

Meniscal Transplant Post-Operative Rehabilitation Guide

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MENISCAL TRANSPLANT

POST OPERATIVE REHABILITATION

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Overview of the procedure

Meniscal Transplantation involves insertion of a donor Meniscus into the knee to treat symptoms of knee pain resulting from damage and loss of meniscus after injury. Treating a torn meniscus (cartilage) is a common procedure but not everyone gets problems afterwards of pain and limitation in activity, but when symptoms occur then replacement with allograft donor meniscus is an option.

Meniscus grafts are matched by exact dimensions and are stored frozen. Sometimes it can take a long time to find a suitable graft but once inserted and healed it can function as a 'nearly new' shock absorber protecting the joint surfaces from wearing.

A key part of the operation is the postoperative care and there are many factors to be considered during rehabilitation after meniscal transplant. Early movement and function must be balanced against allowing time for the meniscus to heal in place.

This document aims to guide you through a goal orientated programme to restore good knee function. Loading of the meniscus, through weight bearing and full bending of the knee, must be controlled in the early phases of rehabilitation due to the increased force that is placed on the fixation of the new meniscus.

The meniscus is an important cushion in the knee protecting the joint surfaces and it must heal in the right position before being loaded in activities of sport, running or squatting. Progression through the phases of rehabilitation is based on achievement of criteria and the state of the knee rather than a specific week by week basis. Approximate time points are given as a guide.

PHASE 1: RECOVERY FROM SURGERY

The initial post-operative phase usually lasts the first 6 weeks. The main priorities during this period are to control inflammation and swelling.

PHASE 1: RECOVERY FROM SURGERY GOALS

- Get your knee straight
 - Control pain and swelling
 - Get quadriceps muscles firing
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WEIGHT BEARING

You will be taught how to use elbow crutches before you leave hospital. You should use these to help you to be non-weight bearing for the first 4 weeks after surgery. You must not put any weight through you operated leg until after 4 weeks from your operation as guided by your consultant.

When you are standing at rest e.g. cleaning your teeth, making food/drink you may rest your foot on the floor – however you must still not take any weight through your operated leg.

KNEE BENDING

For the first 6 weeks bending is limited to 90 degrees. Beyond that will compromise healing of the graft.

BRACING

After meniscal transplant surgery you will be fitted with a brace to help limit your range of movement and also provide you with some support. The brace should be worn day and night for the first two weeks after surgery (it can be removed for washing and dressing). After this 2 week period the brace can be removed at night to sleep.

Initial brace following surgery: TROM brace



A functional brace will be issued at 4 weeks post-operatively which has an offloading feature to help protect the new meniscus. Once fitted with this DJO OA Nano brace it is acceptable to begin partial weight bearing through the operated leg (50% of your weight). The aim is to progress to full weight bearing by 6 weeks after your surgery.

Don Joy OA Nano bract to unload the affected compartment



ICE TREATMENT



Ice treatment after your surgery is very important, aiming to keep the swelling of your knee under control. You should use an ice pack or Cryocuff on your knee for 15-20mins every two hours during the day for the first 7-10 days after your operation.

It is expected that your knee will continue to swell for up to 3 months after your surgery, and icing helps reduce that swelling.

ELEVATION

During the first phase of your rehabilitation you should aim to be resting your operated leg for most of the time. Your knee should be elevated with leg straight and your ankle raised above your hip. This helps to keep the swelling under control in your knee.

NUMBNESS

Patients often describe an area of numbness around the operation site. This is not unusual as the small skin nerves are cut in the operation. Moderate symptoms of numbness and tingling around the knee are common. However, if you are concerned or these symptoms worsen please advise your physiotherapist.

EXERCISES

The success of your surgery will be in a large part due to the amount of effort you are willing to invest into your own rehabilitation. Although you are likely to be in some discomfort after your surgery it is vital you start to complete the exercises below to regain movement and activate muscles after your operation. A physiotherapist will teach you these exercises prior to your discharge home.

