

ANTERIOR KNEE PAIN

Home Exercise Program



SCAN FOR THE
ONLINE VERSION



Stanford
MEDICINE

Key Principles

This program targets both the hip and the thigh. The hip controls the position of the thighbone (femur) underneath the kneecap (patella) and strengthening it changes how the kneecap is loaded. Strengthening the quadriceps/thigh muscles is also critical. The quadriceps absorb load that would otherwise pass through the kneecap and building their strength is important for knee stability. Exercises start with the knee straight or only slightly bent and add more bending as you get stronger. **The kneecap is loaded most when the knee starts to bend** so the goal is to work that in over time.

When performing these exercises, use a simple pain rule. On a scale of 0 to 10, try to **keep the pain at or below 3** during the exercises. If it goes above that, reduce the range, the resistance, or the repetitions rather than stopping. **Consistency in performing these exercises is the key to a positive outcome.**

YOUR HOME PROGRAM

Warm up first with 5 to 10 minutes of walking or an easy stationary bike. Start each session with the stretches, then move to the strengthening exercises.

Do the stretches 5 times a week and the strengthening exercises 3 days per week on non-consecutive days. Begin with 3 sets of 10 repetitions and build toward 3 sets of 15, then add load or progress to a harder version roughly every two weeks.

Continue for at least 6 - 12 weeks. **Patience and consistency are key.** Most of the improvement happens in initial window, but it often takes longer before the knee feels reliably better. After that, continuing the program 2 to 3 days per week is critical to maintain the gains you have made and continue improvement.

What to Expect



What you need:

- ☐ Strap or towel
- ☐ Low step or thick book
- ☐ Resistance band
- ☐ Ankle weight
- ☐ Sturdy chair or counter

Other Things That May Help

None of these replace the exercises, but they are helpful to manage the symptoms. Use what you find helpful.



Ice for about 20 minutes after activity that aggravates the knee. In general, 20 minutes on and 20 minutes off always keeping a thin cloth or towel between ice and the skin.



Anti-inflammatory medication (NSAIDs) or acetaminophen for symptoms if tolerated.



A knee sleeve or patellar brace. Many patients find these helpful during activity.



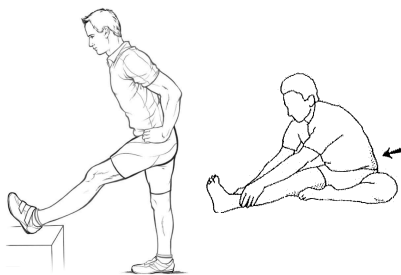
Patellar taping can help with pain in the short term when combined with the exercises.



Arch supports if you have flat feet. Over-the-counter supports work as well as custom ones for most people and the softer insoles without rigid plastic are often better tolerated by athletes.

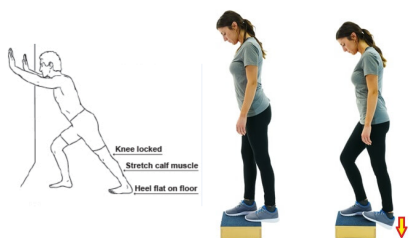


A foam roller for myofascial release to be used as an adjunct to stretching.

1 STRETCHES**5 days per week****1 Hamstring stretch****4 each side · hold 30 seconds**

Place the heel on a low step with the knee straight. Keeping the back flat, lean forward from the hips and bring your chin toward your foot rather than toward your knee. You should feel a pull in the back of the thigh. Do this before and after exercise.

Alternatives - Sit with the leg straight in front of you and, keeping the knee straight and the back flat, bring your chin toward your foot, or lie on your back and hold the leg up with a strap or towel.

**2 Calf stretch****4 each side · hold 30 seconds**

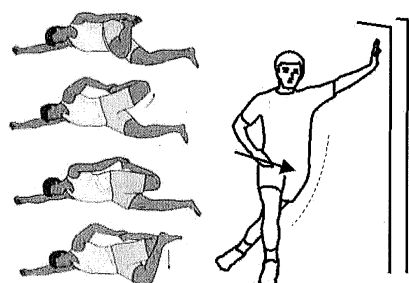
Stand facing a wall with the affected leg back, heel down and knee straight. Lean toward the wall until you feel a stretch in the calf. Repeat with the back knee slightly bent to reach the deeper calf muscle.

Alternative - Stand with the ball of the foot on the edge of a step and let the heel drop below the level of the step.

**3 Quadriceps stretch****4 each side · hold 30 seconds**

Standing and holding a wall or chair for balance, bend the knee and bring the heel toward your buttock. Keep the knees together and the hips forward. You should feel a stretch in the front of the thigh.

Alternatives - Lie face down and pull the heel toward the buttock with a strap, or kneel on the affected leg and shift the hips forward.

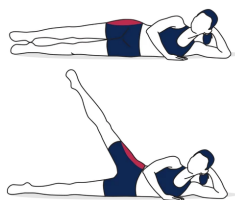
**4 Lateral hip and IT band stretch****4 each side · hold 30 seconds**

Lie on your unaffected side. Bend the affected knee and hold the ankle, drawing the hip back and letting the knee lower toward the floor behind you. Use the other leg to help guide it down.

