Journal of Pediatric Urology (2014) 10, 737—743

Journal of Pediatric urology

Surgical complications and graft function following live-donor extraperitoneal renal transplantation in children 20 kg or less

Mohammed S. ElSheemy [a,*], Ahmed M. Shouman [a], Ahmed I. Shoukry [a], Sherif Soaida [b], Doaa M. Salah [c], Ali M. Yousef [a], Hany A. Morsi [a], Fatina I. Fadel [c], Sameh Z. Sadek [d]

[a] *Division of Pediatric Urology, Aboul-Riche Children's Hospital, Cairo University, Cairo, Egypt*
[b] *Division of Pediatric Anesthesia, Aboul-Riche Children's Hospital, Cairo University, Cairo, Egypt*
[c] *Division of Pediatric Nephrology, Aboul-Riche Children's Hospital, Cairo University, Cairo, Egypt*
[d] *Urology Department, Kasr Al-Ainy Hospital, Cairo University, Cairo, Egypt*

Received 27 October 2013; accepted 13 December 2013
Available online 15 January 2014

KEYWORDS
Renal transplantation;
Extraperitoneal approach;
Live donor;
Low body weight children;
Pediatric

Abstract *Objectives:* To evaluate the effect of patient, surgical, and medical factors on surgical complications and graft function following renal transplantation (Tx) in children weighing ≤20 kg, because the number of this challenging group of children is increasing.
Patients and methods: Between June 2009 and October 2013, 26 patients received living donor renal allotransplant using the extraperitoneal approach (EPA). The immunosuppression regimen was composed of prednisolone, mycophenolate mofetil, and ciclosporin or tacrolimus.
Results: The mean weight was 16.46 ± 2.61 kg. Mean cold ischemia time was 53.85 ± 12.35 min. The graft survival rate (GSR) and patient survival rate (PSR) were 96% at 3 years. Acute rejection episodes (AREs) occurred in eight patients (30%). Postoperative surgical complications were ureteral leakage (3), vesicoureteric reflux (2), and renal vein thrombosis (2) (with one graft nephrectomy). Mean follow-up was 37.5 ± 7.4 months.
Conclusion: Excellent PSR and GSR can be achieved in low weight (<20 kg) recipients. Even in very low weight patients, the EPA was used. No cases were reported with primary graft non-function due to use of living donors, increasing pre-Tx body weight to at least 10 kg and maintaining adequate filling pressure before graft reperfusion. The presence of related donors and use of induction therapy and tacrolimus decreased the rate of ARE while the presence of pre-

* Corresponding author. Tel.: +20 1006117755; fax: +20 237809663.
E-mail addresses: mohammedshemy@yahoo.com, mohammedshemy@hotmail.com (M.S. ElSheemy).

http://dx.doi.org/10.1016/j.jpurol.2013.12.013

Tx lower urinary tract surgical interventions increased the rate of ureteric complications, but this was statistically insignificant.

Introduction

Recent developments in prenatal diagnosis and subsequent treatment of urological abnormalities have reduced perinatal mortality from renal insufficiency. There is therefore increased survival beyond the first months of life of a very special group of young patients with end-stage renal disease (ESRD) who will require renal replacement therapy (RRT) [1]. Renal transplantation (Tx) is the treatment of choice for them [2]. The 5-year patient survival rate (PSR) for Tx (94–97%) exceeds dialysis (75–87%) [3]. Tx is still used less frequently in very young children because it is technically more demanding. There are complex surgical and pediatric intensive care requirements. Younger patients present specific anesthetic problems related to vascular and hemodynamic changes after graft revascularization [4]. Our aim was to evaluate the effect of patient, surgical, and medical factors on the surgical complications and graft function following Tx in children weighing $\leq$20 kg.

