muscular strength and endurance

Return to activity requires both time and clinical evaluation. To safely and most efficiently return to normal or high level functional activity, the patient requires adequate strength, flexibility, and endurance. Return to intense activities may increase the possibility of repeat injury or the potential of compounding the original injury. Symptoms such as pain, swelling, or instability should be closely monitored by the patient.

PHASE ONE:

EXERCISE GOALS

RANGE OF MOTION

Full range of motion

Hamstring/ITB/Gastroc/Soleus/Quad/Hip flexor stretches

Patella mobs

STRENGTH

Quad sets with biofeedback

SLR in 4 planes

Heel raise/Toe raise

SAQ (30-0°)

Leg press (0-45°)

Hamstring curls

TKE with theraband

Bicycle with resistance with seat high

BALANCE TRAINING

Single leg balance with plyotoss

Sportscord balance/agility work

Wobble board balance work

½ Foam roller balance work

Minitramp balance work

MODALITIES

E-stim/biofeedback as needed

Ice 15-20 minutes

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PHASE ONE: (cont'd)

GOALS OF PHASE ONE:

- Control pain and inflammation
- Independent in HEP
- Initiate muscular strength and endurance training without pain
- Educate patient on diagnosis
- Adequate quad/VMO contraction

PHASE TWO

EXERCISE GOALS

RANGE OF MOTION

Continue with all stretching exercises from phase one, concentrating on muscle group with greatest deficient STRENGTH

SLR with ankle wt/tubing

SAQ with ankle wt

Knee extension (90-45°, 90-30°)-range of motion depending on pain

Leg press-single leg eccentric

Hamstring curl

Reverse lunge-not to migrate knee over toe

Mini-squat (0-30°)

Stool crawl

Straight leg dead lift

Multi-hip in 4 directions

Bicycle for endurance

EFX for strength and endurance

BALANCE TRAINING

Continue with all balance activities from phase one

Advance balance/neuromuscular by variance of surface

MODALITIES

Ice 15-20 minutes

GOALS OF PHASE TWO:

- Minimize pain with all exercise
- Enhance lower extremity strength and endurance
- Normalize dynamic balance, proprioception, and coordination
- Preparation for return to functional activities

PHASE THREE:

EXERCISE GOAL

RANGE OF MOTION

Continue with all stretching activity from previous phases

STRENGTH

Continue with all strengthening activity from previous phases increasing weight and repetition

Progressively increase resisted knee range of motion within a pain free arc

Continue with all eccentric quad/hamstring work

Bicycle for strength and endurance

EFX for strength and endurance

Advance all single leg activity within pain free range



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PHASE THREE: (cont'd)

BALANCE TRAINING

Continue with advanced balance, proprioception, and coordination training

RUNNING PROGRAM

Initiate running on a minitramp, progressing to treadmill as tolerated

Initiate jump rope for impact/endurance activity

Backward running

AGILITY PROGRAM

Initiate agility drills-carioca, high knee drills, short sprints, figure 8's

FUNCTIONAL PROGRAM

Initiate sports specific drills

Initiate functional drills

MODALITIES

Ice 15-20 minutes as needed for pain and/or swelling

GOALS OF PHASE THREE:

- Maximize lower extremity strength and endurance
- Maximize balance, proprioception, and coordination
- Minimize pain and swelling
- Return to functional activities
- Return to sports specific activities

Patello-femoral pain/syndrome is a common problem. With recognition of the problem and early intervention, this problem can be treated and allow for return to maximum performance and participation in sporting activities for a lifetime.