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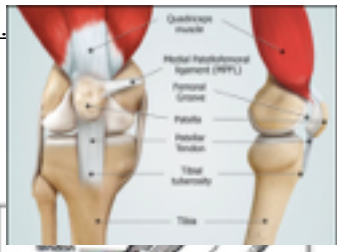
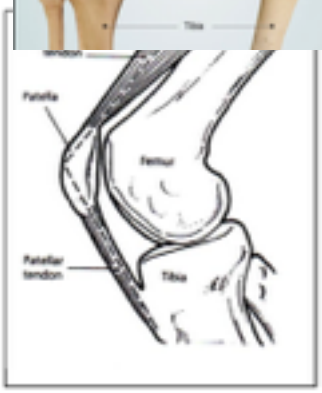


PATELLOFEMORAL INSTABILITY (SUBLUXATION ANDDISLOCATION)



Anatomy and Function
The knee joint is composed of two distinctly separate articulations. The tibiofemoral joint is formed by the thigh bone (**femur**) meeting the shin bone (**tibia**). The patellofemoral joint is formed by the kneecap (**patella**) gliding along a groove (**trochlea**) of the femur. The quadriceps muscles in the front of the thigh attach to the patella and continue via the patellar tendon to insert into the tibia. When the quadriceps muscles contract, the knee straightens (extends). The patella protects the knee from a direct blow and, more importantly, creates a fulcrum that increases the mechanical efficiency of the action of the quadriceps muscles.

Patellofemoral Alignment
Multiple aspects go into patellar instability including: the q-angle(quadriceps angle), alta or baja, trochlear dysplasia, TT-TG distance, rotation of the femur as well as the tibia, dynamic muscular forces. With abnormalities of the aforementioned structures the patella can partially dislocate (**subluxate**) or completely **dislocate** from a direct sideways blow to the knee or if the Q-angle temporarily increases too much due to outward rotation of the leg and foot (such as when pivoting).

Diagnosis of Patellofemoral Instability
Pain in the front of the knee and a sensation of "looseness" of the kneecap are common complaints. If the patella partially dislocates (subluxates) the knee will "give-way" or buckle. If this condition is suspected, Dr. Nelson may order x-rays of your knee that will show the position of the patella in the trochlear groove. Patellar tracking can be tested during the physical examination.

Non-operative Treatment
Non-operative treatment consists of the following:
- Bracing and lateral knee supports to help hold the patella in place.
- Exercises to strengthen the quadriceps muscles
- Activity modification - avoiding excess pivoting sports

Operative Treatment
Operative treatment for patellofemoral instability consists of surgery to re-align the patella and to decrease the Q-angle. Surgical treatment can be divided into two basic types:

Proximal re-alignment procedures
- Proximal re-alignment consists of making a small incision at the knee and lengthening the restraining structures on the outside of the patella and/or shortening the ligaments on the inside of the patella. This procedure is usually used in young patients in whom the growth plates are still open. Proximal re-alignment is often done in combination with a distal re-alignment procedure.

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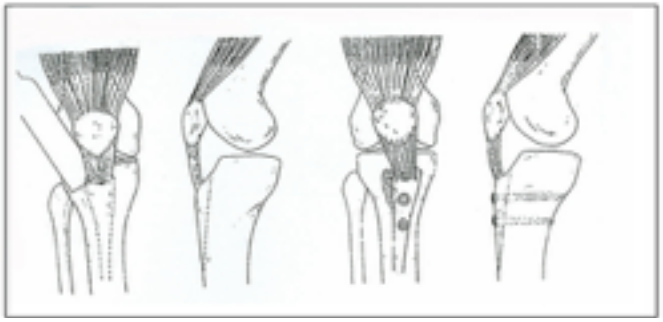
- Another option to proximal re-alightment consists of making small incisions along the inside of the knee to reconstruct the medial patellofemoral ligament (MPFL). This procedure is utilized on patients who have normal alignment and have incompetent medial soft tissue structures.

