carrier in concert with epithelial transplantation significantly increases the number of blood vessels formed by transplanted endothelial cells. Recent studies proved that alginate gel delivery can promote outward migration and dispersion throughout ischemic tissues [42].

4.2.3.2 Bones

Due to poor healing effects, bone injuries are treated only limitedly. But alginate gels have the capacity to regenerate bone by the delivery of osteoinductive factors, bone forming cells, or a combination of both. They can be introduced into the body in a minimally invasive manner, and they have the ability to fill irregularly shaped defects; there is a case of chemical modification with adhesion ligands (e.g., RGD) and controlled release of tissue induction factors (e.g., BMP, TGF-β). But alginate gels do not have sufficient mechanical properties to allow load bearings in the initial stage of regeneration, and they are not inherently degradable in physiological conditions. The use of RGD alginate gels can lead to complete regeneration of critical sized femoral defects in rodents. Alginate gels that contain BMP (bone morphogenetic proteins) can result in tissue regeneration; they can also be used to transplant cell populations that directly participate in bone formation [43]. There is wide application for the use of alginate gels for the transplantation of stem cells. Alginates have also been combined with some inorganic materials to enhance bone tissue formation. Alginate gel beads containing cells presented a potential for bone tissue engineering in moderate stress-bearing conditions [44]. Alginate gels containing collagen type 1 and β-tricalcium phosphate exhibit adhesion and proliferation of human bone marrow stem cells than pure alginate gels [45].

4.2.3.3 Cartilage

The repair of degraded and damaged cartilage is still a major problem faced in the orthopedics field. But this challenge can be solved to a great extent by the use of alginate gels. Alginate gels have a capacity to transplant chondrogenic cells to restore damaged cartilage in animal models. Before, alginate solution containing chondrocytes is mixed with calcium sulfate and produced preshaped cartilage. But now, shape memory alginate gels are developed with which we can engineer the cartilage with the desired shape and size *in vivo*. In short, alginate gels, which have a macroporous structure, are introduced into mice with a catheter. Later, the gel is rehydrated *in vivo* to attain its original shape, which allows cartilage formation in mice with desired geometry [46]. The use of stem cells in alginate gel can help