1. Range of Movement

Knee flexion

Sitting on a firm surface, gently bend your knee. Slide your heel towards your buttocks. You may find it easier to do this with a plastic bag under your heel. Do this for 10 times. Repeat up to 5 times daily.

Remember not to push flexion beyond 90 degrees for the first 6 weeks.

Knee extension

Sit with a rolled towel under your ankle without anything underneath your knee. Allow gravity to help to passively stretch your knee. Start this for 2 mins and gradually build up as your pain allows. Repeat 5 times daily.

It is very important to regain full straightening of your knee in the first 6 weeks.

2. Strengthening

Static Quadriceps



Sit or lie with leg out straight, tighten your thigh muscles and push knee down firmly against the bed. Hold and for 5 secs. Repeat 10 times.

Don't be tempted to do exercises that bend the knee while not supported on the bed, otherwise this puts high load on the graft.

Static Hamstrings



Sit on bed or floor, bend your knee slightly, then push your heel into the bed keeping knee slightly bent. Hold for 5 secs. Repeat 10 times.

3. Stretching

Calf stretches

Standing with support facing a wall. Keeping one leg forward, foot flat on the floor, extend your opposite leg straight backwards placing your heel flat on the floor. Try to keep your back knee straight and gently bend the front knee. Lean in towards the wall until you feel a stretch in your back calf. Hold for 30 seconds, repeat 3 times on each leg.

Hamstring stretches

Sitting on a firm surface, with both legs out straight in front of you. Try to ensure both legs are as straight as possible. Lean forwards trying to reach your toes. Hold for 30 seconds. Repeat 3 times.

MUSCLE STIMULATION

After surgery some patients initially struggle to regain good quadriceps control and activation. You may be issued with a muscle stimulation device to help with this. It is advisable to use this as per your physiotherapists' guidance. *It is at your consultant and physiotherapists discretion as to whether you will require this device as part of the rehabilitation program.*



CRITERIA FOR PROGRESSION TO PHASE 2:

- Full extension to 0 degrees
- 90 degrees flexion
- Minimal swelling
- Minimal pain
- Straight Leg Raise without lag

PHASE 2: STRENGTH & NEUROMUSCULAR CONTROL (6 weeks onward)

Regaining muscle strength, balance and core strength are the goals of phase 2. In order to progress through this stage, the knee must be 'quiet'. Increases in pain and/or swelling indicate that the knee is not yet able to tolerate an increase in load of exercise.

PHASE 2: STRENGTH & NEUROMUSCULAR GOALS

- Achieve good single leg balance
 - Regain good muscle strength
 - Restore 'normal' gait
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1. Lower Limb Strengthening

Quadriceps

Bed, static, Inner Range Quads (IRQ) Low load. Patient must feel the load in their quadriceps thigh muscles.

Calf Raises

Stand on the edge of a safe step. Engage your core. Make sure the balls of your feet are solidly planted on the edge of the step with your heels over the edge. For safety, begin this exercise with a wall or railing nearby to hold on to for support. Keeping your legs straight lift your heels up, hold for three seconds and gently lower heels until they are below the step level. Complete 12 times.

Hip Abduction

Lying supine, with a plastic sheet/bag under the operated leg. Tighten your abdominals and glute muscles. Slowly slide the leg out to the side, ensure not to lift the leg as this will activate a different muscle group. Complete 12 reps, repeat 3 times.

Hip Adduction

Lying with your knees bent, place a pillow between your knees and gently squeeze. Hold the squeeze for 5 seconds. Repeat 10 times. Gently increase repetitions as your pain allows.

Hip Extension

Standing supported by a chair or work surface, tighten your abdominal muscles. Raise one leg backwards, keeping your knee straight until your foot is approximately 3 inches off the floor. Hold for 3 seconds, then slowly lower. Ensure you do not lean forward, remain standing tall. Complete 12 reps, repeat 3 times.

