Post-Operative Instructions
Tibial Tubercle Osteotomy and Open Osteochondral Allograft Transplantation for Femur/Patella

Day of surgery
A. Diet as tolerated
B. Icing is important for the first 5-7 days post-op. While the post-op dressing is in place, icing should be done continuously. Once the dressing is removed on the third post-operative day, ice is applied for 20-minute periods 3-4 times per day. Care must be taken with icing to avoid frostbite. Alternatively, Cryocuff or Game-ready ice cuff can be used as per instructions.
C. Pain medication as needed every 4 hours (refer to pain medication sheet).
D. Make sure you have a physical therapy post-op appointment scheduled during the first week after surgery.

Video instructions for your brace can be found at https://www.youtube.com/watch?v=jyRZkSyFBOQ

First Post-Operative Day
A. Continue ice pack every 1-2 hours while awake or at least twenty minutes prior to and after exercise session.
B. Pain medication as needed.

Second Post-Operative Day Until Return Visit
A. Continue ice pack as needed.
B. Unless otherwise noted, weight-bearing is toe-touching only for the first 4 weeks after surgery. After 4 weeks, you can bear as much weight on the affected leg as you can tolerate. Most patients use crutches for the first 2-3 weeks.
C. Call our office @ 646-501-7223 option 4, option 2 to confirm your first postoperative visit, which is usually about 1-2 weeks after surgery if you have not been given a time. If you are experiencing any problems, please call our office or contact us via the internet at www.newyorkortho.com.

Third Post-Operative Day
A. You may remove surgical bandage and shower this evening. Apply 4x4 (or similar size) waterproof bandage to these wounds prior to showering and when showering is complete apply fresh waterproof bandage. Please ensure that the bandage is large enough to completely cover the incision. You will need to follow this routine for 2 weeks after surgery.
Rehabilitation Protocol Following Osteochondral Allograft or Autograft Transplantation (OATS)

There are two types of cartilage in the knee—meniscus and articular cartilage. There are two menisci in the knee—a medial meniscus and a lateral meniscus. These menisci are semi-lunar wedges that sit between the femur (thigh bone) and tibia (shin bone). The menisci are primarily composed of fibrocartilage, with about 75% of the dry weight being Type I collagen. The function of the menisci is to protect the other type of cartilage in the knee—the articular cartilage.

The articular cartilage is a layer of hyaline cartilage that covers the end of bones that articulate with other bones. In the knee you have articular cartilage on the end of the femur (femoral condyles), the top of the tibia (tibial plateau) and the back of the knee cap (patella). The articular cartilage has a frictional coefficient approximately one fifth of ice on ice (i.e. rubbing articular cartilage on articular cartilage would be five times smoother than rubbing ice on ice.) This allows for a very smooth gliding surface. A large portion of articular cartilage is fluid, which provides significant resistance to compressive forces.¹

During athletic trauma or injury, focal areas of the articular cartilage can be damaged or torn, exposing the subchondral bone. This is referred to as an articular cartilage lesion (Figure 1). When this happens you lose the normal smooth gliding articulation and the ability to resist compressive forces at the joint. These changes can cause pain, swelling, loss of motion, weakness and reduced function or performance.

The osteochondral autograft transplantation (OATS) procedure involves transplantation of plugs of bone with overlying articular cartilage (Figure 3) from areas of relatively no weight bearing (Figure 2) to weight bearing areas of the knee which have articular cartilage loss.² An allograft (cadaver) plug is also an option that can be used to fill the lesion. The size of the harvested plug is sized to match that of the injury/lesion. These plugs are then press t into holes created at the lesion. This can be done with a single large plug (Figure 4) or several smaller plugs (Figure 5). Initially these plugs can be susceptible to getting pushed in further, thus weight bearing is restricted for the rest six weeks to ensure that the cartilage plug heals “flush” with the rest of the cartilage surface.²

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¹ Figure 1 Full thickness articular cartilage lesion on the femoral condyle of the knee, exposing the subchondral bone plate
² Figure 2 Donor site from area of relatively no weight bearing
³ Figure 3 A harvest bone plug with overlying articular cartilage (removed from donor site, Figure 2)
Rehabilitation Protocol After OATS

The OATS procedure is currently the only procedure that restores the normal hyaline articular cartilage to the injured knee. Microfracture and chondroplasty procedures attempt to fill in the chondral defects with fibrocartilage. Research has shown that fibrocartilage is more likely to deteriorate over time, and that the chance of returning to sports is greater with the OATS procedure. A study by Gudas et al. found that 93% of patients who had an OATS procedure were able to return to their pre-injury level of sports versus 52% who underwent microfracture. The ability to return to sport is also dependent on the size of the lesion (or degree of injury), patient age, patient size (BMI), associated injuries and length of time that the injury has been present. For some patients the goal will be to return to daily activities without pain, for others it may be returning to sports.

