

KIDNEY TRANSPLANTATION IN CHILDREN: A 50-CASE EXPERIENCE

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ABSTRACT

Objectives: The aim of this article was to report our experience with kidney transplantation in children.

Materials and Methods: From June 1980 to December 2003, 690 kidney transplants were performed in our institution, among which 50 were in patients with less than 18 years old. Technical aspects as well as clinical and surgical evolution were reviewed in this study.

Results: Patient's mean age was 12 years (2-17 years). Twenty-nine patients were male and 21 female. Live related donors were responsible for 75% of the cases (38 patients) and 25% (12 patients) came from cadaver donors. The main complications were ureteral fistula in 6 patients (12%), arterial stenosis in 2 (4%), wall infection and dehiscence in 1 case (2%). The overall rate of surgical complication was 20%.

No case of hyperacute rejection was reported. During the follow-up 20 grafts were lost due to chronic rejection and 2 patients died. No loss of graft due to surgical complications was reported. The graft survival rate was 71% in 1 year, 64% in 3 years and 57% in 5-year follow-up.

Conclusions: Kidney transplantation in children is a viable treatment option for terminal kidney disease presenting success and surgical complication rate similar to kidney transplantation in adults.

Key words: kidney transplantation; children; complications; graft survival

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INTRODUCTION

Pediatric renal transplantation is an excellent option for the treatment of uremic children. Even though the first successful transplant was made in 1954, the first data on kidney transplantation in children were published only in 1966 (1).

Almost 3 decades ago, Riley (2) suggested that the decision to perform a surgery should take into consideration 2 main questions: the survival prolongation and the factors of discomfort on the child's point of view. Another important factor was the delay in growth that occurred after well-succeeded transplants, resulting in the use of a kidney in a "healthy dwarf" (2).

In 1985, Fine (3) showed that the growth in transplanted prepubertal children was greater as compared to children on dialysis. Transplantation, as an initial therapy in breastfed infants and in minors, however, still rouses a certain controversy.

In 1987, The North American Pediatric Renal Transplant Cooperative Study (NAPRTCS) was organized aiming at the participation of United States and Canada transplant centers that make more than 4 pediatric renal transplantations per year. This is presently the most complete data bank on kidney transplantation in children (4).

National data on pediatric renal transplantation are only now arising. In 1997, the National Trans-

plant System (NTS) was created. Brazil has 135 NTS authorized centers today, however, the number of procedures is still considered low. In 2003, 1784 renal transplantations were accomplished with live donors and 1342 transplantations with cadaver donors. From those, 18 transplantations were performed in patients between 0 and 5 years, 112 transplants between 6 and 14 years and 115 transplants in patients between 15 and 18 years (5).

Many studies in adults confirm that the survival of a renal-transplanted person is superior to that of patients on dialysis and probably the same applies to children (6). This article aims at reporting our experience with kidney transplantation in children.

MATERIALS AND METHODS

From June 1980 to December 2003, 690 kidney transplantations were performed in our institution, 50 of which were in patients with less than 18 years of age.

All patients were submitted to general anesthesia through a central venous catheter with monitoring of the central venous pressure. The incision used was the external pararectal with retroperitoneal access in all patients.

The protocol of the immunosuppression employed was azathioprine (1.5 mg/kg/day) and prednisone (0.5 mg/kg/day) until 1985, when cyclosporin (15 mg/kg/day) was added. After 2001 the protocol of the immunosuppression employed started to associate prednisone (0.5 mg/Kg/day), tacrolimus - FK 506 (0.2 mg/kg/day) and micofenolate (600 mg/m²/day).

Technical aspects, as well as clinical and surgical evolutions were accessed.

RESULTS

The mean age of patients was 12 years (2-17 years). Twenty-nine patients were male and 21 female. Their weight varied from 11 to 47 Kg (mean of 31 Kg).

Regarding the arterial anastomosis, the hypogastric artery was the one used in 42 cases (84%), common iliac in 4 cases (8%), external iliac in 2 cases (4%), and the aorta in 2 cases (4%).

The venous anastomoses were performed with the external iliac vein in 44 cases (88%), vena cava in 4 (8%) and the common iliac vein in 2 cases (4%).

There were no cases of vesical enlargement previous to transplantation. In a patient with myelomeningocele, the ureteral reimplant was made in the vesicostomy, since the family refused the performance of vesical enlargement. The ureterovesical reimplant in all cases was extravascular through the Lich-Gregoir technique and 6 patients needed a ureteral stent.

There were no cases of hyperacute rejection. During the follow-up period, 20 grafts were lost due to chronic rejection and 2 patients died.

