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Patella Femoral Pain Syndrome

Approximately one in four people will experience patellofemoral pain (PFP) at some point during their lifetime. It is the most common form of knee pain. The patellofemoral joint is the anterior knee joint which is comprised of the patella (knee cap) and the femur (thigh bone). This joint is subject to forces of up to 5-7x body weight during activities such as climbing/descending stairs, squatting, jumping and running. The patella is a "floating" bone held in place by numerous soft tissue structures including ligaments, tendons and retinaculum which work in synchrony to keep the patella positioned properly during rest and activity. The large forces seen at this joint combined with the floating nature of the patella make the patellofemoral joint susceptible to injury. It is important to realize that PFPS is not a specific diagnosis. It is rather a catch-all term that is based on symptoms.

PFPS is often called Runner's Knee because of the prevalence of this injury in recreational and elite runners. Although, this name is really a misnomer because it also occurs frequently in hikers and cyclists as well as people who are inactive and sit most of the day. Patellofemoral pain can be broadly described as pain located at the front of the knee; on, under and/or around the patella. The pain can be achy and/or sharp and is generally intermittent. Pain will often be worse when going up stairs, squatting or even sitting in a chair with bent knees. Pain can sometimes occur during activity but can just as often be absent during activity only to present shortly after stopping.

Causes

The most current research points to one predominant causative factor; an increase in volume, frequency or intensity of training which exceeds the tissue capacity. Although, there also seems to be correlations to quadriceps weakness, hip weakness, excessive pronation of the foot, and lack of mobility of the hip, quads, calf and hamstring. If it occurs with cycling, it can often times be related to bike fit. Raising the height of the seat can be useful BUT we hightly recommend meeting with a bike fit specialist to ensure proper adjustments are made. In many cases, biking is a great activity to utilize as part of the pain management and recovery process.

Treatment

It is important to address PFPS as soon as you start to experience symptoms, even if they are sporadic or mild in nature, as PFPS can become more difficult to treat over time. Once your knee joint has become irritated, it becomes more sensitive to loading and even low intensity activities can aggravate it. Treatment should include activity modification, massage and mobilization to improve range of motion in hip, knee, ankle, strengthening of the hip and quadriceps muscles, the use of a patella tendon strap or taping and possibly making slight adjustments to running mechanics. The use of orthotics could also be tried although research does not seem to support this approach.

You should generally avoid taking anti-inflammatories such as ibuprofen because inflammation is usually not the problem. Icing is a bit different in that the numbing may have an impact on the pain response from the central nervous system. If you ice and it seems to help, then keep icing. If icing makes it worse or has no positive effect, then stop. The same can be said of heating the knee.

For More Information

This packet provides a great general outline for treating Patella Femoral Pain Syndrome. For more specific guidance, you can contact us directly. We are availabe for in person appointments at our clinics in Palo Alto and San Francisco or for telehealth virtual appointments. Go to our website at www.smiweb.org for more information OR contact Mark Fadil at Mark@smiweb.org or 650-823-1091.

Patellar Tendon Strap

A patellar tendon strap is in no way a cure for PFPS but it can be a useful way to at least mitigate the pain. It is an inexpensive and benign approach with no negative side effects. Although we do not know exactly why it helps, it most likely has something to do with changing the proprioception of the knee and/or changing the sensory input from the knee to the central nervous system. Make sure you use a strap that is designed to go below the kneecap *(Figure A)*. The above the knee straps are designed for IT band syndrome.

Figure A

Keep Your Knees Straight When Sitting!

As you bend your knee, pressure between the kneecap and the underlying femur starts to build. The more you bend your knee, the more pressure builds between the two bones. This occurs even if you are sitting in a chair without bearing any weight whatsoever. Furthermore, a 2007 study found decreased blood flow during flexion in patients with PFPS compared to NO decrease in blood flow in the control group. As a result, sitting with your knees bent will often times exacerbate PFPS. Symptoms can become worse after sitting for long periods of time. This can be particularly problematic when sitting on an airplane or movie theater where leg room is limited. When you are sitting, make sure to straighten your knees as much as possible. You should do this even if you don't have pain or discomfort when sitting.

