

eral blood stem cells (PBSC) in combination with hyaluronic acid (HA).

Methods: 180 patients with full thickness chondral defects during arthroscopic surgery were treated with multiple subchondral drilling. Clinical cases vary from isolated chondral lesion to cases with multiple kissing lesions requiring ligament reconstruction and longitudinal axis correction. Following surgery, the operated knee was placed on Continuous Passive Motion (CPM) two hours per day for a period of 4 weeks and was on partial weight bearing for up to half the body weight for the first six weeks. Autologous PBSC were harvested by the process of apheresis one week after surgery. 8mls of the harvested PBSC in combination with 2mls of HA were injected into the operated knee one week after surgery. The remainder of the harvested PBSC were divided into vials and cryopreserved for future injections. A total of a five weekly intra-articular injection of PBSC in combination with HA were injected into the operated knee. Serial MRI scans were performed to document articular cartilage regeneration. Five patients underwent second look arthroscopy with chondral core biopsy. Patients were followed up for a period of 6 to 30 months.

Results: MRI scans showed satisfactory healing of the subchondral bone and filling-in of the chondral defects indicating articular cartilage regeneration. Second look arthroscopy with a 2mm chondral core biopsy on five patients confirmed articular cartilage regeneration and excellent integration with surrounding native articular cartilage. The sections showed full thickness mature chondrocytes, both singly and in pairs. They exhibit the usual central pale rounded nuclei with perinuclear halo within a pale basophilic ground substance. The predominant background substance was noted to be hyaline cartilage morphologically. Positive staining was evident with Safranin-O and Collagen II. Collagen I staining was limited to the superficial layers. There was no significant inflammation. Patients showed improved IKDC scores post-operatively. Apart from the minimal discomfort of PBSC harvesting and localized pain associated with the intra-articular injections, there were no other notable adverse reactions.

Conclusion: This is a relatively simple and effective method to regenerate articular cartilage as the entire process involves only a single arthroscopic procedure followed by post-operative intra-articular injections of autologous PBSC in combination with HA. The pre-clinical animal work titled "Articular Cartilage Regeneration With Autologous Marrow-Aspirate and Hyaluronic Acid: an Experimental Study in a Goat Model" has been accepted for publication by *Arthroscopy: The Journal of Arthroscopic and Related Surgery*.

Concentrated Bone Marrow Aspirate in Cartilage Repair (SS-35) *Alberto W. Gobbi, M.D., Lorenzo Boldrini, M.D., Brunella Grigolo, M.D., Laura Mazzucco, M.D.*

Introduction: Cartilage lesions represent a significant clinical problem. Recent advances in our understanding of the functions of mesenchymal stem cells (MSC) have shown their chondrogenic potential. The use of autologous concentrated bone marrow aspirate represents an improvement on the currently available techniques for cartilage transplantation avoiding the first surgery for cartilage biopsy and cells cultivation.

Methods: A group of 25 patients with grade IV cartilage lesion of the knee, have been treated from at our Institution with MSC implantation. We prospectively followed up them for 24 months, surgery was performed with a mini arthrotomy approach and concentrated MSC were pasted into the lesion and covered with a collagen membrane sutured to the surrounding tissue. Bone marrow was harvested from the ipsilateral iliac crest subjected to concentration and activation prior to implantation. All patients followed the same specific rehabilitation program for a minimum of 6 months. IKDC, KOOS, Lysholm and Tegner scores were collected at pre-op and every 6 months post-operatively and at final follow up. All patients did MRI at 6,12 and 24 months. Second look arthroscopy and biopsies were done on four knees of these patients at 6 months and at 1 year post procedure .

Results: Patients mean age was 40.6 years, all patients showed improvements in evaluation scores. Mean pre-op values were: IKDC subjective 52.3, KOOS Scores P=87.2/S=54.0/ADL=86.0/SP51/QOL= 41.8, Lysholm 64 and Tegner 3.2. At final follow-up mean scores were: IKDC subjective 76.7, KOOS P=95.7/S=87.0/ADL=96.5/SP=71.3/QOL=73.2, Lysholm 90 and Tegner 5.8. MRI showed good integration and coverage of the defect and no reaction of subchondral bone. No adverse reactions or post-op complication were noted in these patients. Second look arthroscopy and biopsies were done in 4 knees and revealed the formation of good cartilage type tissue with typical hyaline features particularly at longer follow-up times.

Conclusion: This study demonstrates that concentrated bone marrow aspirate with one step implantation of mesenchymal stem cell can be a viable alternative in the treatment grade IV chondral lesions of the knee. Furthermore this procedure offers the advantage of a lower cost if compared with standard A.C.I.