CAN TRANSPLANTATION OF KIDNEY FROM LIVING RELATED DONOR WITH BOTH-SIDED DOUBLE RENAL ARTERIES TO ADPKD PATIENT ALLERGIC TO MUSCLE RELAXANT SUCCEED? – A CASE STUDY.

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ABSTRACT

55-year old man (BMI = 32) with ESRD caused by ADPKD was qualified to kidney transplantation. His 63 years old sister (BMI = 24, GFR = 97 ml/min/1.73 m² and both-sided double renal arteries) volunteered to be an organ donor. In the half of March 2014, open nephroureterectomy procedure was performed. Left kidney was prepared and ureter was cut out. Then, transplant recipient revealed anaphylactic shock during induction of his general anaesthesia. Donors ureter was reconstructed by end-to-end repair. The diagnosis of recipient’s allergy to the antibiotic was suspected. A month later, second try of transplantation was performed. At those time, ciprofloxacin instead of ceftriaxone was administered for the recipient, however symptoms of the anaphylactic shock occurred again. Further diagnostic tests for anaesthetic agents showed positive intradermic allergy tests with cisatracurium. Next month, third try of kidney transplantation was organized and pancuronium was administered for skeletal muscles relaxation. Recipient anaesthesia underwent without any complications. The kidney was successfully procured despite of some postinflammatory adhesions over the kidney and ureter due to the previous surgery. Both renal arteries were attached separately end-to-side each one to recipient’s iliac external arteries. The diuresis of the recipient started in few days after transplantation, but serum creatinine concentration still estimates above 6 mg/dl, with CKD-EPI GFR in the range of 10-15 ml/min/1.72 m². Three years later, patient does not require any renal replacement therapy and does not have to conduct fluid restriction. The donor remains under regular follow-up care. The donor’s serum creatinine concentration of the is 1.3 mg/dl. Despite of GFR estimated at 40 ml/min/1.73 m², the donor has no complains, does not require any special treatment and declares no regrets of decision to kidney donation.
BACKGROUND

Autosomal dominant polycystic kidney disease (ADPKD) is the fourth leading cause of renal failure, accounting for 3%-4% of all end-stage renal disease (ESRD). Approximately 50% of patients with ADPKD will require dialysis or transplantation. There are still not enough cadaver donors to meet the soaring demand for organs. Despite of more than 1000 renal transplantsations performed in Poland each year, comparable number of patients have an active status on the National Waiting List for Transplant. Still only 5% of all transplanted kidneys came from living donation. In response to shortage of donor organs and long waits, many transplant centers have expanded their selection criteria for living donors. However, the outcomes for recipients of kidneys from these medical complexities donors are largely uncertain.

CASE REPORT

55-year old man (body mass index (BMI) = 32) with ESRD caused by ADPKD, requiring dialysis for 1 year, admitted to Transplantation Surgery Department at the beginning of 2014. His past medical history revealed left-sided and right-sided nephrectomies in 2013, with no complications noted. He was qualified to kidney transplantation. His sister (63 years old female with no comorbidities, BMI = 24) volunteered to be an organ donor. There were two HLA mismatches occurred at the HLA-B and HLA-DR loci. Transplant procedure was planned to be conducted. Donor’s imaging (CT scan, MRI) revealed both-sided double renal arteries. Her total glomerular filtration rate (GFR) estimated with Chronic Kidney Disease Epidemiology Collaboration (CKD-EPI) equation was 97 ml/min/1.73m2. As the organs function was equivalent (split function: 47% for left kidney, 53% for right kidney), decision of left-sided nephrectomy was taken by the qualifying council.

In the half of March 2014, open nephroureterectomy procedure was firstly performed to the donor. In the first step, left kidney was prepared. Then, ureter was detected, isolated and cut out. In the meantime, pantoprazole, ceftriaxone and the premedication with midazolam and fentanyl have been already administered to recipient. Induction of general anaesthesia was conducted with using propofol and cisatracurium, when patient revealed anaphylactic shock manifested with hypotension and tachycardia. Anaesthetic team decided to stop the anaesthesia. Donor’s ureteral stump was found and the ureter was reconstructed by end-to-end repair with using double J stent. Kidney was placed in its previous location in adipose capsule. As a result, we decided to contact with surgery department that performed both nephrectomies previous year. No information about any complications during the previous anaesthesia was found. The diagnosis of allergic to the antibiotic was suspected.

A month later, transplant council decided to perform a transplant procedure once again. At those time, kidney recipient was induced into general anaesthesia prior to his donor. Ciprofloxacin instead of ceftriaxone was chosen. While cisatracurium was administered, symptoms of dyspnoe, hypotension, numbness and rush over the whole body occurred. Few moments later, patient developed the anaphylactic shock again. Nephrectomy procedure to the donor wasn’t performed. Double J stent was removed. Further examination procedures were conducted. The recipient was referred to the allergological unit for diagnostic tests for many anaesthetic agents. The examination showed positive intradermic allergy tests with cisatracurium and confirmed the diagnosis of allergy to that. Next month, third try of kidney transplantation was organized. At those time, pancuronium was administered for skeletal muscles relaxation. There were no complications during recipient’s anaesthesia. There were some difficulties during the donor’s nephrectomy. Transperitoneal approach for open nephrectomy was ordered, because of a lot of postinflammatory adhesions over the kidney and ureter due to previous releasing. Finally, the organ was taken successfully.

