

INHIBITION OF COLLAGEN DEPOSIT IN OBSTRUCTED RAT BLADDER OUTLET BY TRANSPLANTATION OF HUMAN MESENCHYMAL STEM CELLS

Hypothesis / aims of study

Bladder outlet obstruction (BOO) caused by collagen deposit is one of the most common problems in elderly male. The present study is to investigate if human mesenchymal stem cells (hMSCs) are capable of inhibiting collagen deposition and improve cystometric parameters in bladder outlet obstruction in rats.

Study design, materials and methods

hMSCs were labeled with nanoparticles containing superparamagnetic iron oxide (SPIONs), and transplanted in rat BOO lesion site. Two weeks after the onset of BOO, SPION-hMSCs were injected into the bladder wall. Serial T2-weighted MR images were taken immediately after SPION-hMSCs injection and at 4 weeks post-transplantation. Transplantation of SPION-hMSCs (1×10^6 cells) into the bladder wall, T2-weighted MR images showed a clear hypointense signal induced by the SPION-hMSCs. SPION-labeled hMSCs transplanted into BOO rat bladder survived 4 weeks post-transplantation and their movement monitored by MR imaging.

Results

While weight of bladder and collagen deposition increased after BOO, transplantation of hMSCs in BOO resulted in return to the original weights. The expression of collagen and TGF β protein increased after BOO. The expression of hepatocyte growth factor (HGF) and its receptor c-met protein increased in the group with hMSC transplantation after BOO. The expression of collagen and TGF β protein returned to the original levels after hMSC transplantation. Intercontraction interval decreased after BOO but it recovered after hMSC engraftment. Maximal voiding pressure and residual urine volume increased after BOO, but it recovered after hMSC treatment.

Interpretation of results

Transplanted hMSCs inhibited the bladder fibrosis and mediated recovery of bladder dysfunction in the rat BOO model.

Concluding message

MSC-based cell therapy could be a novel therapeutic strategy against bladder fibrosis in patients with bladder outlet obstruction.

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Is this a clinical trial?	No
What were the subjects in the study?	ANIMAL
Were guidelines for care and use of laboratory animals followed or ethical committee approval obtained?	Yes
Name of ethics committee	Institutional review board and Institutional Animal Care and Use Committee of Soonchunhyng University hospital