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THE DONOR

SURGICAL COMPLICATIONS OF LIVING DONOR NEPHRECTOMY

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INTRODUCTION

Kidney donation is an important decision from the ethical point of view for the donor and the physician itself. As for any other kind of surgery the risk for pre and post-operative complications is present. The long term risk of donor nephrectomy is under evaluation in many centers. A recent study by Brenner (1) has suggested some physiologic effects of reduction of renal mass in living donors several years after nephrectomy. However simple nephrectomy leads to no difference in longevity of subjects as shown by Anderson (2).

Surgical complications of 148 living donors were reviewed in our center. Results are presented.

PATIENTS AND METHODS

148 living donor nephrectomies were performed in our center between January 1965 and December 1983. There were 77 females and 71 males. Mean age for the donors was $39.3 \pm$ years (range 18-62 years). Siblings represented 52%, parents 45% and non related donors 3%.

The medical evaluation of the donors included intravenous pyelogram and renal angiography. General evaluation and immunological tests were performed as well.

The left kidney was preferred because of the length of its vein. However, multiple arteries were present on the left side, the right kidney with a single artery was chosen. In the case of a slight malformation of one of the kidneys in the donor, that one kidney was preferred for transplantation. The left kidney was selected in 113 cases (76%) and the right kidney in 35 cases (34%). Twelve kidneys (8%) had multiple arteries (2 to 3 branches) and nine kidneys had multiple veins (6%). In the case of multiple vessels a vascular reparation was performed as described previously (3).

Technique for nephrectomy: The kidney was approached through a flank incision in the 10th intercostal space. Renal vessels were first dissected carefully. Tributaries of the renal vein (a. dre-

nal vein, genital vein) were ligated in divided. The initial 2 thirds of the ureter was dissected taking care of its vascularisation. The kidney was then freed from the surrounding tissues. During the operation infusion of manitol and fluid was performed in order to maintain a suitable diuresis.

When the site of transplantation in the recipient was ready, renal vessels were ligated and transected and the kidney removed from the operative field. The kidney was immediately cooled and perfused with chilled Euro-Collins solution, and transplanted in the recipient.

RESULTS

In every instance the selected kidney could be used for transplantation. Intra operative complications occurred in 3 patients. A splenectomy had to be performed in one patient. A massive aortic hemorrhage occurred in one patient at the time of the division of the renal artery. The renal artery was damaged during the preparation in one patient, the distal part of artery was resected and the kidney was transplanted without problems.

Post-operative complications occurred in 52 (35,13%) patients. One death (consecutive to a massive per-operative hemorrhage) was observed. Non specific complications occurred in 8 patients: a stress ulcer, cholecystitis necessitating cholecystectomy, 4 thrombophlebitis, one pulmonary embolism, one lung infection. Minor complications were represented by wound infection or hematomas (21 patients) and required only local treatment. The most significant complication was urinary tract infection that occurred in 21 patients. Most of them were asymptomatic and discovered on a routine urine culture. No symptomatic case of pyelonephritis was observed. All the infections observed were concomitant with bladder catheterization. Intra operative blood transfusion were not recorded before 1977. Between January 1978 and December 1983 only one blood transfusion (one unit) was required in a single patient. No significant difference in the early post-operative complications was observed between 1966-1977 and 1978-1983.

The patients were discharged after 10,8 days (range 8-30 days). Mean hospital stay was smaller in the late period 1978-1983.