For the transplantation procedure, J-shaped skin incision was made and extraperitoneal space was opened on its left side. External iliac blood vessels were isolated. The donated kidney was putted into its place and singular renal vein was attached end-to-side into the patient’s left external iliac vein. Then, both renal arteries were attached separately end-to-side each one to iliac external arteries. Transplant organ perfusion was rewarded after the clamps removal. The pulse was observed on all the arteries. First warm ischemic time (WIT) was 200 sec and second WIT was 1 h 43 min. The immunosuppressive protocol included basiliximab for induction and mycophenolate mofetil, tacrolimus, and steroids for maintenance treatment was administered. On 1st postoperative day, no pathologies were observed in the first control ultrasonography imaging. There was no visible distention of the renal pelvis and calyces. Pulsatility index (PI) and resistance index (RI) were within the range of normal (PI 0.64, RI 1.07). However, patient required dialysis on second postoperative day and delayed graft function was diagnosed. Donor was discharged in the fourth postoperative day with no complaints.

Recipient diuresis started in few days, but creatinine serum concentration still estimates about 8 mg/dl. The biopsy of the kidney graft showed an unequivocal result. No acute rejection process was diagnosed. The necrosis of some part of the specimen was only observed. Despite of that, empirical pulse corticosteroid therapy with methylprednisolone was administered with no satisfactory results. Next ultrasonography showed a lack of blood flow in the lower pole of the kidney. Both allograft renal arteries with preserved blood flow were visualized. However, increased resistance in one of them was diagnosed and percutaneous transluminal coronary angioplasty procedure of both allograft arteries was successfully performed. Since then, SCR has been consistently above 6 mg/dl, with the estimated CKD-EPI GFR in the range of 10-15 ml/min/1.73m2, but nowadays patient does not require any renal replacement therapy and does not have to conduct fluid restriction. His donor remains under regular follow-up care. Her SCR is 1.3 mg/dl at 3 years after nephrectomy. Despite of GFR estimated at 40 ml/min/1.73m2, she has no complains,
does not require any special treatment and declares no regrets of decision to kidney donation.

**DISCUSSION**

It is established nowadays, that kidney living donor is anesthetized to nephrectomy prior to its recipient’s surgical procedure. Presented case makes to wonder, if the induction of general anaesthesia shouldn’t be performed in parallel to both of them. Although the recipient underwent two operations under the general anaesthesia in his past, no information about any complications was available. It proves, that the medical crew must be constantly prepared to cope with all possible complications, even the most unpredictable. In reported case, donated kidney was small-sized while recipient BMI was 32. Prolonged WIT is also an established risk factor of delayed graft function. Additionally, two renal arteries attached separately end-to-side to iliac artery cause a double increase of the risk of anastomosis-related complications like perfusion disorders. Despite of all, current diuresis estimates about 2 litres per day and neither clinical, nor biochemical indications for dialysis are observed. Recipient has no complaints, as well as his donor. Ongoing lack of organs for transplantation with generally successful outcomes of living donation have led to loosen eligibility criteria for potential donors. Thus, a growing proportion of living kidney donors have medical or demographic traits, that previously may have excluded them for donation [1]. Such donors are categorised as “marginal donors” or “expanded criteria donors” [2], but the term “medically complex donors” seems to be the most suitable [3]. In accordance to the Amsterdam Forum principles [4], the expanded criteria for living kidney donation include: age ≥60 years, body mass index >30 kg/m2, history of hypertension, dyslipidemia estimated glomerular filtration rate <80 mL/min, proteinuria or microscopic haematuria, and fasting glucose >100 mg/dL.

The impact of donor age on transplant recipient’s outcome has been studied extensively so far. There are some studies published, that report the inferior graft survival [5-8] and recipient survival [7] among recipients of kidneys from older living donors. To the contrary, Balachandran et al. revealed in their study no statistically significant difference between donor age groups in terms of recipient survival, death-censored graft survival, or rates of vascular complications or acute rejection [9]. It should be noticed, that older donors usually have lower predonative GRF when compared to the younger once [10-11]. If so, is it mostly older age or reduced renal function responsible for different graft function? At the same time, a study published by Berger et al. revealed that recipient and graft survival in older living kidney donation are similar as that seen in younger, non-ECD deceased donations [12]. This justifies the consideration of older candidates as a living kidney donors, especially if no significant difference in short-term mortality and surgical outcomes between donor age group are observed, as literature suggest [5,13].

For years, anatomical variables (especially cases of multiple allograft arteries) constituted a contraindication to kidney procurement for organ transplantation [14]. Nowadays, it is well established that perioperative complication rates and overall outcomes are not significantly different both for donor and recipient, when compared to cases with typical anatomy [15-17]. Despite of all, anaphylactic reaction of the transplant recipient appears to be the most important issue in presented case. Allergy to the miorelaxant was not noted in the past medical history, although retrospective thorough analysis revealed some hard-controlled hypotension noted during the previous anesthesia.

**CONCLUSIONS**

Each volunteer should to be considered individually as a potential living kidney donor. The use of medically complex living donor seems to be acceptable and can ameliorate the severe organ shortage. It is one of the crucial factors for the improvement of living donor kidney transplant programme. Due to the skilled surgical team as well as good transplantation and nephrology care, the outcomes of the procedure are satisfying in presented case.

**CITE THIS AS**


**ABBREVIATIONS**

ADPKD – autosomal dominant polycystic kidney disease
BMI – body mass index
CKD-EPI – Chronic Kidney Disease Epidemiology Collaboration
CT – computer tomography
ESRD – end-stage renal disease
GFR – glomerular filtration rate
HLA – human leukocyte antigen
MRI – magnetic resonance imaging
PI – pulsatility index
RI – resistance index
WIT – warm ischemic time

**REFERENCES**


