

AMIC[®]

Patient Information on the AMIC[®] Surgical Technique in the Ankle



Schematic representation of a foot skeleton. The cartilage surfaces are shown in light blue.

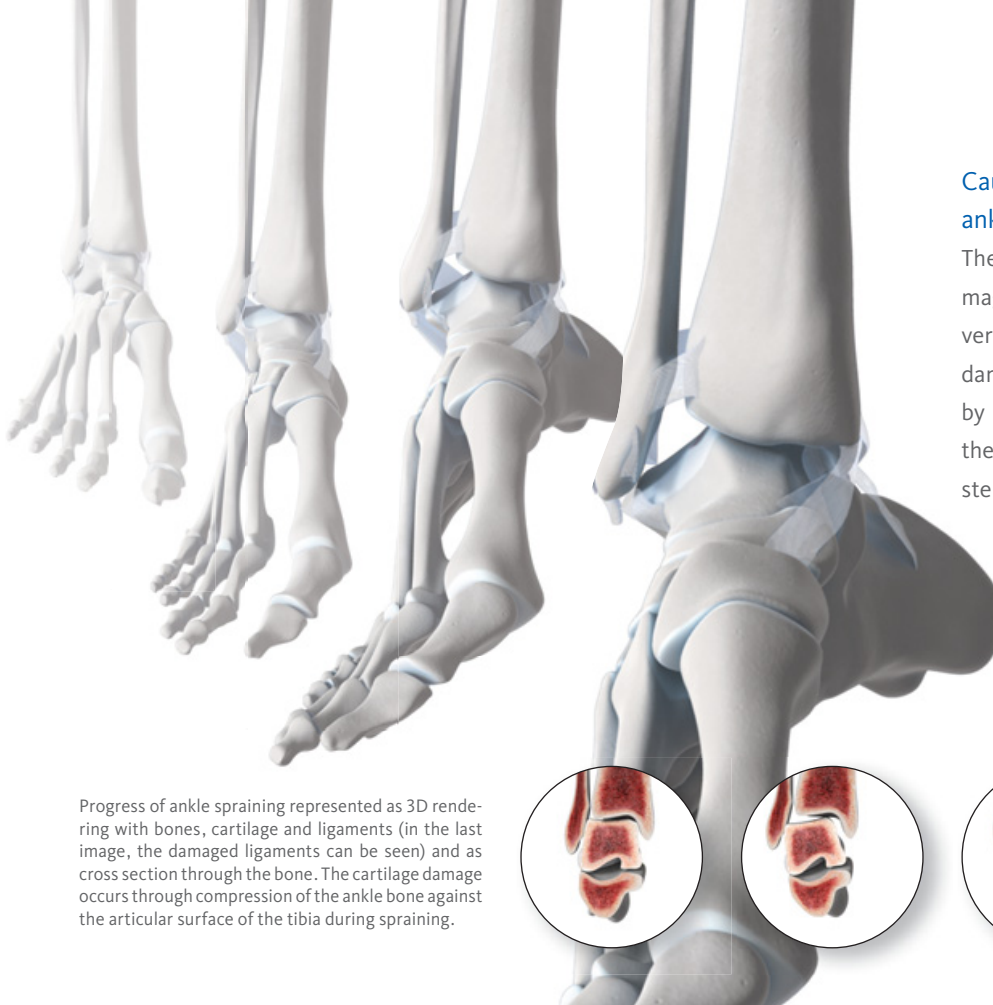


Dear patient,

You have been diagnosed with a cartilage defect in your ankle bone (talus). This and other accompanying illnesses have possibly been causing you health problems for some time. Your doctor has now advised you to have the defect treated with the AMIC® method.

The purpose of this leaflet is to help you understand why a cartilage defect should be treated, what AMIC® is, basically how such a surgical intervention is carried out and how soon thereafter you can resume your usual physical activities without problems.