Movement

A technique that can often be useful in the recovery process is movement and muscle activation. This stimulates the circulatory system which brings fresh bloodflow and nutrients to injured tissue and stimulates the lymphatic system which removes waste. The more efficiently these two systems are operating, the faster recovey will take place. Simply bend and straighten your knee back and forth for 3-5 minutes at a time. Try to do this multiple times throughout the day. It is possible that use of an Electrical Muscle Stimulator (EMS) machine can help with this as well although there is no good research to substantiate this claim.

Running Mechanics

It appears that modifying running mechanics may be able to have a positive impact on PFPS. Running "softer" will generally put less stress on the Patella Femoral joint. There are a few things you can do to accomplish this. Try to avoid pavement and run more on trails or synthetic tracks. Wear shoes with more cushion. Replace old and worn out running shoes. Try to increase your cadence. The conventional thinking for decades was that 90 steps per foot per minute is ideal for all runners but more recent reasearch has shown that this is probably not the case. And while there is no "magic" number as far as cadence goes, increasing your cadence and shortening your stride will most likely result in less stress on your knees. And it is a relatively easy thing to do while you are actually running. At the very least, it's worth trying if you have been struggling with PFPS.

Self-Massage

Massage should be done on a daily basis. It can help eliminate tight areas and release trigger points that may be contributing to pain and dysfunction. We recommend spending 10-15 minutes a day massaging the areas outlined below. Treatments are demonstrated on the right side. The self massage tools shown here can be purchased from PHLX at www.phlxtherapy.com.

Figure B

QUADRICEPS

Roll up and down the front of the thighs as shown in *Figure B*. Do not roll onto the knee itself. Stop when you encounter a tender knot or band and then bend and straighten your knee until you feel the spot "soften" and become less painful. You will sometimes feel pain radiate down the leg into the front of the knee. If this occurs, continue massaging the spot until the referred pain subsides or diminishes. For added pressure, cross one leg over the other.

LATERAL HIP

Place the PHLX point underneath your hip as shown in *Figure C*. To focus on the anterior fibers of the gluteus minimus, gluteus medius and TFL, the foot of the top leg should be placed in front of the bottom leg. This will roll your torso and hip forward. Focus the pressure on a tight/sore knot or band. Move the bottom leg backward and forward for approximately 30 seconds. Try to feel the spot "soften" and become less painful. You may feel pain radiate down to the outside of the knee. If this occurs, continue working this spot until the referred pain subsides or diminishes.

Figure C

ADDUCTOR

Lie face down and place your right leg into a "frog" position on top of the PHLX roll *(Figure E)*. Roll up and down the inside of the thigh focusing on any tight knots and/or bands. You may find a spot that refers down to the knee. Focus on these spots until the pain decreases or subsides.

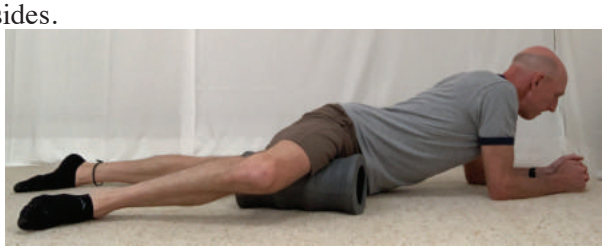

Figure E

LATERAL THIGH with PHLX stick

Slide the PHLX stick up and down the outside of the thigh as shown in *Figure D*. If you find a tight band or knot OR an area that feels "gravelly," move the stick back and forth with short, quick strokes until the tissue softens and the stick slides more smoothly.

Figure D

CALF with PHLX stick

Slide the PHLX stick up and down the calf as shown in *Figure F*. If you find a tight band or knot OR an area that feels "gravelly," move the stick back and forth with short, quick strokes until the tissue softens and the stick slides more smoothly.

Figure F

Mobilization

The mobilizations outlined here should be completed 2-3 times per day when treating PFPS. When performing the mobilization, move into position until you start to feel a stretch and then return to the starting position. The mobilization should be a continuous movement without stopping. Repeat up to 50 times, slightly increasing the range of motion with each rep. An uncomfortable stretch feeling is OK, but make sure that you do not cause pain or irritation during or after the mobilization. All mobilizations are shown for the right leg.

