Clinical Sheet

THE MICROFRACTURE TECHNIQUE FOR THE REPAIR OF PATELLAR CHONDROPATHY LESIONS

Use of a collagen membrane for the treatment of post-traumatic arthrosis of the knee.

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Arthrosis of the knee consists in the progressive degeneration of the joint cartilage, resulting in reduced functionality and symptoms such as pain and swelling. The causes are manifold and include aging, misalignments of the musculoskeletal system, inflammatory and autoimmune conditions. Arthrosis of the knee can also develop following a traumatic event: the trauma, in fact, induces a series of biochemical and biomechanical changes in the cartilage, including the loss of macromolecular structure and organization, which cause it to degenerate.

In recent years, significant progress in diagnostic techniques, surgical techniques and tissue engineering have led to greatly broadening the possible treatment options for the repair of cartilage lesions. The choice of the best option must follow a thorough assessment not just of the extent and the site of the lesions, but also of the patient's general features and functional requirements.

One treatment option is the so-called Steadman microfracture technique. This technique consists in making micro-perforations in the bone under the cartilage, at a distance of approx. 3-4 mm one from the other, so as to cause the formation of a blood clot. This clot assures the presence of growth factors and mesenchymal cells, necessary for the formation of new cartilage tissue at the damaged site.

Materials

The cartilage repair procedure using the Steadman microfracture technique entailed using the MeRG resorbable collagen membrane (Biocollagen, Bioteck). The membrane is obtained from equine Achilles' tendon through a particular extraction process.

The use of the membrane is a variation on the conventional microfracture technique: not only does the membrane prevent the mesenchymal cells from dispersing in the joint cavity, but it also provides a scaffold on which they can settle and proliferate and supports the formation of the blood clot, thus promoting the formation of new cartilage tissue that will fill the joint.

MeRG measures 50 x 50 x 0.2 mm and has one smooth side and one rough-fibrillar side, which is placed in contact with the lesion. The membrane can be secured with fibrin glue; furthermore, its adhesiveness increases in contact with blood. It is spontaneously resorbed in 60/90 days.

Fig. 1 *– X-ray of the left knee after the trauma. The exposed multi-fragmentary fracture of the patella is conspicuous..*

Fig. 2 *– X-ray 16 months after the trauma. One notices the progression of the post-traumatic arthrosis of the patella.*

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Results

The sheet describes the case of a 25-year-old female patient suffering from post-traumatic arthrosis of the knee. The patient had previously suffered a multi-fragmentary fracture of the left patella, treated with a rod and metal cerclage, which were removed 12 months later due to anterior pain. After a further 5 months, the patient reported pain in the knee, even at rest, limited functionality and impossibility to maintain the upright stance for long.

The clinical examination showed chronic inflammation, characterized by recurring effusions which were periodically treated with arthrocentesis. The MRI showed conspicuous damage of the cartilage of the patella and a few indicators of initial osteonecrosis of the trabecular patella bones.

A lateral parapatellar knee arthrotomy was then performed to extend the external alar ligament, osteotomy of the lateral third of the patella to reduce pressure on the external face, chondroplasty to regularize the surface of the patellar joint, and micro-perforations to stimulate blood supply and decompress the osteonecrosis areas. The procedure was completed by sheathing the surface of the patellar joint with the MeRG collagen membrane (Bioteck), so as to cover the medial and lateral faces of the patella. Before insertion, the membrane was saturated with autologous bone marrow concentrate obtained from the iliac crest.

The MRI at 6 months after the procedure showed an improvement in the femur-patellar surfaces and of the cancellous tissues of the patella, thanks to the partial regression of the osteonecrosis areas. A layer of chondral tissue, which was thinner than the native cartilage but uniform, could also be appreciated. Clinically, an improvement was observed in the mobility of the joint, comparable to that of the right knee, and the resolution of the chronic inflammation of the knee.