There was no loss of grafts due to surgical complications. The main complications were ureteral fistula in 6 patients (12%), arterial stenosis in 2 (4%), wall infection and dehiscence in 1 case (2%). The overall rate of surgical complication was 20%. Four patients were submitted to ureteral reimplant (through the Politano-Leadbetter technique) and placement of ureteral stent. A patient was submitted to nephrostomy with ureteral ligation and later reconstruction (uretero-uretero anastomosis and placement of ureteral stent) and a patient was submitted to a primary uretero-uretero anastomosis with the placement of ureteral stent. The 2 patients with artery stenosis were treated with angioplasty and placement of ureteral stent. The 6 lymphocele cases were described in ultrasonographic findings and the option made was of a conservative treatment due to the small volume of collections.

There was hemotransfusion in 35 patients (70% of the cases), mainly in the beginning of the experience in low weight children (below 25 Kg), due to the absence of commercial erythropoietin.

Live related donors were responsible for 75% of the cases (38 patients) and 25% (12 patients) came from cadaver donors.

The graft survival rate was 71% in 1 year, 64% in 3 years and 57% in 5 years follow-up.

COMMENTS

In the United States, kidneys from pediatric donors were indicated to children until 1990. The results of the use of small donor kidneys in both chil-

dren and adults show smaller survival rate mainly if the donor's age is inferior to 2 years (7).

The use of adult donors for transplantation in children under 1 year of age is also technically impossible. There is a need of a careful preoperative hydration in order to avoid hypotension and to reduce the chance of a renovascular thrombosis. It is admitted that there is an unbalance between the vascular resistance of the grafted kidney and the capacity of the fragile cardiovascular system of the child to perfuse it (2).

Renal transplantation in children does not significantly differ from the same procedure in adults when the recipient weighs 20 kg or more (8). Generally speaking, the most proximal vessels are chosen for the implant. The artery and the common iliac vein are the most used ones, being also possible to opt for the aorta and vena cava (7). In our institution, we most commonly use the anastomosis of renal vessels with the external iliac vein and the hypogastric artery since we are more experienced with this technique, also with excellent results.

The arterial anastomoses should be performed with separate stitches using a polypropylene thread 6-0, mainly in the cases of termino-terminal reconstruction, or at least in half of the circumference in other anastomoses, allowing a future growth, decreasing the risk of stenosis. In most cases venous anastomosis can be performed in a continuous way with a polypropylene thread 5-0 (7).

At the time the clamps are taken from the renal vessels a big hemodynamic repercussion can occur. An adult kidney might need 200-300 mL of blood, representing a large part of a small child's blood volume. Immediately before the child should receive a hydric overcharge keeping its central venous pressure between 12 and 16 cm H₂O (8). Clamps should be removed gradually. All those measures envisage the prevention of hypotension, ischemia and vascular thrombosis (7). Even though thrombosis is a highly feared complication in pediatric renal transplantations, we did not have any case in our casuistic.

In low weight patients the approach can be either retroperitoneal or transperitoneal, being this last one reserved to children with a very reduced weight

(< 15 Kg) and with a big difference between the size of the graft and the receptor (8).

In transperitoneal implants, the kidney placed is in a retroperitoneal position, with a right colon displacement. Retroperitoneal approach, however is possible even in children with a weight under 15 Kg. In a recent study that followed 19 children with weight inferior to 15 Kg good results were found with the use of a retroperitoneal approach. This technique reduces the chances of gastrointestinal lesions and restrains possible surgical complications such as bleeding and urinoma (9). In our experience, the placement of the kidney in the retroperitoneum did not present major difficulties even in smaller children.

The ureteral reimplant, in most of the cases, is done through the Gregoir anti-reflux technique, with good results. In a recent article (10) results of the follow-up of 166 pediatric patients submitted to uretero-ureteral anastomosis were presented. The compilation rate was similar to the Gregoir reimplant, encouraging the use of this technique in pediatric renal transplantation. Even though the idea of uretero-ureteral anastomosis is attractive, we continue to perform Gregoir reimplant following the ureteral stent positioning only in cases of doubt as to the quality of the anastomosis.

There are reports of recent advancements in the area of pediatric renal transplantations. Laparoscopic nephrectomy in pediatric kidney donors has presented similar results to adult donors, without significant changes in the organ retrieval method (11).

The follow-up of all patients was performed in our institution. The study comparing pediatric patients followed in the same institution where the transplant was performed to patients accompanied by their original nephrologists did not show any difference in the evolution of both groups (12).

There are many published articles that prove the efficacy of pediatric renal transplantation even in patients with severe vesical dysfunction secondary to myelomeningocele (13) or posterior urethra valve (14).

CONCLUSION

Kidney transplant in children is a viable treatment option to terminal renal disease presenting a rate

of success and rate of complications similar to adult transplantations.

CONFLICT OF INTEREST

None declared.

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