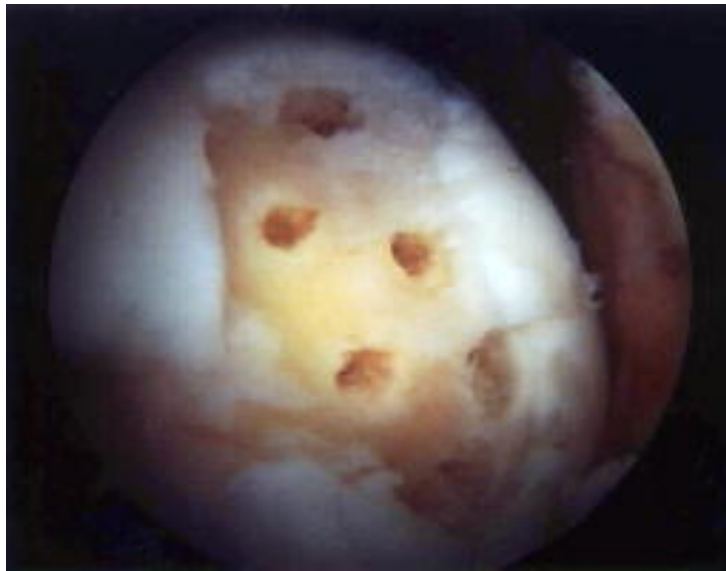


Microfracture



Introduction:

Articular cartilage is the name we give to the slippery gliding surface of all human joints. It varies in thickness from around 2-3 mm in the ankle joint up to 7 mm on the back of the knee cap. It has fantastic mechanical properties and has ten times less friction than the best man made bearings. Unfortunately, it has very limited capacity to heal. If articular cartilage is experimentally damaged the defect will still be apparent many years later.

How is articular cartilage injured?

Articular cartilage can be damaged with a large impact or a shearing force such as when an athlete suffers a severe twisting fall. The cartilage can be damaged at the same time as a ligament or a meniscus is damaged.

Articular cartilage may also be damaged when the cartilage is overloaded repeatedly over a long period of time. An example of this is when a patient has had an entire meniscus (cartilage shock absorber) removed from the knee placing more load on the articular cartilage. Several years later the

patient may have a full thickness defect of their articular cartilage. Another common scenario is when a patient suffers one or many ankle sprains. The articular cartilage of the ankle can be damaged and even after many months the athlete still has a painful ankle with intermittent swelling.

How do we get articular cartilage to heal?

Many different techniques have been used to promote healing including:

1. drilling
2. abrasion
3. thermal energy
4. cartilage cell grafting
5. grafts from another patient

None of these are perfect and the resultant repaired cartilage is never quite as good as the original undamaged joint.

Microfracture is a variation that was introduced in the early 1990's to try and avoid the heat damage of drilling. The supporting bone of the joint is perforated with a small awl to allow bone marrow cells to enter the defect and form a clot. The clot then gradually transforms into fibro-cartilage which is like scar tissue cartilage. This is analogous to patching a hole in a damaged road. The repair job is not as good as a new road but is generally better than leaving the pothole in place.

How is the surgery performed?

Most often microfracture can be performed through arthroscopic or keyhole surgery. The last remaining pieces of damaged cartilage are removed from the lesion leaving squared-off healthy cartilage at the edge of the defect. The bone at the base of the lesion is then curetted and holes are punched three to four millimeters apart to a depth of 2-3 mm.



Figure 1: The unstable flaking cartilage around the edge of the defect is removed with a curette.

