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EFFECTS OF BONE MARROW MESENCHYMAL STEM CELL TRANSPLANTATION ON VASCULAR REMOLDING AND RESTENOSIS AFTER ANGIOPLASTY IN HYPERLIPOIDEMIA RAT

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Objective To investigate the effect of bone marrow mesenchymal stem cell transplantation on vascular remolding and restenosis in hyperlipoidemia rat.

Methods MSCs were cultured in vitro, identified by flow cytometer. Then MSCs were pre-labelled by DAPI. Twenty four SD rats were randomly divided into control group and transplantation group. The all of rats were intramuscularly injected vitamin D_3 (60 million U/kg weight) and fed with high fat diet and suffered from the thoracic and abdominal aorta damage by balloon one week later. Transplantation group received MSCs (2×10^6) by catheter and control group only received equal-volume normal saline following procedure. Blood lipids were measured at weeks 0, 3 and 7 weeks after being fed with high fat diet. MSCs labelled by DAPI were traced under immunofluorescence microscopy, the histomorphology and expression of bone morphogenetic protein-2 (BMP-2) and proliferating cell nuclear antigen (PCNA) in aorta were done after procedure different time.

Results (1) After high-fat feeding three week, the levels of TC, LDL-C in transplantation groups were significantly increased (1.47±0.09 mmol/l vs 4.45±0.08 mmol/l, 0.23±0.05 mmol/l vs 3.08±0.05 mmol/l, $p<0.05$), in a time-dependent manner, but no difference was observed between the two groups (2) The DAPI-labelled MSCs could be found on impaired intimae in transplantation group at 1 to 2 weeks (3) The typical atherosclerosis plaques were presented in two groups at 6 weeks after operation (4) The EELA, IELA and Lumina areas of transplantation group was significantly decreased (2.017±0.089 mm^2 vs 1.635±0.045 mm^2, 1.609±0.075 mm^2 vs 1.419±0.034 mm^2, 1.609±0.075 mm^2 vs 1.369±0.054, $p<0.05$) in comparison to the control group after the procedure two weeks later. The stenosis rate of remaining vascular Lumina and index of vascular remolding was from 14.92% to 30.58% and from 0.811 to 0.544 in transplantation group at 2, 6 weeks, respectively (5) The expression of BMP-2 and PCNA in transplantation group in the neointima were both significantly increased in comparison to the control group after the 2-week procedure ($p<0.05$) (6) Black calcium deposition among the aorta of rat in transplantation group was stronger than in control group by Von Kossa Staining at six weeks.

Conclusion Bone marrow MSCs transplantation could aggravate the vascular postangioplasty vascular remolding and resteosis in hyperlipidemia rats, the mechanism may be related with promoting the expression of osteogenic differentiation transcription factors BMP-2, which lead to vascular calcification.