Distal re-alignment procedures

- Distal re-alignment consist of making a small incision over the upper tibia. The surgeon then uses a bone-cutting instrument to cut the tibial tubercle (to which the patellar tendon attaches) so that the bone and patellar tendon can be moved medially or toward the inside of the knee. The piece of bone is reattached to the tibia using two screws. This procedure re-aligns the pull of the quadriceps muscles across the knee by **decreasing** the Q-angle. After surgery a knee brace is worn to protect the knee for about six weeks until the bone is healed. You may bear partial weight on the leg when using the immobilizer and crutches when you are comfortable doing so. The two screws can be removed when the bone is completely healed (after about six months) if they are tender.



Results of Surgery and Risks

Results of both proximal and distal patellar re-alignment procedures are good when performed on appropriately selected patients. In patients who have pre-existing injury to the joint surfaces (such as chondromalacia), knee pain and crepitus (joint noise) can persist. In most instances, however, knee function improves after surgery due to better knee mechanics.

Risks of surgery:

- wound infection
- continued pain
- delayed bone healing
- loss of motion

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PATELLAR RE-ALIGNMENT SURGERY PREOPERATIVE INSTRUCTIONS

Here are guidelines that will help you prepare for surgery that will re-align your patella.

WITHIN ONE MONTH BEFORE SURGERY:

Dr. Nelson will see you in the office. A preoperative history and physical examination will be completed. He will write preoperative hospital orders and order laboratory tests. These tests usually include a complete blood count (and also electrocardiogram for patients over 40 years old.)

THE DAY BEFORE SURGERY:

Please contact the doctor's office to get the exact time you should report to the hospital for surgery. **You can have nothing to eat or drink after midnight on the evening before surgery**. It is very important to have a completely empty stomach prior to surgery for anesthesia safety reasons. If you have to take medication, you can take the medication with a sip of water early in the morning prior to surgery (but later tell the anesthesiologist you have done so).

THE DAY OF SURGERY:

Please bring any crutches, brace, ice machine, or imaging studies that you have received.

SURGERY:

If a problem inside of the knee is suspected (such as chondromalacia), arthroscopy may be done in addition to open surgery to re-align the patella. After anesthesia has been given,
your knee will be cleaned and sterile drapes will be placed. To perform the patella realignment, a small incision will be made below the knee joint on the outer side of the upper tibia. The doctor will divide the tibial tubercle (where the patellar tendon inserts into bone) and move the tibial tubercle medially about one-half inch. The bone will be fixed in it's new position using two screws.

AFTER SURGERY:

You will be given a prescription for **pain medication** to take home with you. The pain medication has a tendency to make you constipated while you are taking it and occasionally can cause nausea. In addition to pain medication you should take one **aspirin** a day to help prevent blood clots (phlebitis) unless there is a reason to avoid aspirin. You will have a **knee brace** applied to protect the knee. The brace can be removed for washing and sleeping, but should be used when you are up and walking for about six weeks. You can use crutches for the first week or two to take excess pressure off of the knee. The **dressing** will be changed the day following surgery and can be removed at two days. The wound is sealed with steri-strips (small pieces of tape on the skin). You can **shower** on the second day following surgery, but be careful standing in the shower so you do not fall. It is better to have a small stool to be able to sit on. You can get the incision wet and wash the knee. If the lower leg swells, elevate the leg or use below-knee **elastic stockings** to control swelling. If you develop calf pain or excessive swelling in the leg, call the doctors office. The **cryocuff** is a blue wrap that is sometimes put on the knee to make it easier to keep it cold. You can use the cryocuff or ice packs as often as you want to cool down the knee to reduce swelling and pain.

OFFICE VISIT

Please arrange an office visit approximately one week after surgery for suture removal and further instructions.