HIP EXTENSION

Kneeling on your right knee, lunge forward with your left leg. Make sure you have a towel or cushion under your right knee. Shift your hips forward and contract your right glute while at the same time lifting your right arm and reaching up towards the ceiling *(Figure G)*.

Figure G

Figure H

QUADRICEPS

Kneeling on your right knee, lunge forward with your left leg. Make sure you have a towel or cushion under your right knee. Place a stretch strap around your foot and then over your shoulder as shown in *Figure H*. Shift your hips forward and contract your right glute as you pull on the rope to bring your foot closer to your butt.

ROTATIONAL HAMSTRING

Stand on your left foot and place your right heel on a surface below waist level (*Figure I)*. Keep your right leg straight but do not lock your knee. Lean forward from the waist and keep your back straight until you start to feel a stretch down the back of the right thigh. Rotate your torso to the right and then to the left so that you are alternately facing to the outside and inside of your right leg.

Figure I

CALF

Place your hands on a wall as shown. Bend the knee closest to the wall and let your pelvis shift forward. The mobilization is for the calf further from the wall. Your weight should be focused on the heel of the back leg and not the forefoot. Shift your hips forward and backward. It is important to incorporate both versions described below.

1. Keep the back knee straight as shown in *Figure J* to focus on the gastrocnemius.

2. Keep the back knee bent as shown in *Figure K* to focus on the soleus/Achilles.

Figure J

Figure K

Strengthening

There is a strong correlation between hip and quad weakness and PFPS. We don't have a strong understanding of wether these weaknesses cause PFPS or develop as a result of PFPS. But we do know that strengthening both the lateral hip and quad do seem to accelerate the recovery process. It is important that you do not strengthen too aggressively or you run the risk of further irritating the plantar. A good general guideline to follow is to strenghen every other day for the first week, two out of every three days for the second week and every day from the third week on.

LATERAL HIP STABILIZER

To strengthen the right hip, balance on your right leg with the band wrapped around your left leg just above the knee as shown in *Figure L*. Keep your right knee slightly bent and and bring your left knee up in a running motion. Focus on keeping your pelvis in neutral without rotating or tilting. Repeat with the band placed behind the right knee and focusing on the back kick aspect of the running motion as shown in *Figure M*. For increased difficulty, add a second band at the ankle as shown in *Figure N*.

Figure L

Figure M

Figure N

MONSTER WALK

Wrap a band around your legs just above your knees as shown in *Figure Q*. Assume a half squat position and walk sideways by lifting your right foot and shifting your leg to the right. Then follow with the left leg. Stay in the half squat position the entire time. For increased resistance, add a second band around your ankles.

Figure Q

STRAIGHT LEG RAISE

Lie on your back with a foam roller under your knee so that your knee is only slightly bent. Turn your leg slightly out and lock your knee *(Figure O)*. Then lift your leg approximately 3 inches off of the roller and hold for 2 seconds.

Figure O

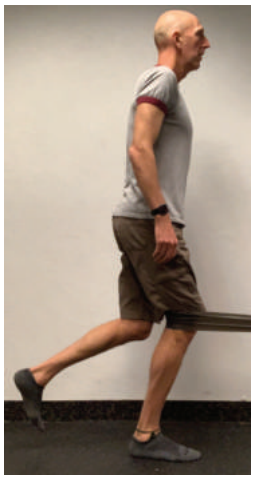

Figure P

SINGLE LEG MINI-SQUAT

Balance on your right leg. Bend your knee approximately 15-20 degreees and then straigthen and lock your knee out. For added resistance, wrap a band around the back of the knee so that it is pulling your knee forward *(Figure P)*.

SQUAT WITH BALL

With hips shoulder width apart, squeeze a ball between your knees, bend your knees and drop your hips down towards the floor as shown in *Figure Q*. Keep your back straight and your weight on your heels. You can also place something approximately 1-2 inches thick under your heels.

Figure Q