

# Cartilage Repair Case Study

Two patients with cartilage lesions treated with temporary unloading.

## Indication

Patients with large cartilage lesions without any malalignment or patients with small to medium-sized defects but with a slight malalignment may need a temporary unloading of the lesion site area post-surgery and during the initial maturation time. I have here below two examples of patients being candidates for temporary unloading with a brace.

## Case Examples

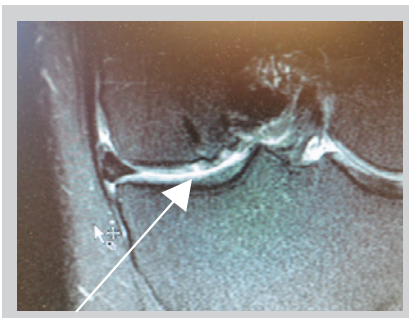
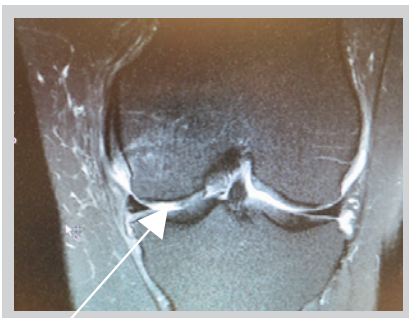


Figure 1. Patient 1's MRI.



Patient 2 arthroscopy (Figure 2) and MRI (Figure 3).

One patient (patient 1) has been operated on before with carbon fiber implants, resulting in successful pain relief. A return of pain results in a new conventional weight bearing x-ray + an MRI.

A lesion in the repaired area was found on the MR images (see arrow).

There was a slight narrowing of the joint space and a minor malalignment in varus (0.5 degrees). The patient did not want an unloading osteotomy as was suggested. Instead, an arthroscopy was performed and an injury of the repaired area was treated by an AMIC procedure with a hyaluronic acid membrane. Post-operatively, the rehabilitation was combined with an unloading brace locked in extension for 2 weeks with full weight bearing allowed. At the 3rd week, the brace was opened and put into unloading position for another 4 weeks. For the rest of the post-operative year, the patient was advised to use the unloading brace as much as possible outdoors.

The second example is a patient with a knee trauma. The weight bearing x-ray is normal but the MRI images show a large chondral lesion on the medial femoral condyle of the injured knee. At the arthroscopy examination, treatment with ACI was decided and a biopsy was taken.

8 weeks later, a trans-arthroscopic ACI was performed. The patient was immobilized in an unloading brace locked in extension for 2 weeks with full weight bearing allowed. At the 3rd week, the brace was opened and put into unloading position for another 4 weeks. For the rest of the post-operative year, the patient was advised to use the unloading brace as much as possible outdoors.



Mats Brittberg  
MD, PhD

Professor, Region Halland  
Orthopedics

Kungsbaca Hospital, Sweden



## Treatment Goal/Rehabilitation

It is important to be patient when treating cartilage lesions as the healing time is very long. The maturation process seen in different types of cartilage repairs goes on for 2-3 years. Too much load may have negative effect on the repair tissue development. When there is a large malalignment, a definitive unloading with an osteotomy is needed. The amount of time needed post-operatively to protect a repair area with an unloading brace is not known. However, one may follow the reduction of bone marrow edema seen below a cartilage defect repair as a sign of repair tissue maturation. If the bone marrow edema has disappeared at 1 year, less use of the unloading brace is needed and vice versa.

Goals are: 1) Motion Control, 2) Muscle Strengthening and 3) Balance and Coordination training.

Post-operative physiotherapy programs following articular cartilage repair procedures vary much among patients and are individualized based on the nature of the lesion, the special characteristics of the patient, and the type and detail of each surgical procedure. The repair tissue development after surgery is slow. Theoretically, there are several repair phases to which the rehabilitation could be adapted. Furthermore, the speed of rehabilitation is partly limited if there are other injuries repaired at the same time like meniscus and ligaments. Cartilage repair is the slowest tissue to repair and the rehabilitation is subsequently adapted primary to the cartilage repair mechanisms. Weight bearing as much as pain allows. Crutches 4-6 weeks.

PHASE I: 0-12 WEEKS	PHASE II: 3-6 MONTHS	PHASE III: 6-24 MONTHS
Proliferative phase: After cell migration, proliferation and attachment, a fibrocartilaginous soft repair tissue forms.	Transition phase: Tissue integration into the surrounding tissue improves the structural composition of the repair cartilage.	Remodeling and maturation phase, 6-24 months: Ongoing remodeling of matrix is seen with reorganization of collagen.
<p>Physiotherapy steps: protection and articular joint activation.</p> <ul style="list-style-type: none"> <li>Active-assisted heel slide exercises progressing to gradual increases in pain-free active knee ROM exercises.</li> <li>Stationary cycle, minimal resistance once 100° of knee flexion are achieved.</li> <li>Full active ROM exercises for ankle and hip.</li> <li>Quadriceps setting exercises progressing to multi-angle isometric exercises.</li> <li>Partial to full weight-bearing proprioceptive exercises.</li> <li>Aqua therapy when surgical wound has healed.</li> <li>Rowing ergometer, no resistance (no handle).</li> <li>Introduce treadmill walking after full weight bearing.</li> <li>Introduce forward lunges, forward step-ups, and lateral step-ups within safe range of knee flexion after full weight bearing.</li> </ul>	<p>Physiotherapy steps: progressive joint loading and functional restoration.</p> <ul style="list-style-type: none"> <li>Progress knee exercises to light resistance within safe ranges, with no resistance over repaired area.</li> <li>Progress from concentric to eccentric loading.</li> <li>Progress from static to dynamic loading.</li> <li>Proprioception/balance exercise progressions: stable to unstable surfaces, uniplanar to multiplanes, double- to single-limb. Strength exercises for the hip muscles in full WB positions.</li> <li>Progress proprioception exercises to more challenging surfaces.</li> <li>Introduce low-impact uniplanar aerobic activities and progress to moderate-impact uniplanar activities and then to multiplanes activities.</li> <li>Introduce plyometrics in supine double-limb landing with gravity eliminated, progressing to single-limb landing with gravity eliminated and then to standing on foam surface.</li> <li>Continue cycle and rowing ergometer with increasing duration and gradual increase in resistance.</li> <li>Continue aquatic therapy for general endurance.</li> </ul>	<p>Activity restoration (sport-specific reconditioning/on-field rehabilitation):</p> <ul style="list-style-type: none"> <li>Loading program individualized with progression to full resistance over repaired area in both closed-kinetic-chain and open-kinetic-chain activities.</li> <li>Continue strengthening and flexibility exercises from phase 2.</li> <li>Education and preparation for return to sport.</li> <li>Sport-specific high load strength training (increase of intensity and duration).</li> <li>Increase of dynamic training with implementation of functional sport-specific agility training.</li> </ul>

## Conclusion

Remember the T3 of cartilage repair: Time is long, Training is needed regularly, and Tolerance is crucial from both doctor and patient related to the first two T's. Cartilage repair is a biological process with a repair tissue under constant remodeling. Such a process needs adequate loading; not too little and not too much. A temporary support from an unloading brace may increase the possibilities of good quality cartilage repair especially when treating large lesions without malalignment or the lesions in malaligned joints.

FOLLOW ÖSSUR ON



TEL (800) 233-6263  
CANADA (800) 663-5982  
WWW.OSSUR.COM