Initially post-operative rehabilitation will focus on regaining range of motion and protecting the healing plugs. As the rehabilitation progresses the focus shifts to regaining strength and movement control. Developing the muscular ability to reduce force will help decrease stress to the articular surfaces. In the final phase of rehabilitation the athlete will work on regaining movement control with change of direction activities, such as cutting and pivoting. This is imperative to prevent increase shear stresses on the articular cartilage.

The rehabilitation guidelines are presented below in a criterion based progression. Specific time frames, restrictions and precautions are given to protect healing tissues and the surgical repair/reconstruction. General time frames are also given for reference to the average, but individual patients will progress at different rates depending on the size and location of the chondral lesion, their age, associated injuries, pre-injury health status, and rehabilitation compliance. Specific attention must be given to impairments that caused the initial problem. For example if the patient is status post medial compartment OATS procedure and they have a varus alignment, post-operative rehabilitation should include correcting muscle imbalances or postures that create medial compartment stress.
## Rehabilitation Protocol After OATS

### Phase I (Surgery to 6 weeks after surgery)

<table>
<thead>
<tr>
<th>Goals</th>
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<tbody>
<tr>
<td>Protection of knee after surgery</td>
<td></td>
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<tr>
<td>Restore normal knee ROM (range of motion)</td>
<td></td>
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<tr>
<td>and patellar mobility</td>
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<tr>
<td>Restore full control over leg</td>
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<tr>
<td>Bracing</td>
<td></td>
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<tr>
<td>Week 1: Hinged knee brace locked in extension; removable for CPM &amp; rehab</td>
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<tr>
<td>Weeks 2-6: Gradually open brace in 20° increments as quad strengthens</td>
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<tr>
<td>D/C brace when able to perform straight leg raise w/o extension lag</td>
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<tr>
<td>Range of Motion Exercises</td>
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<tr>
<td>Continuous Passive Motion (CPM) Machine: 6-8 hours per da, 6-8 weeks</td>
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<tr>
<td>Set CPM to 1 cycle per minute, starting at 40° flexion</td>
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<tr>
<td>Advance 10° per day until flexion is achieved (goal: 100° by week 6)</td>
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<tr>
<td>PROM/AAROM and stretching under guidance of PT</td>
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<tr>
<td>Therapeutic Exercises</td>
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<tr>
<td>Patellar mobilization</td>
<td></td>
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<tr>
<td>Quad/hamstring/adductor/gluteal sets: straight leg raise, ankle pumps</td>
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<tr>
<td>Stationary bike for ROM</td>
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### Phase II (6 to 8 weeks following surgery)

<table>
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<tr>
<th>Goals</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Advance to full weight-bearing as tolerated</td>
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<tr>
<td>D/C crutch use</td>
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<tr>
<td>Range of Motion Exercises</td>
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<tr>
<td>Advance to full/painless ROM (should obtain 130° of flexion)</td>
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<tr>
<td>Therapeutic Exercises</td>
<td></td>
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<tr>
<td>Closed chain exercises: wall sits, shuttle, mini-squats, toe raises</td>
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<tr>
<td>Gait training</td>
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<tr>
<td>Patellar mobilization</td>
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<tr>
<td>Begin unilateral stance activities</td>
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## Phase III (8 to 12 weeks following surgery)

<table>
<thead>
<tr>
<th>Goals</th>
<th>Full weight-bearing</th>
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<tbody>
<tr>
<td>Range of Motion Exercises</td>
<td>Full/painless ROM</td>
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<tr>
<td>Therapeutic Exercises</td>
<td>Advanced closed chain strengthening exercises, proprioception activities</td>
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<td></td>
<td>Sport-specific rehabilitation</td>
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<td></td>
<td>Maintenance program for strength and endurance</td>
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<tr>
<td>Other Suggestions</td>
<td>Gradual return to athletic activity as tolerated</td>
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<tr>
<td></td>
<td>Jogging: 3 months</td>
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<td>Higher impact activities: 4-6 months</td>
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### References


Rehabilitation Protocol:
Tibial Tubercle Osteotomy and Open Osteochondral Allograft Transplantation for Femur/Patella

Name: ____________________________________________ Date: ______________________

Diagnosis: ______________________________________ Date of Surgery: ______________

Phase I (Weeks 0-6)
- **Weightbearing**: Weightbearing as tolerated with hinged knee brace locked in extension
- **Bracing**:
  - Hinged knee brace locked in extension (week 1) - remove for CPM and rehab with PT
  - Weeks 2-6: Gradually open brace in 20° increments as quad control is obtained
  - D/C brace when patient can perform straight leg raise without an extension lag
- **Range of Motion** - Continuous Passive Motion (CPM) Machine for 6-8 hours per day for 6-8 weeks
  - Set CPM to 1 cycle per minute - starting at 40° of flexion
  - Advance 10° per day until full flexion is achieved (should be at 100° by week 6)
  - PROM/AAROM and stretching under guidance of PT
- **Therapeutic Exercises**
  - Patellar mobilization
  - Quad/Hamstring/Adductor/Gluteal sets - Straight leg raises/Ankle pumps