Patients and methods

Between June 2009 and October 2013, 26 patients weighing 11–20 kg were included in this prospective study. They received living donor renal allotransplant at the Uronephrology Unit, Children's Hospital, Cairo University. Evaluation for recipients and potential donors included a detailed history and examination, routine laboratory testing, a work-up for infectious diseases, and abdominal ultrasonography (US). Evaluation for a potential donor also included a 24-hour urine collection for creatinine clearance and protein excretion, and renal isotope and spiral computed tomography scanning to determine the number of renal arteries (RAs). Recipient evaluation also included TB urinalysis, voiding cystourethrography (VCUG) and echocardiography. Thrombophilia work-up was carried out in all cases including protein C, protein S, antithrombin 3, and other factors. Additional tests were done when required, such as urodynamic studies and cystoscopy.

Under general anesthesia, the routine extraperitoneal approach (EPA) was used. A central venous line was introduced in the internal jugular vein guided by ultrasound for central venous pressure (CVP) monitoring and volume management. The arterial blood pressure (ABP) was monitored directly through an arterial cannula. Maintenance crystalloid fluids were supplied (4 mL/kg/hour for the first 10 kg of body weight (BW) then 2 mL/kg/hour for the next 10 kg BW). After adjustment of any underlying hypovolemia detected by decreased CVP (normal range 5–10 cmH_20), conservative fluid management was adopted, through replacement of insensible fluid losses and blood loss, in order to avoid postoperative edema. Packed red blood cells (RBCs) were transfused if hemoglobin (Hb) $<$ 7 g% (packed cells [mL] $=$ BW [kg] $\times$ Hb rise required [gm/L] $\times$ 0.4). If the patient had hypoalbuminemia, albumin 5% was transfused to maintain the albumin level within normal range. At the time of vascular anastomosis, a CVP range of 15–20 cmH_2O was attained in order to maintain the filling pressure before kidney reperfusion. Dopamine infusion (2–5 μg/kg) was used to maintain ABP if required. The overall aim was to keep ABP in a range approximating the donor's normal adult ABP and a little bit hypervolemic until graft function is well established.

A Gibson incision was done (on the right side to facilitate access to the inferior vena cava [IVC] starting below the thoracic cage). The external oblique, internal oblique, and the transversus abdominis muscles were incised. The inferior epigastric vessels were divided and ligated. The peritoneum was swept medially starting at the level of the round ligament (transected and ligated) or vas deferens. A self-retaining Buchwalter retractor was used in all patients to facilitate traction and exposure of the wound using fixed and adjustable blades. The common iliac vessels and distal parts of the aorta and inferior vena cava were exposed. Furosemide 0.5–2 mg/kg was administered intravenously just before vascular declamping. The sites for vascular reconstruction were chosen by placing the graft into the iliac fossa to determine the best fit to avoid vessel traction or kinking. Renal vein (RV) anastomosis to the IVC was done using a running 5-0 polypropylene suture followed by RA anastomosis to the aorta using a 6-0 polypropylene suture. Urinary tract reconstruction was carried out by extravesical ureteroneocystostomy (Lich–Gregoir). All graft ureters were routinely stented.

As regards induction immunosuppressive therapy, high immunological risk children received antithymocyte globulin (ATG) prior to transplantation (pre-Tx). All children received methylprednisolone (10 mg/kg/day) intravenously (on the night of the operation, induction of anesthesia, declamping time, 6 h postoperatively and once on the first postoperative day (D1)). It was then gradually tapered and converted to oral prednisolone.

Post-transplantation (post-Tx), all patients were placed on an immunosuppression regimen of prednisolone, mycophenolate mofetil (30 mg/kg), and ciclosporin (8–10 mg/kg/day) or tacrolimus (0.1–0.15 mg/kg/day). The target prednisolone dose 15–30 days postoperatively was 1 mg/kg/day. The prednisolone dose was subsequently reduced gradually to reach 5–7.5 mg/day at the first 6 months and 2.5–5 mg/day at next 6 months. The ciclosporin dose was adjusted based upon its blood concentration. The trough ciclosporin level (C0) was routinely measured at D4. It was also measured 2 days after any dose modification or addition of any interacting drugs. The targeted C0 level was 200–250 ng/mL for the first 2 weeks; then it was gradually tapered to reach 100–150 ng/mL from the seventh month postoperatively. The peak ciclosporin (C2) level was only measured in cases with difficult dose adjustment and impaired graft function. Tacrolimus was used with a target