IMPACT OF AUTOLOGOUS MESENCHYMAL STEM CELLS TO MARKERS OF RENAL DETERIORATION IN TYPE I DIABETES MELLITUS WITH NEPHROPATHY

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OBJECTIVES

Diabetic nephropathy is one of the leading causes of ESRD worldwide. Recent pre-clinical studies have been showed promising tool to treatment of type 1 diabetes mellitus via regeneration of pancreatic β-cells. Some experimental studies reported direct renoprotective action of mesenchymal stem cells without normalisation of hyperglycaemia. We aimed to study influence of autologous mesenchymal stem cells therapy in amelioration of kidney function type 1 diabetic nephropathy patients.

METHODS

This is a preliminary data of prospective cohort study which included 5 patients (2 male and 3 female) with type 1 diabetic nephropathy, who had completed 2 visits during 6 months. Autologous mesenchymal stem cells were prepared from each patient (from the posterior iliac crest of patients under local anaesthesia) and cultivated in DMEM medium and incubated at 37c for three days according to cell preparation protocol. All of the patients received autologous mesenchymal stem cells (up to $140x10^6$ cells) via IV infusion according to study protocol every 6 months. Routine physical and laboratory data were obtained at each visit. Markers providing renal deterioration such as microalbuminuria, urinary type IV collagen, urinary neutrophil gelatinase-associated lipocalin (NGAL) and urinary transforming growth factor (TGF)-β1 were also determined at each visit.

Table 1. Baseline and control laboratory data after stem cells therapy.

Parameters [Mean±SD]	I - Visit	II - Visit	P - value
Total protein, g/L	59,6±11	67,2±5,97	0,212
Serum creatinine	70,2±48,0	61,0±46,7	0,234
GFR, ml/min	114,1±47,2	131,6±69,5	0,593
Hemoglobin, g/L	122,2±15,8	129,6±19,7	0,220
C peptide, ng/ml	0,02±0,02	0,06±0,11	0,458
Hemoglobin A1c	8,66±1,97	8,71±2,43	0,952
Fasting glucose, mmol/L	9,34±3	7,1±2,85	0,035
Postprandial glucose, mmol/L	13,6±5,84	11,9±2,03	0,516
Insulin, μU/ml	2,13±1,64	1,81±1,95	0,724
Microalbumiuria, mg/ml	401,4±329,6	115,1±170,8	0,026
Urinary type IV collagen, μg/L	8,5±7,14	12,3±18,4	0,561
Urinary NGAL, ng/ml	14,8±31,8	0,97±2,17	0,395
Urinary TGF- β1, pg/ml	< 31,0	<31,0	1,0

RESULTS

Descriptive analysis showed that mean age of patients were 23,2±4,08 years, duration of diabetes 117,6±63,7 months, maximal glucose level 12,6±1,69 mmol/L during one year follow-up time. Baseline (I visit) and control (II visit) laboratory data after autologous mesenchymal stem cells therapy is presented in Table 1. All of the parameters providing pancreatic endocrine function showed trend to improvement, but non significant except fasting glucose (p=0,035). In some cases, patients reduced dose of insulin and oral antidiabetic medications. Markers indicating renal deterioration also improved after single dose autologous mesenchymal stem cells therapy but not significantly except microalbuminuria (p=0,026).

CONCLUSIONS

Autologous bone marrow-derived stem cells transplantation is a safe and may be beneficial in type 1 diabetes mellitus with nephropathy. Further studies with a large number of patients are needed to substantiate these observations.

REFERENCES:

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