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Cartilage Repair By using ACI Technology and MSC Technology

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Introduction

Human body is composed of many cell, tissues, and organs. In case of any injury or disease the organs of human body functions may be effected but since Living organisms have endogenous mechanisms of regeneration that repair the structure of biological units it will have ability to heal its cells and become normal. Generally regeneration of organs take place naturally in some cases this do not take place and restoration of some organs may not be possible when severe damages take place. At that time treatment should be taken to regenerate organs , this regeneration of organs artificially is called as regenerative medicine [1] .Treatment using mesenchymal stem cells has become more widely available, and it has showed promise in the healing of articular cartilage abnormalities in the knee. More recently, an open arthrotomy with allogenic human umbilical cord blood-derived mesenchymal stem cells has been conducted via a para-patellar incision for cartilage repair (hUCB-MSCs). However, arthroscopy, especially in the knee joint, provides for improved visibility and results in faster range of motion gain and less scar development than open arthrotomy. We report a simple and effective arthroscopic hUCB-MSC insertion procedure that requires no specific equipment in our investigation.

Autologous Chondrocyte Implantation (ACI) Technology

Based on tissue engineering ACI is introduced. It is the first real application of regenerative medicine in humans. In a patient with severe cartilage disorders several steps are performed as follows.

Initially arthroscopy is performed to check the general condition of knee followed by small cartilage biopsy and then , Chondrocyte cultivation is performed i.e. to retrieve patient's own autologous chondrocytes a biomaterial is sent to the labs of chondrocyte culture and they are expanded in vitro for 3-4 weeks. Later these expanded cells are imp lanted into the patient this is called as cell implantation.

MSC Technology

MSCs can be easily obtained from bone marrow aspirate and have a high expansion capacity. They are new promising cells for regenerative medicine since MSCs can migrate to the sites of injury, disease and inflammation to induce a local repair mechanism [2-6]. Human bone marrow aspirate is the most accessible and rich source of MSCs, they also have immunosuppressive properties both in vivo and in vitro and are very stable. New approaches of MSCs are working on increasing the concentration of MSCs by centrifugation. The chondrogenic differentiation of MSCs that is chondrocytes harvested from a non-weight bearing area of the cartilage in patients has a main role in functional cartilage construction.

Reasons for vital use of Cartilage development

- Low efficacy of current drugs, therapeutic treatments and surgical strategy to solve these problems, with a longterm span, in the population over than many years
- After severe damage caused by disease, disorder, trauma or injury the inability of adult cartilage to repair itself
- The increasing number of rheumatoid arthritis, osteoarthritis diseases and cartilage trauma in the knees.

These main musculoskeletal problems which generate pain associated to weight bearing, swelling of damaged joint stiffen, and also severe pain in patients suffering with arthritis can be cured by these methods this method of tissue engineering has a growth and is playing a vital role in clinical practice, mainly in soft tissue replacements of the body [7]. Comparing to technological trajectories ACI and MSC are more effective in cartilage repair by tissue engineering. For adequate cartilage preparation and h UCB-MSC implantation, access to the entire drilling hole is required. Retraction needle positioning and far medial working portal development should be performed in conventional arthroscopy with saline solution prior to dry arthroscopy. For greater coverage of the cartilage defect, the holes should be made as close together as feasible, although drilling should be done carefully to avoid joining nearby holes, which could cause subchondral fracture [8]. To prevent the loss of hUCB-MSCs, the surgeon should strive to avoid using suction equipment during the implantation process. The remaining hUCB-MSCs were sequentially implanted into the small additional holes and onto the surface of the large main holes to fill them from the bottom to the surface, and the remaining hUCB-MSCs were implanted into the small additional holes and onto the surface of the large main holes to fill them from the bottom to the surface. On postoperative day 1, the cylinder splint was replaced with a knee brace. While using the knee brace, the patient began quadriceps setting and straight leg lift exercises. On the third postoperative day, range-of-motion exercises were started utilising a continuous passive motion machine. For the first three months after surgery, non-weight-bearing ambulation with a crutch was recommended. Following that, a gradual and reasonable increase in weight bearing was permitted [9-10].

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Conflict of Interest

The authors declare that they are no conflict of interest.

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