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Rehabilitation After Patellar Realignment Surgery

Phase One: the first week after surgery

Goals:

1. Control pain and swelling
2. Initiate knee motion
3. Activate the quadriceps muscles

Guidelines and Activities:

1. You will go home with crutches and a knee immobilizer. You can bear full weight and **walk** on the leg with the immobilizer and your crutches unless otherwise instructed by Dr. Nelson.
2. Apply **cold** to reduce pain and swelling. Use ice on the knee 20 minutes/on and 20 minutes/off for the first day when awake. Then apply cold as often as needed for 15 to 20 minutes at a time for the next several days. Place a towel or cloth between the skin and the ice to prevent skin injury.
3. Wrap an **elastic bandage** (ace) around the knee at other times to control swelling.
4. You may **shower** and get your incision wet. Do not soak the incision in a bath tub or Jacuzzi until the stitches have been removed.
5. Take an **aspirin** each morning, unless there is a reason not to take aspirin.

Exercise Program:

QUADRICEPS SETTING -
to maintain muscle tone in the thigh muscles (quadriceps) and straighten the knee. Lie on your back with your knee extended fully straight as in figure. Tighten and hold the front thigh muscles making the knee flat and straight. If done correctly, the kneecap will slide slightly upward toward the thigh muscles as the muscles contract. The tightening action of the quadriceps should make your nee straighten and be pushed flat against the bed or floor. Hold for five seconds for each contraction. Do 20 repetitions whenever you think about it (many times a day).

STRAIGHT LEG RAISE- Lay flat on back, unaffected knee bent to 90 degrees. Keep involved leg straight and raise it so that your thighs are equal. Hold for count of 6. Perform 3 sets of 15 reps. Add 1-2 pounds to your ankle until you can reach your goal weight of 5-10 pounds.

ANKLE PUMPS - move the foot up and down to stimulate circulation in the leg.
Do at least 10 ankle pump exercises each hour.

OFFICE VISIT

Please return to see Dr. Nelson approximately **10-14 days** after your surgery. At this time, your sutures will be removed and your progress will be checked. You will see the physical therapist for exercise instruction.

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Rehabilitation After Patellar Realignment Surgery

Phase two: Two to six weeks after surgery

This protocol is a guideline for your **rehabilitation after patellar re-alignment surgery**. You may vary in your ability to do these exercises and to progress from one phase to the other. Please call your doctor if you are having a problem with your knee or if you need clarification of these instructions.

GOALS:

1. Protect the patellar re-alignment – avoid falling
2. Ensure wound healing
3. Maintain full knee extension (knee straight)
4. Initiate passive knee flexion exercises
5. Decrease swelling in the knee and leg
6. Promote activation of the quadriceps muscle
7. Avoid blood pooling in the leg

ACTIVITIES:

BRACE/CRUTCHES

Use the knee brace (immobilizer) when you get out of bed and walk. The brace is set for full extension (straight). You can put your full weight on your operated leg while wearing the immobilizer. You should use the crutches if you need extra support when you are walking. After one or two weeks, you can begin to using one crutch on the side opposite of your surgery if you are comfortable and gradually stop using the crutch when the knee feels strong enough to do so (but continue to use the knee immobilizer).

COLD APPLICATION (CRYOCUFF OPTIONAL)

Fill the blue cryocuff by putting ice water in the container and elevating the container above the knee so the cold water runs into the cryocuff. Use the cryocuff for 20 minutes at a time whenever you want to, but especially after exercising. If you do not have a cryocuff, put ice into a plastic bag. Put a thin towel over the knee and apply the ice pack.

Exercise Program

Perform daily

Quadriceps set	3 sets of 10 reps
Heel slides	3 sets of 10 reps
Straight leg raise	3 sets of 10 reps
Short arc lift	3 sets of 10 reps
Standing toe raise	3 sets of 10 reps
Hip abduction	3 sets of 10 reps
Ankle pumps	10 times an hour

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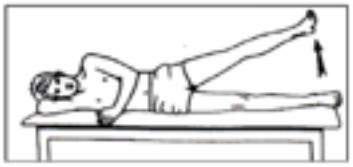
HEEL SLIDES - to regain the bend (flexion) of your knee**.** Keep brace on 0-30 degrees of flexion for TTO 0-90 for MPFL.
While lying on your back, use your muscles to slide your heel backward to bend the knee. Keep bending the knee until you feel a stretch in the front of the knee. Hold this bent position for five seconds and then slowly relieve the stretch and straighten the knee. While the knee is straight, you may repeat the quadriceps setting exercise.