DISCUSSION

The risk of death from nephrectomy in living donors was first

estimated to be as low as 0,05% by Hamburger in 1968 (4). Death has been reported in the literature in 4 instances (5-6). In our series, one death was observed. We have observed in our series 9 major complications (6%) and 42 minor complications. This represents a slightly higher rate of complications than the other series reported in the literature. However all complications were included in our series, including simple urinary tract infections. The risk of living donor nephrectomy appears in fact non negligible. For many years living donor transplantation was justified by the results on graft survival in the recipient, and the non availability of cadaver kidneys. At present, results of transplantation with kidneys from cadavers have improved, and are comparable to those of living donor kidneys. Considering the risks of nephrectomy in the donor, this may make living donor transplantation questionable. However living donor transplantation still gives the best results in identical siblings justifying this type of transplantation. The lack of availability of cadaver kidneys remains the main problem in the development of renal transplantation, this reason may be the base of the development of living donor kidney transplantation.

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SURGERY AND POSSIBLE COMPLICATIONS IN THE LIVING DONOR FOR THE PANCREAS TRANSPLANT, SHORT AND LONG TERM

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Between July 1978 and December 1983, 86 pancreas and 20 islets transplants were performed at the University of Minnesota, of which the outcomes on all except the most recent have been previously reported (1-5). Two of the transplants were performed (in 1977 and 1978) with dispersed islets prepared from segments of pancreases removed from HLA identical siblings of the recipients (4). Thirty-five of the pancreas transplants were segmental grafts from living related donors (4 parents, 24 HLA identical, 6 nonidentical siblings, 1 cousin). The age of the donors ranged from 20 to 74 years (mean 35 ± 14 years). Eleven of the pancreas donors had previously given kidneys to the same recipients. Twelve related donors were HLA DR 3; ten were DR 4; ten were DR 3, 4; and three were neither DR 3 or 4.

Currently 15 of 35 living related pancreas grafts are functioning (43%) 5 to 59 months post-transplant. In contrast, only 9 of 51 cadaveric pancreas grafts performed since 1970 are currently functioning (18%).

The use of living related donors was based on the premise that well matched grafts were much less likely to be rejected and on the knowledge that most of the pancreas can be removed from a normal individual without the occurrence of diabetes (6-8). Our criteria for selection of related donors has been previously outlined (9). The donor must be an adult and must be > 10 years older than the age of onset of diabetes in the recipient; the interval between onset of diabetes in the recipient and transplantation (the length of time the donor and recipient have been discordant for diabetes) must also be > 10 years, and the metabolic profile and glucose tolerance tests must be normal. If these criteria are fulfilled, the risk of diabetes occurring in the recipient in the

future should be small, and at least no greater than in the general population, even if the donor and recipient are HLA identical or are HLA DR 3 or 4. Barbosa et al (10) have shown that if a siblings or other immediate family member of a diabetic are destined to become diabetic, they will do so within 10 years of onset of the disease in the proband.

Most of our donors fulfilled these criteria. Two exceptions were one sibling (age 47) and one parent (age 64) who had mildly abnormal glucose tolerance tests; one of these has had a change in glucose tolerance after donation, while the other has not; neither have become diabetic. All donors were informed of the risks involved with the operation, and the project was approved by our University Committee on Use of Human Subjects in Research.

The operative technique for hemipancreatectomy in living related donors has previously been described (9,11). The splenic artery and vein are ligated in the hilum of the spleen, leaving intact the short gastric, gastroepiploic, and other accessory vessels or collateral blood supply. The tail and distal body of the pancreas are mobilized, and the gland is divided at its neck portion where it overlies the portal vein; the duct is ligated and the cut surface of the proximal pancreas is oversewn. The splenic artery is divided and ligated at its origin from the celiac axis, and the splenic vein is divided at its termination in the portal vein. Of the 37 donors, complications requiring reoperation occurred in 2 (5%); splenectomy because of splenic devascularization in one, and religation of the pancreatic duct at the line of transection because of a leak in the other. One additional donor developed a fluid collection (pseudocyst) in the region of the pancreatic remnant; this was aspirated percutaneously and it did not recur. Sulfur colloid technetium-99 scans showed that the spleen functioned in 37 of the donors after the operation (97%). Currently (May 1984), all donors (100%) are alive and generally well, the longest followup being 6.6 years.