

THE CONSTRUCTION AND CLINICAL APPLICATION OF TISSUE ENGINEERED BONE

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Tissue engineering construct has already been used to repair some kinds of bone defect in clinical patients, but repairing massive segmental bony defect in tibia more than 10 cm still has not been reported. We describe a case of patient, who received a tissue engineered bone graft for repairing the 12 cm bone defect in his right tibia and report the findings after 36 months of follow-up. The recipient, a 35-year-old man from China, had his leg severely injured in Sep' 2014 and got massive tibia defect after one year of treatment using external fixator. Implantation of tissue engineered bone graft was done in Aug' 2015. A β -tricalcium phosphate (β -B-TCP) scaffold was custom-made according to the shape of the bone defect area. The patient got bone marrow aspiration and 15 ml bone marrow was used for isolation and proliferation to get enough autologous bone menchymal stem cells (BMSCs) with serum-free stem cell medium to avoid immune rejection. 3.4×10^6 cells were seeded onto the β -B-TCP scaffold and then implanted into the bone defect area after two weeks of co-culture. Laboratory blood examination was used to observe the immune rejection or infection. The radiography and three-dimensional computed tomography (CT) were used to detect the bone repair effect. No major complications and no obvious immune rejection or infection occurred after the surgery. After 3, 6, 12, 24 and 36 months, radiography showed bone defect gradually repaired with time, and bone repair effect was satisfactory. The patient was allowed to gradually regain limb function after 12 months. After 36 months, the patient recovered a full function of the lower extremity without any support. Our promising results suggest the clinical safety and effectiveness of tissue engineered bone for repairing massive weight-bearing tibia bone defect more than 10 cm and our treatment procedure might be an option for those patients with weight-bearing massive bone defect.

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