SHORT ARC LIFT-Place 2-3 towels rolled up under the knee to the affected knee. This will have the knee bent to 30 degrees. Bring the leg up into full extension. Hold for a count of 6 and repeat 3 sets of 10 repetitions.

STANDING TOE RAISES
With the knee brace on, use a table for support and balance. Tighten the quadricep to hold the knee fully straight.Raise up on 'tip-toes' while maintaining the knees in full extension. Hold for one second, then lower slowly to the starting position.

HIP ABDUCTION - lie on your unoperated side. Keep the knees fully extended. Raise the operated limb upward to a 45 degree angle as illustrated. Hold one second, then lower slowly. Repeat 20 times, once or twice a day



ANKLE PUMPS - move your foot up and down at the ankle to stimulate circulation in the leg. You should do at least 10 ankle pump exercises each hour.

OFFICE VISIT
Please return to see Dr. Nelson approximately six weeks after your surgery.

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Rehabilitation After Patellar Realignment Surgery

Phase three: 6 to 12 weeks after surgery Goals:

1. Walk normally
2. Regain full motion
3. Regain full muscle strength

Activities:

1. Continue the brace opened from 0-120 degrees of motion.
2. Bear full weight and **walk** on the leg. Try to avoid limping and walk slowly but normally.
3. Continue to ice the knee if there is pain and swelling. Place a towel or cloth between the skin and the ice to prevent skin injury.

Exercise Program

The following exercise program will help you regain knee motion and strength. If the exercises can be performed easily after the first week, then an ankle weight may be used to increase the resistance of the exercise and to build strength. Start with one pound and add one pound per week until you reach five pounds.

Do the exercises daily for the first week, then decrease to every other day when using ankle weights. You may ride the stationary bicycle daily for 10 to 20 minutes.

Avoid using stair-stepper machines, doing deep knee bends and squats or any exercise that causes crunching, clicking or pain at the kneecap.

Quadriceps set	3 sets of 10 reps
Heel slides	3 sets of 10 reps
Straight leg raise	3 sets of 10 reps
Short arc lift	3 sets of 10 reps
Standing hamstring curl	3 sets of 10 reps
Standing toe raise	3 sets of 10 reps
Hip abduction	3 sets of 10 reps
Wall slides	3 sets of 10 reps

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STATIONARY BICYCLE
Utilize a stationary bicycle to move the knee joint and increase knee flexion.
If you cannot pedal all the way around, then keep the foot of your operated leg on the pedal, and pedal back and forth until your knee will bend far enough to allow a full cycle. Most people are able to achieve a full cycle revolution backwards first, followed by forward. You may ride the cycle with no resistance for 10 to 20 minutes a day. Set the seat height so that when you are sitting on the bicycle seat, your knee is fully extended with the heel resting on the pedal in the fully bottom position. You should then ride the bicycle with your forefoot resting on the pedal.

STANDING HAMSTRING CURL-Stand facing the wall, using the wall for balance and support.While standing on the non operative limb, bend the knee of the operated side and raise the heel toward the buttock. Hold this flexed position for one second. Slowly lower the foot back to the floor. Keep the thighs aligned as illustrated.

WALL SLIDES
Stand upright with your back and buttocks touching a wall.
Place the feet about 12 inches apart and about 6inches from the wall.
Slowly lower your hips by bending the knees and slide down the wall until the knees are flexed about 45 degrees (illustration). Pause five seconds and then slowly slide back up to the upright starting position.

OFFICE VISIT
Please make an appointment with Dr. Nelson's office at 12 weeks after surgery.