2. Core Strengthening

Pelvic tilts

Lying on your back with your knees bent. Flatten your back against the floor by tightening your abdominal muscles and tilting your pelvis upwards slightly. Hold for 10 seconds, repeat 6 times.

Clam

Lying on your side, arm outstretched in line with your trunk. Allow your head to rest on your arm. Hips bent up to approximately 45 degrees and knees bent up to approximately 90 degrees. Raise the top knee upwards keeping the feet together. Then continue to lower the top leg onto the lower limb.

Plank

In the push up position on the floor, bend your arms to 90 degrees and rest your weight on your forearms. Your elbows should be directly beneath your shoulders and your body should form a straight line from your head to your feet. Aim to hold for 30 seconds with 15 seconds rest, repeat 3 times.

You may also wish to add 'side plank' into this exercise for increased core strength.

Supermans

Start on all fours, place a pillow under the knees if required. Ensure your core is engaged and your back is straight. While keeping one arm and knee on the floor extend the opposite leg and arm to fully straighten them. Slowly return to the starting position and repeat the action 5 times on each side.

3. Proprioception

Single leg stance

Remove shoes and socks. Stand still on one leg for 20 seconds without allowing you elevated foot to touch the ground – vary this exercise with eyes open and closed and arms at your sides or raised. You may need to hold on to the wall or a chair to start with. Repeat 3 x 20 secs daily.

Double leg mini-squats on an unstable surface

Standing on a BOSU or a balance board with both feet, gain your balance. Try to spread your weight evenly between the balls of your feet and your heels. Maintaining your balance and trying to keep the surface of the BOSU/board level. Gently lower yourself into a mini-squat (approx. 30-40 degrees knee flexion).

4. Stretching

Calf : As per phase 1 above.

Hamstrings: As per phase 1 above.

Hip Flexors

Get down on one knee, with the back leg being the one you are about to stretch. Keeping the hips pointing forward and back straight lean forward to feel a stretch around your groin. Hold for 30 seconds and return to starting position. Repeat 3 times on both legs.

5. Cardio-Vascular

Cycling on a static exercise bike is the most favourable exercise to do at this stage. Given the nature of the surgery you have had, cycling provides the least impact whilst still working the musculature around your knee appropriately. We advise to start on the bike positioned with the seat as high as is comfortable and with no resistance applied. Once you can complete 20 minutes of cycling at this level then **slowly** increase the resistance with each subsequent session.

Walking is also a recommended exercise, on land or in a swimming pool. Monitor the response of your knee regarding swelling and pain to gauge the appropriate time and distance to walk. If your knee does not swell or become painful then you are able to gently increase the time and distance. We do not recommend breaststroke at this stage.

We strictly advise no running or other high impact activities at this stage of rehabilitation.

CRITERIA FOR PROGRESSION TO PHASE 3:

- At least 120 degrees flexion
- No pain
- Minimal swelling
- 80% quadriceps strength of contralateral side
- Y-balance test

PHASE 3: END STAGE REHABILITATION AND RETURN TO APPROPRIATE ACTIVITY (starting approximately 4 -6 months following surgery)

PHASE 3:

- Adequate strength, power, neuromuscular control, symmetry and stability for patients' specific goals
 - Functional Movement Training
 - Safe, guarded return to low impact sport
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1. Continued Strengthening

All major muscle groups of the core and lower limb will need to be strengthened further. Large deficits in individual muscle groups can have a significant effect on functional ability and your eventual return to function. Effectively you are only as good as the weakest link in the chain. Our aim is that each patient should be assessed individually to identify the specific areas of weakness needing to be addressed.

There also needs to be a balance of the types of exercises undertaken. Exercises such as squats and lunges work the muscles hard, but they also put a high degree of force through the joint and meniscus, which is not advisable e.g. deep squatting >90degrees, high weight leg press. There needs to be a balance of continued endurance and strength training.

2. Functional Movement Retraining

Good movement patterns will need to be retrained and practiced to help maximise the life of the new meniscus as well as ability to return to functional goals. This is all about trying to make the muscles work well together as a team. Muscles are your shock absorbers.

