

The therapeutic protocol for rehabilitation after surgical chondral lesion treatment of the knee

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ABSTRACT

The success of a rehabilitation program after surgical treatment of the cartilage lesions of the knee depends on the process of healing and the correct application of surface forces on the joints during treatment.

Although early recovery is important to obtain cartilage healing and restore joints mobility, muscle tone and functional ability, the therapeutic program must be graduated so that it won't slow down the joint healing.

Therapeutic protocol's main objectives are to restore mobility, muscle tone and progressive increasing joint loading during walking.

The rehabilitation program must include procedures which consist in controlling some unwanted complications such as pain, effusion, quadriceps inhibition or persistent extensor lag.

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1. Restoring joint mobility

Recent studies show that active and passive movements can improve the quality of joint healing, can limit unwanted reactions of immobilization, reducing the risk for adhesions. Therefore, complete immobilization is not recommended for treatment of the knee surgery.

However, the application of shear stress while the healing lesion is under compression may have adverse effects on the healing process.

Exercises to increase mobility should be closely monitored by kinetotherapist to avoid excessive loads while the knee is under compression. That is why the therapeutic program must include passive ROM, active-assisted and active without resistance exercises in the early postoperative period (first 6 weeks). □

2. Muscle strengthening

Muscle performance training is an important part of postoperative rehabilitation because it absorbs shocks and dissipates loads across the joint.

The resistance exercises should be customized so as to avoid loading combined with shearing forces in the postoperative healing period. Therefore, exercises in closed kinetic chain should be avoided in early stages of rehabilitation. During this period, isometric exercises are the most reliable option to restore muscle tone.

Quadriceps isometric exercises with the knee in full extension prevent knee extensor lag and most joints injuries will not be engaged in this position.

Isometric exercises at 90 degrees of flexion are safe, since they don't create excessive compression or shear loads. Isometric exercises at angles between 20 and 70 degrees must be avoided because most articular lesions would be engaged at this angle. □

3. Weight-bearing progression

Progression of weight-bearing and functional activities are a gradual process that begins in the intermediate phase of postoperative rehabilitation and depends on the size, nature and location of the lesion, as well as the surgical procedure that has been used.

After arthroscopic debridement, patients are permitted weight-bearing as tolerated with crutches, but only if increased loading does not

result in increased pain or effusion. Crutches can be discontinued when the patient has full passive knee extension and at least 100 degrees of knee flexion, when the patient can rise the lower member extended (without an extensor lag), and can walk painless and without limp.

When surgical interventions are more complex (abrasion arthroplasty, microfracture procedure, fixation of an articular cartilage defect or osteochondral grafting) weight-bearing is usually delayed for 6 weeks to allow the lesion to healing.

In the immediate postoperative rehabilitation period non weight-bearing or touch-down weight-bearing are allowed. In some cases, when the stability of the fixation is satisfactory, partial weight-bearing with crutches may be permitted only if the patient will use a rehabilitation brace locked in full knee extension.



At 6 weeks after surgery, progressive weight-bearing is usually initiated because the osteochondral graft or articular cartilage fragment should have united with adjacent subchondral bone.

Crutches can be discontinued under the same conditions as those described above.

Progression to full weight-bearing can be achieved by using the techniques of dewatering device, so walking can be performed without pain. Walking in the pool can be used for the same reason to unload body weight.

Once the patient has performed a full weight-bearing without pain, we may introduce aerobic activities (walking, cycling) to improve muscular and cardiovascular endurance.

Resumption of sports activities depends on the severity of the joint lesion, and it may not be possible for some patients. This patients must be counseled to specific activities. For patients

who can resume sports activities we recommend a program of functional retraining, focusing on agility exercises, but without changes in pain or effusion when this activities are progressed. □

General considerations on postoperative rehabilitation after arthroscopic surgical intervention of the knee

1. Orthopedic surgeon must communicate to Rehabilitation Physician the surgical procedure type, the location of the lesion and restrictions in ROM during exercises, so that the lesion is not engaged during exercise.
2. Passive ROM exercises or active-assisted without loading should be initiate very early postoperative and exercises in closed kinetic chain should be avoided in the first 6 weeks after surgery.
3. Isometric exercises with the knee in full extension or 90 degrees of flexion should be made for muscle tone recovery, while open kinetic chain exercises can be applied to degrees of mobility without engaging the lesion.
4. Protected weight-bearing using the crutches or a rehabilitation brace should be started in the first 6 weeks postoperative. This kind of devices can be discontinued when the patient has full knee extension, 100 degrees of knee flexion, can rise up the affected lower limb with knee in full extension and can walk without pain or a limp.
5. Progression of weight-bearing activities can be made using dewatering devices or pool activities. The patient can resume sports activities, but not without a complete retraining of sport skills, including agility exercises. □

Rehabilitation protocol after arthroscopic debridement (Fitzgerald and Irrgang)

1. Early postoperative phase

To increase joint mobility we use passive and active-assisted ROM, with no restriction in ROM. Full knee extension should be obtained in 1 week and full knee flexion in 3 weeks.