Phase II (Weeks 6-8)
- **Weightbearing**: Weightbearing as tolerated, unlock hinged knee brace
- **Range of Motion** - Advance to full/painless ROM (patient should obtain 130° of flexion)
- **Therapeutic Exercises**
  - Continue with Quad/Hamstring/Core strengthening
  - Begin stationary bike for ROM

Phase III (Weeks 8-12)
- **Weightbearing**: Weightbearing as tolerated, D/C hinged knee brace
- **Range of Motion** - Full/Painless ROM
- **Therapeutic Exercises**
  - Begin closed chain exercises - wall sits/shuttle/mini-squats/toe raises
  - Gait training
  - Continue with Quad/Hamstring/Core strengthening
  - Begin unilateral stance activities

Phase IV (3-6 months)
- **Weightbearing**: Full weightbearing with a normal gait pattern
- **Therapeutic exercise**
  - Advance closed chain strengthening exercises, proprioception activities
  - Sport-specific rehabilitation - jogging at 4-6 months
- **Return to athletic activity**: 9-12 months post-op
- **Maintenance program** for strength and endurance

Comments:

Frequency: _____ times per week  
Duration: _______ weeks

Signature: ____________________________________________ Date: ____________________
**WARNING:**

- Do not modify or cut the hinge bars. A hinge bar that has been modified or cut is not suitable for use.
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**NOTICE:**

- The hinge bars are sized to fit around the patient’s leg and should not be modified or cut. A hinge bar that has been modified or cut is not suitable for use.

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**ATTENTION:**

- Do not modify or cut the hinge bars. A hinge bar that has been modified or cut is not suitable for use.

**PRECAUCIÓN:**

- No modifique ni corte las bisagras. Una bisagra modificada o cortada no es adecuada para su uso.

**ADVERTENZE:**

- Non modificare o tagliare le staffe. Una staffa modificata o tagliata non è adatta per l’uso.

**AVERTISSEMENTS:**

- Ne pas modifier ou couper les barres d’articulation. Une barre d’articulation modifiée ou coupée ne convient pas.

**Avertissements:**

- Ne pas modifier ou couper les barres d’articulation. Une barra d’articulation modifiée ou coupée ne convient pas.

**ADVERTENCIAS:**

- No modifique ni corte las bisagras. Una bisagra modificada o cortada no es adecuada para su uso.

**INSTRUCTION RECOMMENDATIONS:**

- Read the instructions carefully before using the hinge bars.

**WARNING:**

- Do not use the hinge bars for any other purpose than those intended. The hinge bars are not suitable for use.

**INSTRUCTIE:**

- Lees de instructies zorgvuldig voor gebruik van de hinge bars.

**INSTRUCTIONS:**

- Lea las instrucciones cuidadosamente antes de usar las bisagras.

**INSTRUCTIONS:**

- Les instructions soigneusement avant d’utiliser les staffes.

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Puede obtener acolchados de espuma adicionales del Departamento de Atención al Cliente: (800) 321-0607. El acolchado de incisión Lave a mano los acolchados de espuma y las tiras con jabón suave, y seque al aire. No seque los acolchados ni las tiras en una secadora.

USO Y CUIDADO DE LA RODILLERA T-SCOPE:

Lave a mano los acolchados de espuma y las tiras con jabón suave, y seque al aire. No seque los acolchados ni las tiras en una secadora.

Usar el acolchado de espuma BridgeTech continuamente, al menos dos veces al día. Si se coloca en el acolchado, retirelo y fíjelo en su lugar en la parte medial del cinturón. La secuencia que se detalla se aplica al cinturón cuando se fija en el cinturón.

APLICACIÓN DE LÍNEAS DE MOVIMIENTO DEL CIERRE:

Las limitaciones de las líneas de movimiento pueden seleccionarse entre -10° (hiperextensión) y 70° de flexión. Para este, puede ajustar la línea lateral a la posición deseada y girar/aflojar los relevadores en la escala correspondiente.

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Regulación de las líneas de movimiento del cierre:

La rotulación del valor de extensión máximo puede seleccionarse entre 0° y 90°. Para ello, tire de la línea lateral a la posición deseada y girar/aflojar los relevadores en la escala correspondiente.

Los valores de límites de extensión pueden seleccionarse entre -10° (hiperextensión) y 70° de flexión. Para este, puede ajustar la línea lateral a la posición deseada y girar/aflojar los relevadores en la escala correspondiente.

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