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## Case Report / Приказ случаја

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### En block paired cadaveric renal transplantation from an 18 months old infant as a donor to an adult recipient: Case report and literature review

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## En bloc paired cadaveric renal transplantation from 18 months old infant as a donor to adult recipient: Case report and literature review

„En bloc“ кадаверична трансплантација два бубрега са детета старости 18 месеци као даваоца на одраслог примаоца: Приказ случаја и преглед литературе

### SUMMARY

**Introduction** Even, in modern era of kidney transplantation, usage of small grafts from pediatric cadaver donors remains controversial. This kind of transplantation is rare and so far limited data are presented. Major problems with one infant kidney transplantation are difficulty to perform vascular anastomosis, vasospasm, renal vein thrombosis and small infant kidneys with bad venous runoff. However, „en bloc“ infant kidney transplantation could resolve this problems.

**Case outline** We report transplantation of „en bloc“ cadaver kidneys from a 18-month-old infant. The transplant recipient was a 32-year-old male, body weight 65 kg. Abdominal ultrasonography showed kidneys growing, no hydronephrosis, perirenal or retroperitoneal collections were seen.

**Conclusion** Transplantation of infantile kidneys „en bloc“ in our adult recipient provided good results. Follow-up will show the final effect.

**Keywords:** kidney transplantation, methods; dual kidney transplant; paediatric kidney donor; patient selection

### САЖЕТАК

**Увод** И у модерној ери трансплантације бубрега, употреба малих органа са кадаверичних педијатријских давалаца остаје контроверзна. Оваква трансплантација је ретка са мало објављених података. Главни проблем код трансплантација са једним дечјим бубрегом је тешкоћа у креирању васкуларних анастомоза, спазам крвних судова, тромбоза реналне вене и мала величина дечјег бубрега са недовољним венским протоком. Трансплантација два дечја бубрега „у блоку“ могла би решити ове потенцијалне проблеме.

**Приказ болесника** Приказујемо „у блоку“ кадаверичну трансплантацију бубрега са 18 месеци дечјег даваоца. Одрасли мушка-рац старости 32 године и телесне тежине 65 кг је био примаоц. Контролни ултразвук трбуха је потврдио увећање оба бубрега, без присутне хидронефрозе, периреналне и ретроперитонеалне течности.

**Закључак** Трансплантација парних дечјих бубрега „у блоку“ на одраслог примаоца је дала добре резултате. Праћење ће показати коначни резултат.

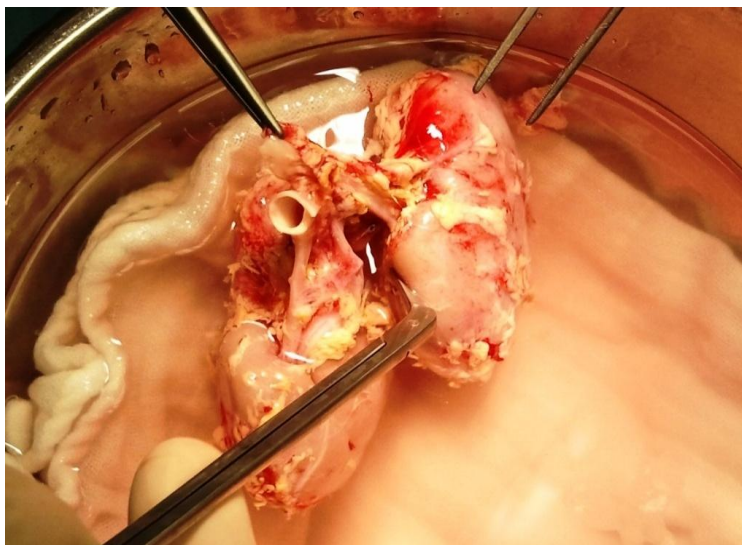
**Кључне речи:** трансплантација бубрега, методе; трансплантација два бубрега, дете давалац бубрега; селекција болесника

### INTRODUCTION

Single infant kidney transplantation is technically more demanding, more often complications are present, as well as graft loss, either due to injury at the start or later due to hyperfiltration. [1-2]. Transplantation of a pair of kidneys in the block constitutes a solution, and in the era of ever-increasing organ needs as a marginal donor, reduces the number of potential recipient by half. Even, in modern era of kidney transplantation, usage of small grafts from pediatric cadaver donors remains controversial. This kind of transplantation is rare and so far limited data are presented. This was the first case of infant kidney cadaver transplantation to adult recipient performed in our institution. We report a case of kidney transplantation from 18 month old infant to adult men.

