Articular cartilage lesions are common and treatment is difficult because of its limited healing potential. Marrow stimulation, substitution, and regenerative techniques are the most widely used options. For symptomatic full thickness defects, we would consider the area and location of defect, degree of bone containment, concomitant correction of underlying cause, and patient's functional demand, in making the choice of treatment. Localised and contained defects would be our prerequisite for joint preservation surgery. We aim at either prior or concomitant correction of the cause of the defect, such as ligamentous reconstruction, patellar realignment, and corrective osteotomy. Low demand patients will receive marrow stimulation technique in the form of microfracture, while high demand patients will receive substitution with autologous osteochondral transfer if the lesion is small, and regenerative options will be considered for those larger than 2.5cm². Autologous Matrix Induced Chondrogenesis (AMIC) and Matrix Induced Autologous Chondrocyte Implantation (MACI) are our current cartilage regeneration options in our hospitals, which can be done either arthroscopically or with a mini-arthrotyomy. We perform d-GEMRIC study for preoperative planning & postoperative monitoring of cartilage repair procedures, as they are shown to be accurate, reproducible, non-invasive, and correlate well with function. When a second look biopsy is possible, we also perform histological and histomorphometrical examination. Correlation with functional scores and the ability to return to play are also noted. On the research side, a microencapsulation technique was established at our university laboratory to entrap Mesenchymal Stem Cells (MSC) in collagen microspheres, and the collagen fibrous meshwork was found to be an excellent scaffold for supporting MSC survival, growth and differentiation. MSC were isolated from rabbit bone marrow and encapsulated in collagen microspheres. The effects of pre-differentiating the encapsulated MSC into chondrogenic lineages and different cell densities on cartilage repair were investigated. Our preliminary findings suggested that a higher local cell density favors cartilage regeneration, regardless of the differentiation status of MSC, while the differentiation status of MSC does significantly affect regeneration outcomes.