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Rehabilitation after Patellar Realignment

Phase four: twelve weeks after surgery onward

ACTIVITIES

1**. Walking/Stairs**
You should be walking without the aid of a brace or crutches. If you feel confident walking on the operated limb and have good strength and knee motion, you can begin attempting to walk up-stairs on the operated limb. It is not recommended that you lower yourself down- stairs on the operated limb until you have regained your strength in operative leg.

2. **Knee Support – for excess activities**
Buy an elastic knee sleeve (made of neoprene rubber) at a sporting goods store. It should have an opening for the kneecap and velcro straps but does not need hinges on the sides. Use this support if you are on your feet for a prolonged period of time.

3**. Stationary Bicycle – good exercise**
Utilize a stationary bicycle to both strengthen the thigh muscles and increase knee flexion. If you cannot yet pedal all the way around, then keep the foot of your operated leg on the pedal, and pedal back and forth until your knee will bend far enough to allow a full cycle. You may ride the cycle with mild resistance for up to 10 minutes a day. Set the seat height so that when you are sitting on the bicycle seat, your knee is fully extended with the heel resting on the pedal in the fully bottom position. You should then actually ride the bicycle with your forefoot resting on the pedal.

4. **Swimming –good exercise**
Swimming is good exercise at this time, if available.

5. **Exercises**
You should add strength training exercises, every other day, as instructed by the physical therapist. In addition, in line running may be added.

Principles of Strength Training

- Warm-up prior to exercising by stationary cycling or other means
- You are "warmed –up" when you have started sweating
- Gently stretch all muscle groups next
- Do exercises involving multiple muscle groups first and individual muscle groups last
- Do aerobic workouts ***after*** strength workouts
- Cool-down by stretching after finishing exercise

Avoid the following exercises unless your therapist has deemed you:

1. Knee extension weight lifting machine
2. Running
3. Jumping
4. Pivoting or cutting
5. Lunges
6. Stairmaster
7. Step exercises with impact

OFFICE VISIT

Please make an appointment to see Dr. Nelson in 12 weeks (6 months after surgery).

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Dr. Nelson's Quad/Patellar Tendon Repair Rehabilitation Protocol

	WEEK											MONTH			
Diagnosis:															
Procedure date:	**S/P:**														
	1	2	3	4	5	6	7	8	9	10		3	4	5	6
PHASE 1 EXERCISES (week 0-2)															
No knee motion, TDWB with crutches	•	•													
Quad sets	•	•	•	•	•	•	•	•	•	•					
Straight leg raise with brace on	•	•	•	•	•	•									
Ankle pumps	•	•	•	•	•	•	•	•	•	•					
PHASE 2 EXERCISES (week 3-6)															
ROM from 0-90 for MPFL 0-30 TTO, in brace,			•	•	•	•	•	•	•	•					
WBAT extension with crutches			•	•	•	•	•	•	•	•					
Heel slides			•	•	•	•	•	•	•	•					
Short arc lift			•	•	•	•	•	•	•	•					
hip abduction			•	•	•	•	•	•	•	•					
standing toe raises with brace locked in extension			•	•	•	•	•	•	•	•					
PHASE 3 EXERCISES (week 6-12) continue prior +															
Motion as tolerated if healing on XR						•	•	•	•	•		•			
Standing hamstring curl						•	•	•	•	•		•			
Wall slides						•	•	•	•	•		•			
Start stationary bike when motion is 110						•	•	•	•	•		•			
PHASE 4 (weeks 12-and on) continue previous plus															
Elastic sleeve for first 6 months contact sports year												•	•	•	•
Stationary bike												•	•	•	•
Swimming												•	•	•	•
Squat to chair												•	•	•	•
Step up/down exercise												•	•	•	•
one leg toe raises												•	•	•	•
Stretch hamstring, quads and calves												•	•	•	•
Leg press													•	•	•
resisted hamstring curls													•	•	•
Add additional weight training and sport specific exercise														•	•

Call or email Dr. Nelson with any concern

Additional Instructions: