

**Dr. Ryan Nelson**  
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## **Mosaicplasty and OATS Rehabilitation Protocol**

### **PHASE 1: 0 – 2 weeks after surgery**

You will go home with **crutches and possibly a cryocuff cold therapy unit.**

### **GOALS:**

1. Protect the cartilage transfer – avoid weight bearing if instructed to do so
2. Ensure wound healing
3. Attain and maintain full knee extension
4. Gain knee flexion (knee bending) to 90 degrees
5. Decrease knee and leg swelling
6. Promote quadriceps muscle strength
7. Avoid blood pooling in the leg veins

### **ACTIVITIES:**

**Extension** (knee straight) **It is very important that you straighten the knee completely!**

### **BRACE/CRUTCHES**

You will wear a knee brace, which is set to allow your knee to bend only 30 degrees for patellar and trochlear lesions and 90 for all other lesions and straighten fully. Use it when walking and put as much weight on your operated leg as possible (without pain) when walking. You should use the crutches in the beginning, but can discontinue the crutches when you have confidence in the knee to support you.

### **CRYOCUFF (COLD APPLICATION)**

If you are experiencing pain, swelling, or discomfort, we suggest icing for 15-20 minutes with at least a 60-minute break in between. Use your cryocuff or place ice in a zip lock bag and/or in a towel and apply to the injured area. Never place ice directly on the skin.

### **WOUND CARE**

Remove your bandage on the second morning after surgery but leave the small pieces of white tape (steri-strips) across the incision. You can wrap an elastic bandage (ace) around the knee at other times to control swelling. You may now shower and get your incision wet, but **do not** soak the incision in a bathtub or Jacuzzi until the stitches have been removed.

### **ASPIRIN / ELASTIC STOCKINGS**

Take an aspirin each morning, you may also wear an elastic stocking (TED) below the knee, and do at least 10 ankle pump exercises each hour to help prevent phlebitis (blood clots in the veins).

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**FREE / MACHINE WEIGHTS**

**Upper Body/Trunk Only**

We suggest that you do not use any lower extremity free or machine weights. If you are doing free or machine weights for the upper body and trunk, we suggest a very light resistance of 3 sets of 15-20 repetitions. Do not place yourself in a compromising position with your recently operated knee.

**EXERCISE PROGRAM**

Perform 2x daily

Quadriceps sets	3 sets of 10 reps
Heel Prop	5 minutes
Heel slides	20 reps
Sitting Heel Slides	20 reps
Ankle pumps	10 times an hour

**Quad Sets-** Isometric exercise. This can be done where ever the knee is straight. (laying in bed, standing, or reclined in the lazy-boy) Tighten up your thigh muscle as tight as you can make it. Hold for a count of 10. Relax and repeat 3 sets of 10 repetitions.



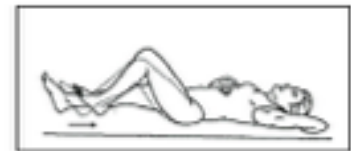
**HEEL PROP-** to straighten (extend) the knee.

Lie on your back with a rolled up towel under your heel or sit in a chair with the heel on a stool as shown in the figure. Let the knee relax into extension (straight). If the knee will not straighten fully, you can place a weight (2 to 5 pounds) on the thigh, just above the kneecap. Try to hold this position for 5 minutes. While maintaining this extended position, practice quadriceps setting.



**HEEL SLIDES -** to regain the bend (flexion) of the knee.

While lying on your back, actively 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 5 seconds and then slowly relieve the stretch and straighten the knee. While the knee is straight, you may repeat the quadriceps setting exercise.



**SITTING HEEL SLIDES -** to regain the bend (flexion of the knee).

When sitting in a chair, slide the heel backward as if trying to get the foot



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underneath the chair. Hold 5 seconds and slowly relieve the stretch by sliding the foot forward. You can help with the opposite foot if necessary.

**ANKLE PUMPS** - 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 **10-14** after your surgery. At this time, your sutures will be removed and your progress will be checked.

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## **Mosaicplasty and OATS Rehabilitation Protocol**

### **Phase Two: 2 to 6 weeks after surgery**

#### **Goals:**

1. Protect the knee from overstress and allow healing
2. Regain full motion
3. Begin muscle strengthening

#### **Brace and Crutches:**

You will wear a knee brace, which is set to allow your knee to bend only 30 degrees for patellar and trochlear lesions and 90 for all other lesions and straighten fully. Use it when walking and put as much weight on your operated leg as possible (without pain) when walking. You should use the crutches in the beginning, but can discontinue the crutches when you have confidence in the knee to support you.

