



Cartilage Injuries and Osteoarthritis

Repair, Regenerate and Replace

The problem with cartilage injuries is that cartilage cannot heal itself, as it lacks a blood supply. Once an injury sets in, it will progress from a superficial injury all the way down to the bone. When this occurs, it is only a matter of time before osteoarthritis sets in. **Dr Michael Soon**, orthopaedic surgeon at Parkway East Hospital outlines the route to repair, regenerate and replace the cartilage.

Articular cartilage, also known as hyaline cartilage, is the smooth and firm material located at the ends of our long bones that forms the joint. This is a very specialised tissue which is only 2 to 3mm thick, but able to bear the weight of our bodies and the stress of exercise throughout our lives. The structures around it like the ligaments and the shock absorber (meniscus) exist to protect and support the cartilage.

According to Dr Michael Soon, the most common factor of cartilage injury would be trauma in the knee. This could be a macro-trauma like a traffic accident or a bad tackle in rugby or soccer. This could also be repetitive micro-trauma, like the repeated pounding action as a runner trains for a marathon.

The first signs of a cartilage injury includes painful grinding in the joint, with occasional swelling and catching. With increasing severity of pain, deformity can gradually set in as osteoarthritis develops. Other factors that contribute to cartilage injuries include rupture of the anterior cruciate ligament (ACL), tear of the meniscus and abnormal alignment of the knee joint (like excessively bow legged or knocked knee).

REPAIR

In early cartilage injury, the management is usually conservative, such as using medications, physiotherapy and injections. Anti-inflammatory medication can reduce pain and inflammation, but do come with side effects. "Oral supplements in the form of glucosamine sulphate do not grow cartilage per se, but is mildly anti-inflammatory in the joint and can help mitigate damage to the joint," says Dr Soon.

Physiotherapy is an important component of treatment. Having muscles around the joint that have strength and endurance, will reduce stress on the joint and cartilage, and thus protects the cartilage. Avoiding excessive and repetitive shocks to the joints is also important through cross-training.

Another non-surgical option would be through injections such as medical steroids and hyaluronic acids. "In recent times, platelet rich plasma (PRP) has also been a popular alternative injectable," says Dr Soon. "PRP is harvested from your own blood, where the growth factors that are present in the blood is concentrated and re-injected back to the injured region."

If all these fail to halt the progress of the disease, then surgery would be required. Cartilage injuries can either be repaired,

restored or regenerated. Reparative surgery uses techniques that grow fibro-cartilage.

A common method to repair cartilage injuries is known as microfracture. The exposed bone of the injury is punched with tiny holes, to cause bleeding. As cartilage cannot heal due to a poor blood supply, with this technique, bleeding is intentionally created from the bone, so that a layer of cartilage would grow over. With time, the fibro-cartilage will repair the defect and prevent further progression to osteoarthritis. However this can only be used for small lesions.

REGENERATE

Restorative or regenerative surgery means a return to normal tissue. "Autologous Chondrocyte Implantation (ACI) is the epitome of this technique, by having your own cartilage cells that are implanted back to you," says Dr Soon. In this technique, the first operation is to take small slivers of your own cartilage. This is then sent to a special lab where these cells are cloned into millions of cells. In the next operation, these cells are then implanted back to the cartilage injury. The advantage of this technique is that it is durable, produces normal cartilage and can be used for lesions of all sizes. The disadvantage is that two operations are required.

Apart from treating the cartilage itself, concurrent surgeries may also be required for other knee ailments such as ACL rupture, meniscal tear or mal-alignment.

REPLACE

If all these fail or if the injuries are too significant to repair or restore, then the only option left would be to replace. With advanced osteoarthritis or deformities in older patients, this is the ideal choice. The damaged joint which is the source of pain and deformity, is removed and replaced with a metal and plastic joint. This is known as a total joint replacement.

Awareness of cartilage injuries is important, as prevention is probably the best option to avoid such injuries. In the event of an injury, the technique chosen will depend on the age of the patient, the activity level and technical concerns (size of injury, location of injury, depth of injury, etc). Your surgeon will discuss with you the options before proceeding with treatment.

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