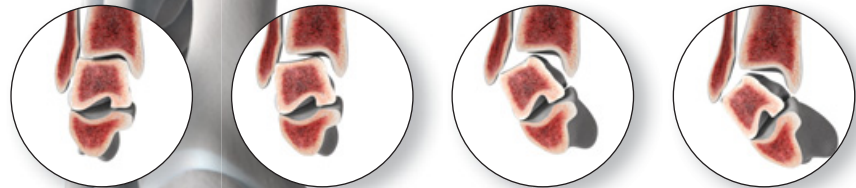




Causes of cartilage damage in the ankle joint

The most frequent cause of cartilage damage in the ankle are joint sprains (inversion or eversion injuries). Cartilage damage, however, can also be caused by lax ligaments leading to instability of the ankle joint or by malalignment. Every step taken results in small, undesirable displacements in the ankle putting continuous strain on the structures involved.

Progress of ankle spraining represented as 3D rendering with bones, cartilage and ligaments (in the last image, the damaged ligaments can be seen) and as cross section through the bone. The cartilage damage occurs through compression of the ankle bone against the articular surface of the tibia during spraining.



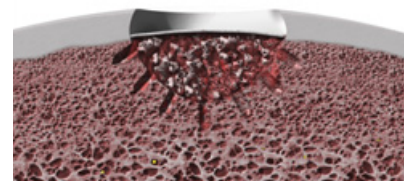
Cartilage regeneration with AMIC®

Left untreated, cartilage defects will get bigger and can lead to severe pain and excessive joint deterioration (osteoarthritis). For this reason, your doctor has recommended surgical treatment with the AMIC® technique.

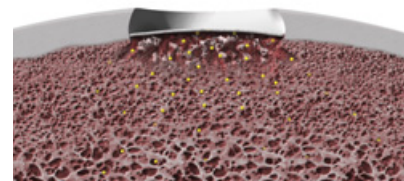
What is AMIC®?

AMIC® stands for Autologous Matrix-Induced Chondrogenesis. This surgical technique is based on the fact that cartilage damage can only heal if the body's own cells and other important components reach the defect via circulating blood. For this to happen, not only must dead or damaged cartilage tissue be removed in advance, but also a supply of cells, blood and other important substan-

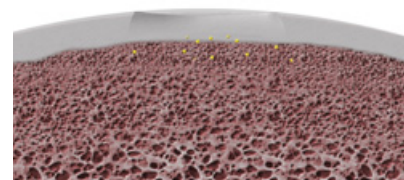
ces to the damaged area must be assured. This is achieved via a key step in the AMIC® surgical technique, called microfracturing in which a surgeon drills small channels in the bone underneath the damaged cartilage. Blood flows through these channels into the damaged area, forming a “super clot” by a process of coagulation. The super clot contains the body's own components necessary for the formation of replacement cartilage. To additionally support the healing process, the surgeon covers the area with a special collagen matrix (Chondro-Gide®).



Cross-section of a bone with bone marrow and channels resulting from microfracturing.



Blood flows into the defect and forms a blood clot through coagulation (super clot).



Regeneration of cartilage, supported by the body's own constituents.



Goal of the surgery

This intervention not only prevents expansion of the defect but initiates and sustains the healing process. The long-term goal of this surgery is restoration of joint function and freedom from pain during sports activities.

Advantages of AMIC®

In contrast to other surgical techniques, usually not more than one intervention is required when using the AMIC® method. Clinical experience has shown that AMIC® is a very safe surgical procedure, and in most patients, leads to a marked reduction of complaints.