Alternatives - Stand with the affected leg crossed behind the other and push the hip toward the wall, or sit on the floor and cross the affected leg over the other, using the opposite arm to pull the knee across your body.

2 HIP STRENGTHENING

three days per week

**5 Side-lying leg raise**

3 sets of 10, build to 3 sets of 15

Lie on your unaffected side with both legs straight and slightly behind you. Lift the top leg toward the ceiling without letting the hip roll backward, then lower slowly. You should feel this on the outside of the hip.

**6 Clamshell**

3 sets of 10, build to 3 sets of 15

Lie on your unaffected side with the hips and knees bent and the feet together. Keeping the feet touching and the pelvis still, lift the top knee toward the ceiling. Add a band around the thighs as it gets easier.

**7 Bridge**

3 sets of 10, build to 3 sets of 15

Lie on your back with the knees bent and feet flat. Squeeze the buttocks and lift the hips until the body is in a straight line from knees to shoulders. Lower slowly. Progress by doing it on one leg.

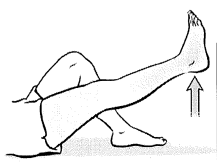
3 KNEE STRENGTHENING

three days per week

**8 Quad set**

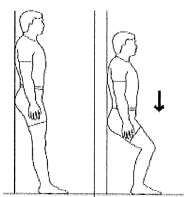
3 sets of 20 · hold 5 seconds

Sit with the leg straight. Tighten the thigh muscle so the back of the knee presses down toward the floor, hold, then relax. This is a good place to start when the knee is irritable.

**9 Straight leg raise**

3 sets of 10, build to 3 sets of 15

Lying or sitting with the leg straight, tighten the thigh and lift the leg about a foot off the floor. Hold briefly, then lower slowly. Add an ankle weight once this is easy.

**10 Wall slide**

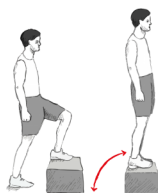
3 sets of 10 · hold 20 seconds

Stand with your back against a wall and feet about two feet out. Slide down until the knees bend about 30 degrees, hold, then straighten. Progress to 45, then 60, then 90 degrees only when the previous depth is pain-free. This can take weeks.

**11 Single-leg knee bend**

3 sets of 10 · hold 5 seconds

Stand on the affected leg, holding a chair or counter for balance. Bend the knee about 20 to 30 degrees, hold, then straighten. Keep the knee tracking over the middle of the foot. As this becomes comfortable, increase the hold to 10, then 15, then 20 seconds.

**12 Step-up**

3 sets of 10, build to 3 sets of 15

Step up onto a low step or thick book leading with the affected leg, then step back down under control. Keep the knee tracking over the middle of the foot and do not let it fall inward. Increase the step height gradually.

Activity

**Modify, do not stop**

Reduce and modify your activity rather than eliminating it completely. Deep squatting, lunging, stair descent, hills and running tend to load the kneecap most. A good rule of thumb is to temporarily cut the volume of whatever is provoking your pain and use the same 0 to 3 rule to guide modifications.

Load the kneecap most

Deep squatting

Lunging

Stair descent

Hills

Running

**If you run**

If you run you **may need to stop or modify length/technique**. Some tips include reducing weekly mileage and taking slightly shorter, quicker steps. These may allow you to keep running while the knee settles, but in some cases you will need to avoid running for a period of time.

**Good to know**

Recovery is usually quickest with rest from the offending activity. That said, continuing sport or an aggravating activity does not usually lead to irreversible problems or lasting damage. This is a question of how quickly you want to get better rather than of causing harm.

**At the gym**

- ⊗ At the gym, **avoid the leg extension machine** where you sit with the knee bent and straighten it against weight at the ankle. Also **avoid deep squats and lunges** until the knee tolerates the exercises above.
- ✓ The **leg press** is usually a better option, kept within a shallow range of about 0 to 45 degrees of knee bend.

**When You Are Ready for More**

Once the exercises above are comfortable and pain stays at or below 3, the next steps are deeper and single-leg loading: squats to progressively greater depth, split squats and lunges, single-leg squats, and step-downs from increasing heights. For athletes returning to running or cutting sport, jumping and landing work is added last. These are harder on the kneecap than anything above, so they come after the foundation is built and often under the supervision of a physical therapist if needed.

Exercise Log

Week	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Pain 0–10
1	☐	☐	☐	☐	☐	☐	☐	
2	☐	☐	☐	☐	☐	☐	☐	
3	☐	☐	☐	☐	☐	☐	☐	
4	☐	☐	☐	☐	☐	☐	☐	

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Dr. Sailesh Tummala is an orthopaedic surgeon at Stanford Health Care and a clinical assistant professor at Stanford University School of Medicine with fellowship training in sports medicine and shoulder surgery. A former collegiate basketball player, he cares for athletes and active patients of all ages and emphasizes nonoperative care while also offering minimally invasive and complex reconstructive surgery. He has authored more than 100 peer-reviewed papers and has received grant funding for his research. He assists with teams at all levels across the Bay Area, including the Stanford men's basketball and football teams.



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Stanford profile

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