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THE CONSTRUCTION AND CLINICAL APPLICATION OF TISSUE ENGINEERED BONE

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Tissue engineering construct has been already used to repair some kinds of bone defect in clinical patients, but repairing massive segmental bony defect in tibia more than 10cm still has not been reported. We describe a case of patient who received a tissue engineered bone graft for repairing the 12cm 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 September, 2014 and got massive tibia defect after 1 year of treatment using external fixator.

Implantation of tissue engineered bone graft was done in August, 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 15ml 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 10cm. And our treatment procedure might be an option for those patients with weight-bearing massive bone defect.

BIOGRAPHY

Guoxian Pei, the professor and chairman of department of Orthopaedic Surgery, Xijing Hospital the Fourth Military Medical University and he was served as the fifth academic degree committee of the state council subject review group, he was the general secretary of international composite tissue allo-transplantation, the primary chairman of Chinese Microsurgery Society, the chief editor of Chinese Journal of Orthopaedic Trauma, chairman of the digital orthopaedics society SICOT China chapter. He has been the editor of 12 monographs including the hand surgical anatomy and clinic microscopic hand surgery and transplantation of allogeneic limbs and has published 156 treatises as the first corresponding author in the domestic and international fields, including 32 articles collected by SCI.

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