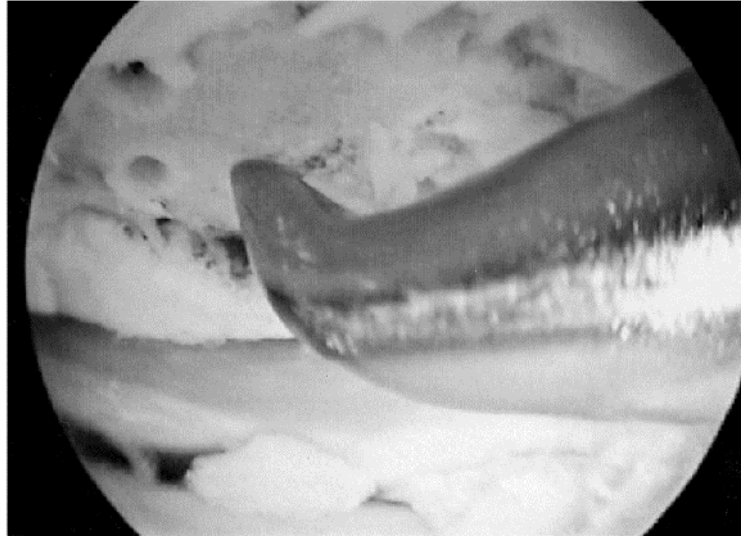


Figure 2: An awl is introduced to punch 2mm holes in the bone at the base of the defect.

The procedure is not especially painful and most patients can treat their pain with simple pain relief such as Paracetamol or an anti inflammatory tablet.

Post operative care

Whether crutches are needed depends on the size of the defect. Generally if the defect is less than or equal to 1 square centimeter crutches are not necessary. For larger defects a period of protected weight bearing is a good idea as the repair cartilage is very slow to harden and full weight bearing is likely to damage it. It is true that the rehabilitation is just as important as the operation.

Healing cartilage likes movement but does not like excessive weight bearing. For this reason you will be encouraged to move the joint within days of surgery. This can be achieved on an exercycle or by simply sitting in a chair with your foot on a skateboard and sliding the skateboard back and forth. Resistance training (light weight training) can be introduced at 12 weeks but impact loading such as running, tennis, squash, netball etc is generally avoided for six months post operatively. Many other types of exercise are appropriate such as cycling, rowing machines or elliptical trainers available at the gym. Because recovery of the cartilage is so slow it can take one to two years to reach maximum medical benefit.

Are other techniques available in New Zealand?

Cartilage cell grafting for defects in the knee is available in special circumstances. The first option will always be microfracture and this cannot be deemed a failure until at least one year post operatively. In carefully

selected cases where microfracture has failed for one year, the patient can be eligible under ACC for cartilage cell grafting.

Cartilage cell grafting is a very expensive procedure and at present there is only one large trial overseas comparing cartilage cell grafting to microfracture and at the time of this writing, there are few if any differences between groups after five years.

Complications

Surgical complications such as bleeding, excessive pain and stiffness are rare. Clicking from the joint is quite common and can take three to six months to resolve. It is usually not painful and is caused by the square edges of the defect prior to filling with fibrocartilage.

Failure to resolve the pre-operative symptoms would be the most common complication. There can be a multitude of reasons for this. In previous studies overweight people did not get the same benefit as patients who were a healthy weight. Patients who had symptoms for a very long time prior to surgery also did not do as well. The majority of patients are significantly better with less pain and the ability to exercise at a higher level but few patients feel that their joint is perfect. Larger defects tend to do worse than smaller defects. Also if the cartilage defect is part of an arthritic process microfracture is unlikely to make much difference.

Recurrent effusions or extra fluid in the joint is another complication which is usually treated by reducing activity, rest, cold therapy (ice) and anti-inflammatory tablets. A possible late complication with any permanent damage to articular cartilage is progressive degenerative changes eventually resulting in osteoarthritis.

Summary

Microfracture is a simple effective treatment with a low complication rate but a prolonged rehabilitation. Because fibro-cartilage or scar tissue cartilage is not as durable as hyaline cartilage (the original undamaged cartilage) it is possible that good results at one to two years may slowly deteriorate with time requiring further surgical intervention later in life.

The perfect solution for damaged cartilage has not been found, however, to date microfracture matches or betters the results of any other type of treatment.