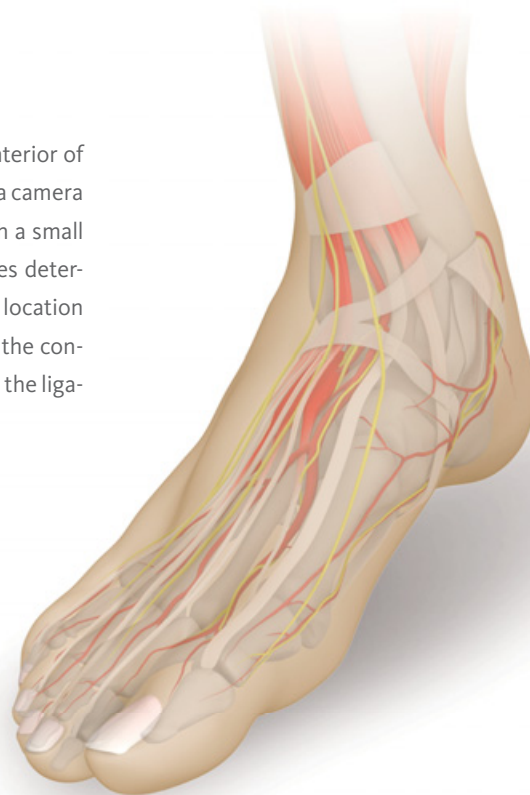
The surgery – step by step

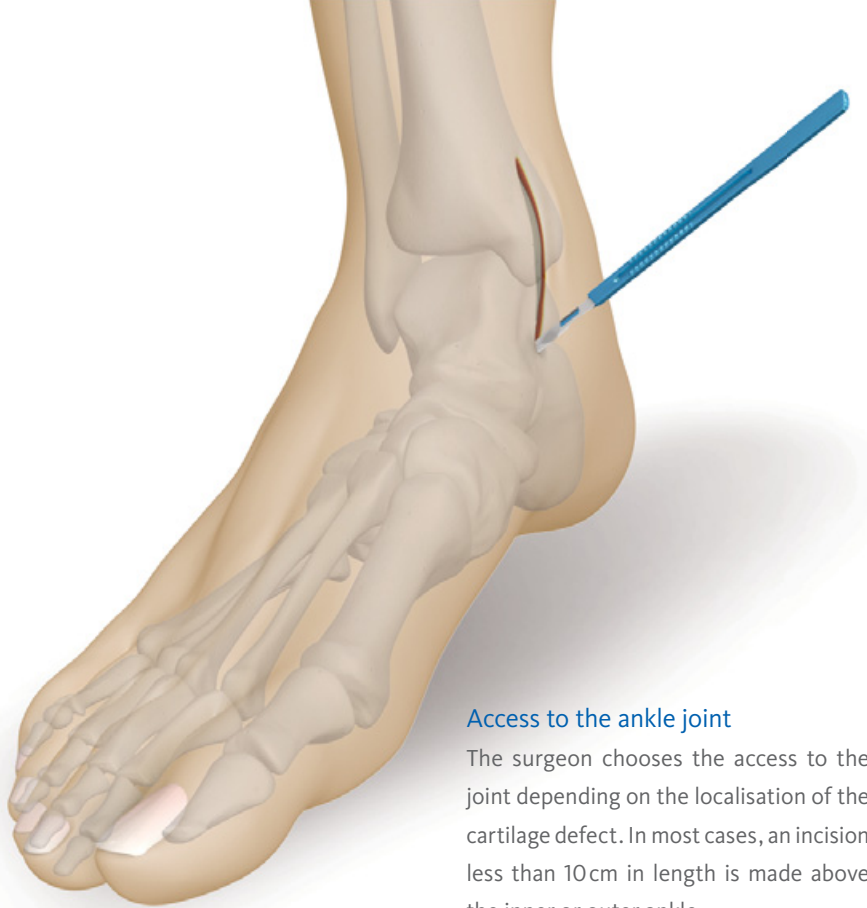
As a rule, the surgery is performed under general or spinal anaesthesia. So you will not feel anything during the procedure. After waking up, you will receive pain-killers so that you are pain-free in the days following the surgery.

Below, the most important steps of the AMIC® surgical technique are described, please note that these can vary according to the clinical picture of your injury. If found necessary, the surgeon not only repairs the damaged cartilage during the surgery, but also carries out additional interventions such as leg axis correction or ligament reconstruction.

A view through a key hole

First, the doctor examines the interior of the upper ankle joint. To do this, a camera (arthroscope) is inserted through a small skin incision. This camera enables determination of the size and precise location of the cartilage damage, as also the condition of other structures such as the ligaments.





Access to the ankle joint

The surgeon chooses the access to the joint depending on the localisation of the cartilage defect. In most cases, an incision less than 10cm in length is made above the inner or outer ankle.