Poorly controlled and co-ordinated movements when stood still, and then when moving, will potentially put excessive load through the knee and meniscus. Return to sport and function will then have a higher risk of failure, e.g. when bending on one leg your knee should stay in line with your second toe, and your pelvis level and straight. This pattern will be perpetuated through functional return unless trained otherwise. This is similar to the skills training done in all sports to maximise ability. This stage takes time and practice: it is about quality of movement, not number of repetitions. Some movement patterns may have been present for a long time and will feel automatic and normal, although they are not ideal, and should be trained out with focussed work.

3. *Low load safe guarded return to sport*

Aim for progression through increasing level of skills and drills as strength and movement patterns progress. It is imperative this is patient specific and depends on goals for return to activity. This is the vital last piece of the jigsaw. If muscles of the lower limb are not used in a safe co-ordinated way then the hard work of rehabilitation to this point will not be best put in to practice.

The table below illustrates the characteristics of sports we feel should be avoided following meniscal transplant. Discussions should be had at twelve months following transplant surgery to finalise end stage goals. These goals will be dependent on many factors including state of the meniscus and joint surfaces of the knee at this stage.

High Risk Sports and factors	Lower Risk Sports
Repetitive impact with cutting and pivoting	Aerobic low impact sports
Contact sport	Moderate sports participation
Competitive situation	Non-contact sports
Playing position on field	Cycling

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A NOTE FROM YOUR CONSULTANT

Meniscal Transplant surgery has been performed for over 20 years worldwide and in Coventry for 16 years.

It is an exciting option to improve symptoms in the knee due to lack of the cushioning effect of the Meniscus. As a donor graft tissue is from someone else it cannot be considered normal and we remind you that the aim is to buy time for the knee – improving your function and enjoyable activity level, and maybe preserving the joint.

You are clearly part of the process. As surgeons we have half the job and the other half is down to you and the physio, hence the detail in this rehab guide.

It takes a year or so for the knee to fully mature after this surgery and your help is needed in buying into this concept of preserving your knee. We have had many successes and a few less successful results. We wish you all the best in your recovery

Lastly we ask that you will be part of our Surgery Outcome Program, responding to our questionnaires documenting your progress. This helps us optimise treatment for you and others.

Tim Spalding

Pete Thompson

A Note to your Physiotherapist please

Thank you for taking on the care of our meniscal transplant patient. Due to the relative pioneering nature of this surgery we have provided this document to help guide your rehabilitation strategy. Meniscal transplant surgery is the implantation of a donor meniscus to the patient via arthroscopic surgery. The meniscus is held with fixation sutures through bone tunnels, hence very different surgery to a meniscus repair, where early weight bearing is allowed.

As per the guidelines above the protection of the new meniscus is paramount in the post-operative rehabilitation. Biomechanical research shows how forces on the meniscus change through ranges of flexion. As the knee flexes beyond 30 degrees, increased force is placed on the posterior horn of the meniscus. At 90 degrees flexion, the stress on the peripheral meniscal repair site is 4 times higher than in full extension. Further deep flexion of the knee to a full squat position, causes large translations of the femoral condyles and increased compressive stress on the meniscus and the joint surfaces is designed to protect. Most patients already have some damage on the important joint surfaces.

Due to these findings we **strictly advise** no squatting/ lunge/ split lunge activities to limit the compressive stresses to the new allograft for at least 6 months post operatively.

Open kinetic chain exercises, even without additional resistance has been shown to produce tibio-femoral shear forces in the range of 500N which exceeds the strength of the initial meniscal fixation.

Cycling and walking put the lowest shear force and compression on the meniscus and joint surfaces.

These principles are the main basis of the protocol for the first 6 months after surgery. The meniscus has to bed into the correct position in order to support the joint, hence no impact exercise is advisable until after 6 months.

If you have any questions regarding the rehabilitation of your meniscal transplant patient please do not hesitate to contact our team at University Hospital Coventry & Warwickshire on 02476 965098.