#### **Exercise Program**

The following exercise program should be followed as directed by Dr. Nelson or the physical therapist. Do the exercises daily unless otherwise noted.

#### **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. You may ride the cycle with no resistance for 20 to 30 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.

Days per week 5-7 Times per day: 1

Quadriceps set	3 sets of 10 reps
Heel prop	5 minutes
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

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**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.



**Short Arc Knee Extension-** 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 15 repetitions. Add weight just like #1 until the goal weight is reached of 10-12 pounds.



**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. Repeat 20 times.



**Standing toe raise-** Stand facing a wall, hands on the wall for support and balance. Keep the knees extended fully. Tighten the quadriceps 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. Repeat 20 times.



**Hip Abduction-** Lie on your non operative side. Keep the knees fully extended. Raise the operated limb upward to a 45 degree angle as illustrated. Hold one second, and then lower slowly. Repeat 20 times.



## **OFFICE VISIT**

Please make an appointment with Dr. Nelson's office at 6 weeks after surgery.

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## **Mosaicplasty and OATS Rehabilitation Protocol**

### **Phase three: 6-12 weeks after surgery Goals:**

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

### **Activities:**

1. You may discontinue the knee brace (patellar/trochlear patients) at this time.
2. Progressively bear full weight and **walk** on the leg. Try to avoid limping and walk slowly but normally. Start by walking with full weight and both crutches for 3 to 5 days. If pain free, then wean to one crutch on the opposite side of surgery for 3 to 5 days. Discontinue the crutch after that when you can walk normally with no pain or limp
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.

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.

### **EXERCISE PROGRAM** (see phase 2 for descriptions and illustrations)

Days per week-5-7 Times per day 1

Quadriceps set	3 sets of 10 reps
Heel prop	5 minutes
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

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Hip abduction	3 sets of 10 reps
Wall slides	3 sets of 10 reps

### **WALL SLIDES**

Stand upright with your back and buttocks touching a wall.

Place the feet about 12 inches apart and about 6 inches 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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## **Mosaicplasty and OATS Rehabilitation Protocol**

### **Phase four: Twelve weeks after Surgery onward**

#### **Goals:**

1. Regain full muscle strength
2. Gradual return to full activity

#### **Cycling**

Days per week: 3-4 Times per day: 1 Duration 30-45 minutes

Stationary or outdoor (mountain or road bikes) (Stay on flat terrain and remain on seat)

Indoors- Brace off

Outdoors- Brace ON

#### **Stretching Exercises**

Times per day: 1-2 Days per week: 5-7

Hamstring stretch	3-5 reps holding 15-30 seconds
Quadriceps stretch	3-5 reps holding 15-30 seconds
Calf Stretch	3-5 reps holding 15-30 seconds

#### **Hamstring Stretch**

Perform this stretch against a table or chair. Bend slowly forward at the hips, keeping the knee fully extended until you feel gentle stretch in the back of your thigh and knee. Hold the stretch for 15 to 20 seconds and repeat 3 to 5 times.

#### **Quadriceps Stretch**

This stretch is performed on your stomach or standing. Lean gently backward as if bringing you heel toward the buttock. When a stretch is felt in the front of the thigh and knee, hold 15 to 20 seconds for 3 to 5 repetitions.

#### **Calf/Achilles Stretch**

Keep the heel flat on the floor and the knee fully extended. Lean forward at the hips with the arms supporting your weight. When you feel a gentle stretch in the back of your calf and knee, hold for 15 to 20 seconds, 3 to 5 repetitions.