Creating the necessary space

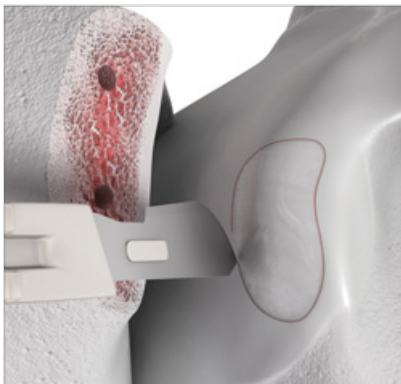
Depending on the size and location of the defect, the surgeon will need to make room for surgery. One possibility to achieve this is by cutting through the bony prominence (osteotomy) of the shin bone (malleolus).



Osteotomy of the malleolus.

The damaged cartilage is removed

All dead and damaged cartilage must be removed before tissue regeneration can take place.



Removal of the damaged cartilage.

Microfracturing

The surgical step called microfracturing is of key importance. The surgeon drills tiny

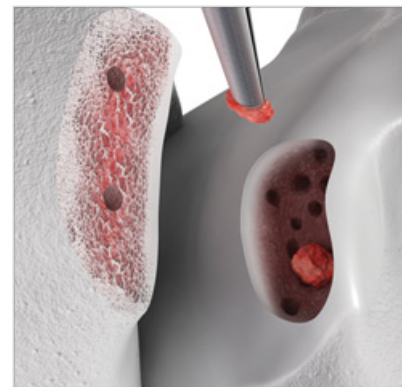


Microfracturing of the bone.

holes into the bone to provide channels for blood, stem cells and other components of the body to flow out and fill the defect. These enable healing and formation of replacement cartilage.

Filling deeper defects

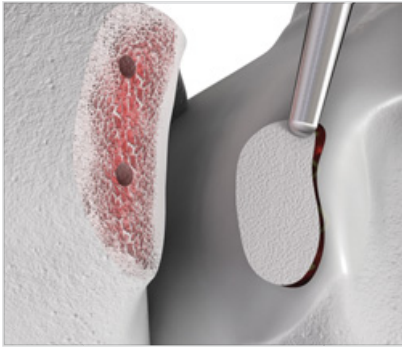
Should the defect be rather deep, the “hole” will have to be filled either with bone from one's own body (mostly harvested from the heel or pelvic crest) or with synthetic bone-substitute material.



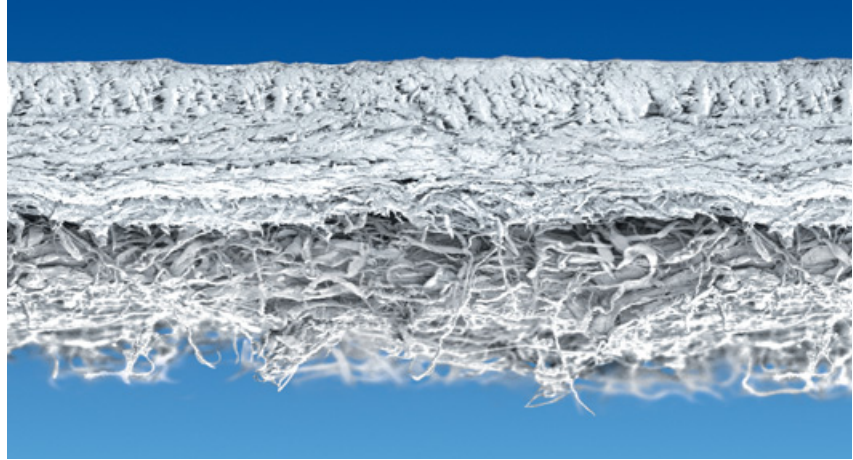
Filling of deep defects with a bone replacement material.

Cut-to-fit cover

The collagen matrix (Chondro-Gide®) is cut to fit the defect and is fixed with surgical glue over the cleaned defect. This seals the defect towards the joint space.



Cut-to-fit covering of the defect with Chondro-Gide®.



Scanning electron microscope image (100x magnification) of the Chondro-Gide® matrix cross-section showing the bilayer structure

The cover supports healing

The Chondro-Gide® matrix is a membrane with a bilayer structure consisting of natural collagen fibres. The upper compact layer is cell occlusive and protective, and the lower, porous layer facilitates invasion, attachment and growth of cells and thus favours the formation of replacement

cartilage. The matrix is resorbed slowly during the healing process so that it does not need to be surgically removed later.