The procedure also markedly reduced the painful symptoms and significantly improved resistance to standing up for long periods of time, thanks to which the patient was able to resume her daily activities and moderate physical exercise.

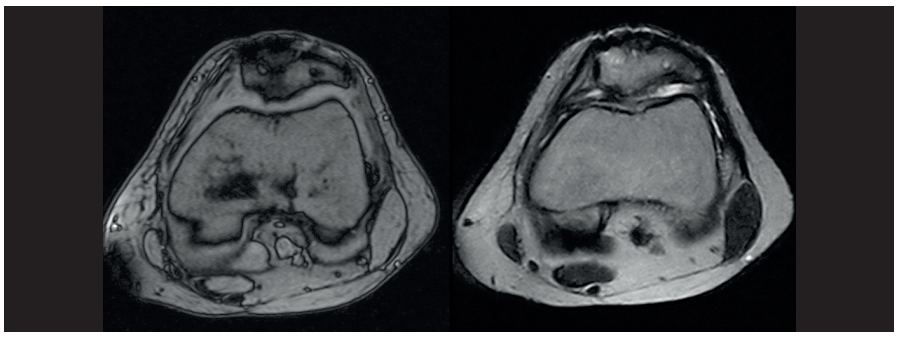

Fig. 3 *– MRI 16 months after the trauma. One notes damage of the cartilage of the patella and a few indications of initial osteonecrosis of the trabecular bones of the knee.*

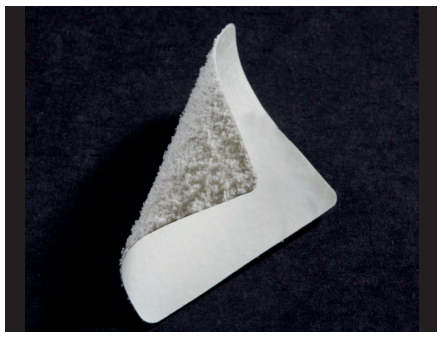

Fig. 4 *– The MeRG membrane has one smooth side and one rough-fibrillar side, which must be placed in contact with the lesion.*

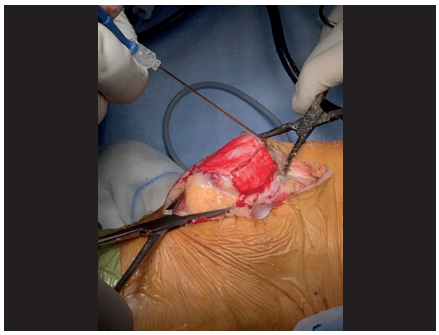

Fig. 5 *– The MeRG membrane, previously saturated with autologous bone marrow concentrate, is applied to cover the medial and lateral faces of the patella and is fixed with fibrin glue.*

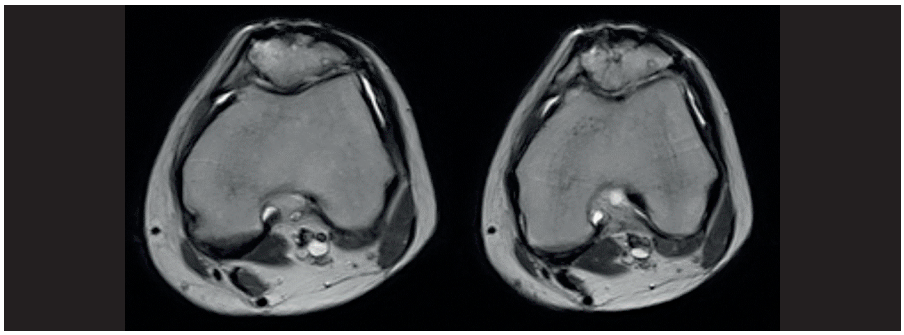

Fig. 6 *– The MRI at 6 months shows an improvement in the femur-patella surfaces, improvement of the cancellous signal of the patella due to partial regression of the osteonecrosis areas, and the presence of a thin but even chondral signal.*

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