RESULTS OF TRANSPLANTATION OF KIDNEYS FROM DIABETIC DONORS

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Summary

Diabetic donors are still reluctantly accepted as potential organ donors because of supposed poor graft function caused by diabetic lesions. The results of transplantation of six kidneys from three donors with insulin dependent diabetes mellitus are reported. All three donors had a normal creatinine clearance and absence of proteinuria. Renal biopsies were taken.

Five grafts are still functioning, six months to two years after transplantation with a mean creatinine clearance of 69ml/min (range 51–95).

Three of five biopsies taken six months after transplantation showed marked decrease of the diabetic lesions. On the basis of these findings it seems justified to accept kidneys from diabetic donors for transplantation.

Introduction

Diabetic nephropathy is a well known complication of long standing insulin dependent diabetes. This complication usually leads to progressive renal failure requiring dialysis or transplantation. For this reason kidneys of donors with known insulin dependent diabetes have been reluctantly accepted for transplantation.

However ample experimental evidence exists on the prevention and reversibility of diabetic glomerular changes when diabetic kidneys are placed in a normoglycaemic environment. In view of the shortage of suitable organ donors it was thought worthwhile to investigate the utilisation of kidneys from diabetic donors for transplantation.

Methods

From June 1982 until February 1984 three potential kidney donors with insulin dependent diabetes mellitus came available within the region of Eurotransplant.
Donor ages at referral were twenty-one, thirty-seven and fifty-nine years. Brain death was the result of cerebral injury in two cases and thrombosis of the basilar artery with brain stem infarction in the other case. The donors suffered from diabetes mellitus for ten, seventeen and eighteen years respectively. All donors had stable blood pressure with small amounts of vasopressors, abundant diuresis, a normal creatinine clearance and absence of proteinuria. Consent of next of kin was obtained before the donor operation was started. In all cases no gross anatomical abnormalities were observed and the renal arteries were without signs of arteriosclerotic changes. The first warm ischaemic time was within the usual range. Four kidneys flushed excellently with Eurocollins and afterwards preserved by cold storage at 4°C.

Two kidneys of the same donor were placed on the Gambro preservation machine and had good perfusion characteristics. Prior to transplantation wedge biopsies were taken from each kidney for histological examination.

Results

Kidneys were transplanted after a cold ischaemic time ranging between twenty-six and fifty-two hours. All showed immediate diuresis.

One graft failed after three days due to rejection. The remaining five grafts are still functioning between six months and two years after transplantation. None of the patients died during their follow-up period. All kidneys were biopsied prior to and/or one hour after transplantation. Two biopsies of kidneys from the same donor showed no diabetic lesions. Light microscopic examination of the remaining four renal biopsies showed diffuse glomerulosclerosis with obliteration of capillary lumina in most glomeruli, basement membrane thickening with PAS positive material, arteriolosclerosis and insudative lesions in the form of capsular drops (Figure 1). Immunofluorescence examination for IgA, IgG, IgM and C3 were positive in two biopsies.

Figure 1. Glomerulus of kidney from a 21-year old donor with a 10 year history of insulin dependent diabetes. Biopsy taken one hour after transplantation: mild diffuse glomerulosclerosis, capsular drop and arteriosclerosis. Methanamin-silver, magnification x100
In three out of four biopsies taken at six months after transplantation a marked decrease of these lesions was observed compared to the pre-transplant observed lesions. One biopsy taken at two months after transplantation showed a slight resolution of glomerular changes although there was still basement membrane thickening and arteriolosclerosis (Figure 2).

Figure 2. Glomerulus of same kidney as in Figure 1. Biopsy taken two months after transplantation. Slight decrease in diabetic glomerular lesions. Methanamin-silver, magnification x 100

Discussion

Clinical features of renal involvement in diabetic patients appear at least ten years after the diagnosis of diabetes mellitus [1,2]. Albustix positive proteinuria is often the first sign of diabetic nephropathy. In contrast to clinical signs morphological changes of the glomerulus can be seen in an earlier phase. In the late phase, when overt proteinuria develops, these morphological changes have severely progressed. From experimental studies it is reported that glomerular changes occurring in the early stage of diabetic renal involvement can be prevented or reversed by accurate blood sugar control in contrast with glomerular changes in the late phase [3,4].

In man, regression of clinical diabetic nephropathy after control of hyperglycaemia is still a disputed matter although regression of light microscopic diabetic lesions in a transplanted kidney after a successful segmental pancreatic grafting was reported by Sutherland et al [5,6].

From this report it seems evident that early diabetic glomerulopathy is reversible in a normoglycaemic situation. These findings have important implications for the potential donor pool because they justify the use of kidneys from insulin dependent diabetic donors with a normal creatinine clearance and absence of proteinuria for transplantation.
References

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