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## Exercises

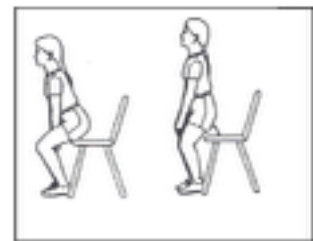
### Range of Motion and Strengthening Exercises

Days per Week: 3 Times per Day: 1

Straight leg raise	3 sets of 10 reps
Hip abduction	5 minutes
Short arc lift	3 sets of 10 reps
Squat to chair	3 sets of 10 reps
Wall slides	3 sets of 10 reps
Leg press	3 sets of 10 reps
Hamstring curls	3 sets of 10 reps
Step up down exercise	3 sets of 10 reps

### Squat to Chair

In the chair squat exercise, you lower your buttocks toward the chair until your buttocks touch the chair. Do not sit or rest at the chair, but instead immediately and slowly return to the standing and starting position. Remember to keep your head over your feet and bend at the waist as you descend. **For patellar/trochlear patients**, do only a partial squat about 1/3 way to the chair. The angle at the knee should not exceed 30 degrees to avoid excess stress on the healing cartilage. Do not do this exercise if there is pain or grinding at the kneecap. After the first week, you may hold dumbbells while performing this exercise and the wall slide. Start with 3 to 5 pounds each hand. You may add 2 to 3 pounds per week until you reach 10 pounds in each hand. 3 sets of 10 to 15 repetitions.

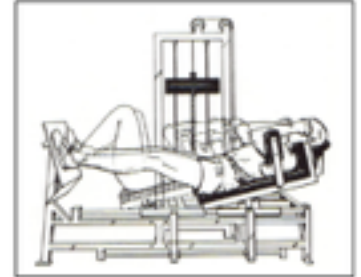


### Seated Leg Press ( patellar and trochlear patient DO NOT do this exercise)

Use an amount of weight that feels easy enough to perform 20 repetitions as the starting weight for this exercise. Use this weight for the first week before raising the weight. The weight may be

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increased by about 5 pounds every 7 to 10 days thereafter, as long as you can perform 20 repetitions per set for 3 sets. In this exercise, avoid letting the knees **snap** or drop suddenly into extension when reaching the fully straightened position. Avoid starting the exercise with the knees excessively bent. Do not bend the knee so far that your calves and back of thighs touch. Adjust the seat position to limit the excursion of the machine.



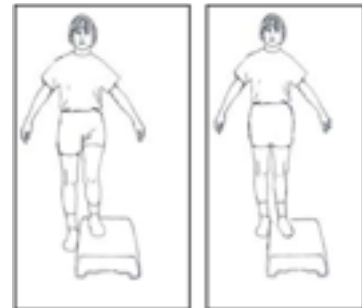
### **Resisted Hamstring Curls**

If you have access to a hamstring curl machine (illustration), you may start using it. As with the leg press, start with a reasonable weight and use that weight for the first week. You may increase the weight by 3 to 5 pounds every 10 days as long as you can perform 3 sets of 20 repetitions slowly, with good form. If you do not have access to a hamstring machine, continue doing the standing hamstring curl adding an ankle weight for resistance. Start with 3 to 5 pounds and add 1 pound per week until you build to 10 pounds for 3 sets of 15 repetitions.



### **Step Up- Down Exercise**

Place the foot of the operated limb on a stool or step. Maintain balance, if necessary, by holding onto the wall or a chair (illustration). Standing sideways to the step, slowly lower the opposite foot to touch the floor. Do not land on the floor, just touch gently and then step up onto the stool by straightening the knee using the quadriceps muscles. Try to keep an upright posture and avoid bending forward during the exercise. When doing a step up-down, you should position your thigh so that your kneecap is in line with the tip of your shoe, or your second toe. Do 3 sets of 10 to 15 repetitions.



### **Progression for Step Up-Down Exercise**

Start with a step of 3 inches in height. Start with 3 sets of 5 repetitions. Add one repetition per set, per workout, until you can do 3 sets of 10 (about 2 weeks) If pain free, progress to a step of 6 inches in height. Repeat the above progression starting with 3 sets of 5 repetitions. Add one repetition per set, per workout, until you can do 3 set of 10 (about 2 weeks). If pain free, progress to a step of 9 inches in height (the height of a standard stair). Repeat this process of progression from 3 sets of 5, to 3 sets of 10 (about 2 weeks).

### **Additional Weight Training**

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Hip Abductor/Adductor machine Roman Chair  
Calf Raise Machine Precautions When Exercising

- Avoid pain at the patellar tendon site
- Avoid pain and/or crepitus at the patella
- Build up resistance and repetitions gradually
- Perform exercises slowly avoiding quick direction change and impact loading
- Exercise frequency should be 2 to 3 times a week for strength building
- Be consistent and regular with the exercise schedule

### **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:

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).