Wound closure

Finally, the joint is closed. If the malleolus was severed, it is re-attached with screws and the skin carefully closed.

Follow-up

The doctor will adjust the follow-up according to your personal situation. The success of the surgery will depend on the surgical technique and in addition, on the consistent, individually adapted follow-up treatment. Only then can optimal results be achieved. It is therefore important that you strictly adhere to the instructions of your doctor.

As a rule, you will spend a few days in the hospital after the surgery. During this time, your leg will be kept elevated and cooled. In addition, you will also be given medications to alleviate pain and inflammation.



The first steps

Already after a few days, you will be permitted to stand up under supervision and take the first few steps with the help of crutches. Your operated leg will be encased in a stable, boot-like supporting shoe (the so-called orthosis). This device not only helps to protect the surgical wound, but also prevents you from ben-

ding the ankle joint too strongly by mistake. You will have to wear the orthosis for at least six weeks. During this time, you should also not load your leg completely.

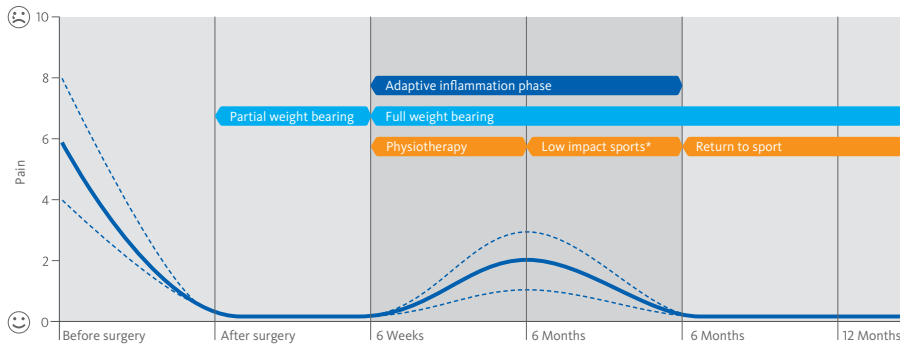
Build-up can now begin

After this resting-phase, you will start with physiotherapy. Loading of the ankle joint will be increased step by step and

targeted training of your leg muscles will commence. During this period, there may be a short-time increase in pain resulting from inflammatory processes in the ankle. This is a frequently observed phenomenon that corresponds to normal reactions in the joint area during with the healing process.

Sports activities

After three months, sports activities involving very little load (cycling, swimming) can be taken up. Full resumption of all sports can be only be expected after a minimum of six months after the procedure.



* For example, swimming and cycling [source: V. Valderrabano]

Overview of recommended postoperative treatment

	Load bearing	Mobilisation	Physiotherapy and Sport
Up to 6 weeks* after surgery	Max. 20 kg	Orthesis with 20° limitation 1. Passive movement 2. Assistive movement 3. Active movement	No sports Immobilising and resting Manual lymph drainage Electrotherapy
6 weeks to 3 months	Progressive increase in load to 100%	Without limitations Full range of motion Cartilage treatment	No sports Physiotherapy
3 months to 6 months	Full	Without limitations	Light sports e.g. swimming and cycling
After 6 months	Full	Without limitations	Full ability to engage in sports

* Up to 8 to 10 weeks in case of concomitant ligament reconstruction



Advantages of AMIC® at a glance

Minimally invasive surgery

The intervention is minimally invasive. Thus, only few tissues are affected. This allows for a speedy recovery and reduces the risk of complications.

Only one surgery

Only one surgery is needed to treat cartilage damage when using the AMIC® technique. Ideal conditions for self-healing are created with this method and necessary additional surgical procedures can be carried out at the same time.

Natural implant

The Chondro-Gide® matrix protects the defect and promotes formation of replacement cartilage. Since the bilayer ma-

trix consists of collagen fibres of natural origin, it is resorbed slowly by the body. Thus, there is no need to surgically remove it later.

Established treatment

AMIC® is an established treatment method since several years. Its success has been demonstrated by scientific studies and continuous follow-up investigations.

Effective treatment

The surgical technique described here enables a significant reduction in symptoms even after resumption of sporting activities.

Notes

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