Muscle performance will be initiated with isometric exercises, progressing to open chain resisted exercises (knee extension for quadriceps and knee flexion for hamstrings). Closed chain resisted exercises are initiated when the

patient meets the criterias for full weight-bearing.

Weight-bearing is limited by the pain, tolerated with crutches. After this we may initiate aerobic activities such as walking, stationary cycling, swimming, when the patient can perform full weight-bearing status, at 3-6 weeks.

2. Intermediate phase (6-12 weeks)

In this phase the knee has a normal range of mobility, so we can continue open and closed chain resistance exercises in the limit of tolerance to pain.

We can start functional retraining initiated at 50% effort to 100% (without inducing pain or effusion).

3. Return to activity phase – begins normally 12 weeks postoperative. □

Rehabilitation protocol after abrasion arthroplasty and microfracture procedures

1. Early postoperative phase

To increase joint mobility we can use passive and active-assisted exercises without inducing pain. Full extension should be achieved in 1 week, full flexion in 3 weeks.

Muscle performance is trained with isometric exercises in ROM that does not engage the lesion site. Open chain exercises with light resistance may be initiated at 4-6 weeks. We must avoid closed chain exercises.

Non weight bearing or toe-touch weight-bearing with crutches is permitted.

2. Intermediate phase

Full range active ROM and loading of resistive exercises can be initiate in this phase. May initiate closed chain exercises when full weight bearing is achieved.

Crutches can be discontinued at 6-8 weeks. Patient can use dewatering devices or pool activity for making the transition to full weight bearing.

3. Return to activity phase

The patient can continue with progression of resistance for open and closed-chain exercises, he will begin functional retraining and progressive resumption of sports activity. Running is allowed only 6 month postoperative. □

Rehabilitation protocol after osteochondral grafts

1. Early postoperative phase

During the first 6 weeks passive and active-assisted ROM exercises can be made in the

range that do not engage the lesion site. Full knee extension should be obtained in 1 week, full flexion in 6 weeks.

Isometric exercises and open chain exercises may be initiated, without engaging the lesion site. Closed chain exercises should be avoided.

Non weight bearing or toe-touch weight-bearing with crutches is permitted.

2. Intermediate phase

We can initiate full range active exercises, resistive exercises and finally, closed chain exercises.

At 6-8 weeks the crutches will be discontinued. We may use dewatering device or pool activities and begin light aerobic activities.

3. Return to activity phase

The patient will continue active ROM exercise, resistive exercises in open and closed chain without engaging the lesion

In this phase we begin functional retraining, progressive resumption of sports activities. Running is allowed only after 6 month postoperative. □

Rehabilitation protocol after knee osteotomy

1. Early postoperative phase

Passive and active Rom exercises in pain-free ROM are initiated. Full knee extension should be obtained in 1 week, full flexion in 8 weeks.

Isometric exercises will be made for increasing muscle performance in the first 4-6 weeks, but open or closed chain exercises are forbidden to avoid loading the full extension osteotomy site.

Touch down weight bearing is used in the first 2 weeks, partial weight bearing in 2-4 weeks, weight-bearing with crutches in 4-8 weeks. The patient must wear a rehabilitation brace locked in full extension.

2. Intermediate phase

There are started active exercises to full range mobility, progress loading of resistive exercises, closed chain exercises when full weight bearing is achieved, restricted to ranges that do not engage the lesion.

After 6 weeks rehabilitation brace is discontinued, without crutches, for making the transition to full weight bearing.

3. Return to activity phase

During this period, active ROM exercises, open and closed chain exercises are continued.

Functional retraining and resumption of sports are gradually begun, avoiding running in the first 6 month postoperative. □

Troubleshooting techniques after articular cartilage lesion

1. Pain and effusion

Monitoring of these two parameters during recovery is particularly important because their presence indicates that the articular lesion is being harmed or the intensity of the exercise are too rigorous.

Consequently, frequency and duration of joint mobilization or the magnitude of loading during resistance exercises may also be reconsidered.

Early postoperative effusion may result in quadriceps inhibition, which delay the rehabilitation program.

Use of cold treatments, compression bandaging, limb elevation and intermittent isometric contractions of the thigh and leg muscles may help to resolve problem with effusion.

2. Quadriceps inhibition or persistent extensor lag

Some patients may have difficulty with voluntary activation of the quadriceps muscles after surgery, clinically expressed by an inability to perform isometric quadriceps contraction or to achieve a full knee extension.

Consequently the appearance of complications may be a knee extensor lag with secondary disorders of gait and excessive loading of the knee during weight-bearing activities.

Treatment consists in neuromuscular electrical stimulation or EMG biofeedback, with an intensity of the treatment stimulus great enough to produce a sustained contraction of the quadriceps, evidenced by superior glide of the patella during this contraction. □



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