Post-Transplant Diabetes and Impaired Glucose Tolerance in Pediatric Renal Transplant Recipients

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Introduction

Post transplant diabetes mellitus (PTDM) and hypertryglyceridemia are known complications of immunsuppressive therapy in renal transplant reciepents with an incidence of 4 to 41 % in adult population (1,2). This wide range can be due to the definition of hyperglycemia during post transplant as some patients can have transient whereas others may have persistent diabetes mellitus (3). There is limited information regarding the incidence and features of PTDM in pediatric renal transplant reciepents. In adults the type of insulin regimen, ethnicity, age, body mass index (BMI), family history, episodes of rejection may be the risk factors (3). In previous reports PTDM was described in association with tacrolimus use (3). In this study we assessed the incidence of PTDM and impaired glucose tolerance test and the factors that are associated with the development of this complication in a cross sectional study in patients without any symptoms with regard to fasting hyperglycemia.

Materials and Methods

29 (16 female, 13 male) non-diabetic, non-proteinuric renal recipients ages ranging from 7,46-23,34 years transplanted between February 1991 and October 2002 in Ege University Department of Pediatrics were evaluated retrospectively. 44,8 % of the patients were transplanted from living related donors and the rest from cadaveric. No child in the study population had DM as the etiology for the renal disease. One of the patients had a family history of Diabetes mellitus. Patients treated for rejection during the last month were not included in the study. In the immediate post tx period, patients received induction immunosuppression consisting of polyclonal antilymphocyte antibodies until serum creatinine was 2,5 mg/dl when cyclosporin (CsA) was iniated. In most patients triple therapy with CsA, azathioprine and prednisolone maintainance immunosuppession was continued. CsA was replaced by FK506 in eight patients and by mycophenolate mofetil in three.

Oral glucose tolerance test (OGTT) was used to categorize renal transplant reciepents to groups with normal glucose tolerance (NGT), impaired glucose tolerance (IGT) or post transplant diabetes mellitus (PTDM) at least one month after transplantation according to 2000 ISPAD consensus guidelines. OGTT was performed with 1,75 g/kg glucose (maximum 75 gr) and blood was withdrawn on the second hour for glucose and insulin levels. Serum glucose and lipid levels were analyzed with an automatic device (Alycon 300 Abbott). Serum insulin was analysed using RIA and HbA1c with agar gel electrophoresis.

As a measure of pancreatic insulin secretion response, basal insulin level before oral glucose load was used as the HOMA IR index.(Fasting glucose (mmol/l) x fasting insulin (mIU/ml)/22,5). IR HOMA was impaired if this was greater than 2. SPSS 10.0 package program was used for the statistical anlyses.

Results

Table 1. Demographic features of the male and female patients at he evaluation and tx

	Male	Female
Age (evaluation)	15,6±3,4	16,2±4,6
Tx duration	3,6±3,3	1,9±2,3
Age at Tx	11,9±2,9	14,1±3,8
BMI SDS (at tx)	-0,3±2,5	-0,12±1,7
BMI SDS (evaluation)	1,3±2,6	1,8±1,7

Demographic features of the patients are given in (table 1). Mean time elapsed since tx was 0,15-11,81 years. Before renal tx 6,9 % of the patients' BMI SDS were below –2 and 6,9 % were above +2 SDS. After tx none of the patients BMI SDS were below –2 SDS. 41,4 % of the patients BMI were above +2 SDS. OGTT was performed 2,7±2,9 years (range:0,15-11,8 years) after transplantation (table 2). 37 % (11 patients) of the patients had hyperglycemia during the first three months posttransplant due to PMP therapy. Nine patients had rejection in the first month and seven were hyperglycemic during the first three months. Two of these received insulin therapy. During evaluation 3 of the hyperglycemic patients during the first three months had DM /they had rejection during the first month and one had impaired glucose tolerance.

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Table 2 Mean values of glucose and insulin during OGTT

	Baseline	120 min
Serum glucose (mg/dl)	83,79±13,18	136,11±68,59
Insulin (mIU/ml)	18,67±24,49	62,35±78,12

Table 3 Mean levels of cholesterol, triglyceride, HbA1C according to NGT, IGT and PTDM, *p>0,05

	NGT	IGT	PTDM
Cholesterol*(mg/dl)	195,09±38,26	208,5±26,16	187,25±51,33
Triglyceride*(mg/dl)	163,95±70,57	169,0±5,65	164,0±14,79
HbA1C* (%)	5,3±5,2	5,4±0,0	5,8±0,22

The patients were divided into groups NGT, IGT or PTDM and because the number of patients were not enough IGT and PTDM patients were regarded as one group (DM). 7.1 % (2 patients) of the patients were catogorised as IGT, 14,3 % (4 patients) as PTDM. Insulin sensitivity measured with IR HOMA was impaired in 10 hastada % 37of the patients.
Mean cholesterol, trygliceride and HbA1c levels were 197,4± 40,0 mg/dl, 165,3 ± 62,93 mg/dl and 5,4 % respectively during evaluation (table 3). There was no difference as regard to Hba1C, cholesterol and triglyceride levels between NGT and DM (table 3). 54,5 % of the obese patients had impaired IR HOMA values. 15,4 % (2 patients) of the 13 patients with increased values of cholesterol according to age showed DM. 23,8 % of the patients with hypertriglyceridemia had DM.
30 % of the patients with impaired IR HOMA had increased cholesterol levels and 80 % of the patients with hypertriglyceridemia had impaired IR HOMA. 41,7 % of the obese patients had DM.
There was no correlation with duration of time and DM and impaired IR HOMA.
Seven of the patients received PMP therapy twice, four of them three times and one of them four times. One of the patients with IGT received PMP two times and two of the patients with PTDM received PMP three times. One of the patients with impaired IR HOMA received PMP two times and two of them received three times.
No correlation was found between PMP therapy and DM and impaired IR HOMA.

Conclusions

In order to decrease the complications of IGT, PTDM or insulin insensitivity as cardiovascular problems to a minumum degree postprandial glucose and insulin levels (OGTT) should be performed in posttransplant patients at certain times.

References

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