### CASE REPORT

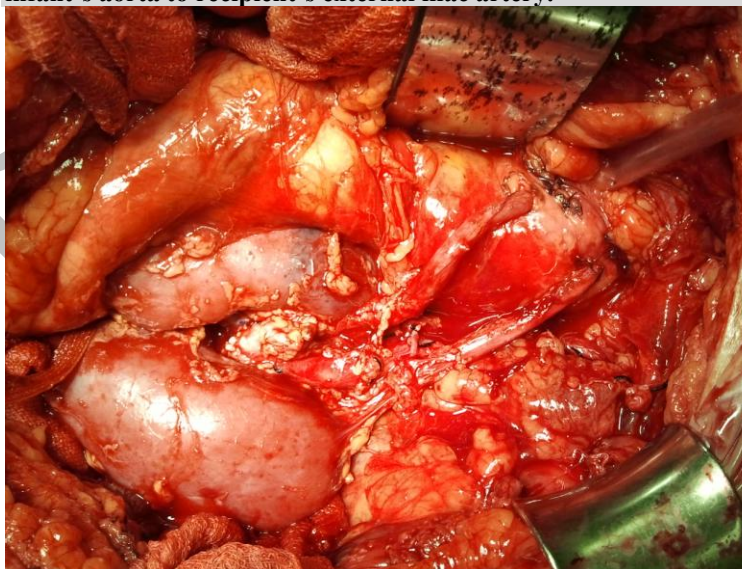
A 18 month old male infant with diagnosed brain death as consequence of extreme dehydration. After parents approval organ procurement was planned. „En bloc“ kidney procurement was performed, including both kidneys with segment of aorta, inferior vena cava (IVC) and both ureters (Figure 1). Kidney perfusion was performed „in situ“ with Euro-Collins solution (1000 ml). Cold ischemia time was 13h. Kidneys measurements were 5.7 x 4.2 x 1.7 cm and aortic and IVC diameter were about 10mm.



**Figure 1. Kidneys preparation.**



**Figure 2. Sutured proximal end of infant's aorta and inferior vena cava (ICV). "End-to-side" anastomosis of infant's ICV to recipient's external iliac vein. "End-to-side" anastomosis of infant's aorta to recipient's external iliac artery.**



**Figure 3. Separate UCN for both ureters.**

A recipient, male 32 years old, (65 kg, 175 cm) with end-stage renal disease was chosen as no child with terminal kidney disease was compatible. Donor was A positive, HLA compatibility 3/6 and negative „cross-match“ using complement dependant cytotoxicity (CDC). Patient was on hemodialysis for last four years (3 times per week), with no diuresis and serum creatinine level was 1052 mmol/l. Preoperative examination included abdominal ultrasonography, MSCT with pelvic angiography and intravenous urography. Operation was done through right Gibson incision. Kidneys were placed at both sides of right iliac blood vessels: left kidney in right iliac fossa and right kidney below aortic bifurcation (Figure 2). “End-to-side” anastomosis of infrarenal infant aorta and ICV and external iliac vessels with continuous GORE TEX CV7 sutures were performed. Suprarenal portions of aorta and IVC were oversewn with continuous 5-0 nonabsorbable monofilament suture. Separate antireflux uretero-cysto-neostomias (UCN) with two J-J stent were made (Figure 3). Diuresis started after 15 min with good perfusion of both kidneys. In the postoperative period diuresis was about 9 L/24 hours and level of creatinine fall on 200 mmol/L.

Abdominal ultrasonography showed kidneys enlargement (8x4x2 cm), moreover no signs of hydronephrosis, perirenal or retroperitoneal collections were recorded. Good flow through arterial and venous anastomosis, and good perfusion of both kidneys were recorded by color Doppler exam. Anti-thymocyte globuline (ATG), methyprednisolone, mycophenolat mofetil and tacrolimus were used as immunosuppressive therapy. There were no surgical complications and on 15<sup>th</sup> postoperative day patient was discharged.

## DISCUSSION

Modern transplant surgery is challenged with lack of available organs needed for transplantation. This the main reason while marginal donors are used more frequently for organ procurement. Main characteristic of these donors are increased transplantation risk, deficiency of functional nephrons, diabetes, hypertension, and age older than 60 years. Recently, more infant organ donors are accepted for kidney procurement. In 1969 a report was submitted on the first successful transplantation of a pair of kidneys from pediatric kidney to an adult [ 3]. Different techniques are being developed, Salehipour and others explain this in their papers [ 4]. Small vascular and urethral anastomoses present technical challenge for surgeon. Small and immature kidney vascular vessels and large and mature vessels of recipient make vascular anastomosis technically more difficult to perform. This problem is overcome with end-to-side anastomoses of the infrarenal donor vena cava and aorta to the recipient vessels [5]. The other method, is a interposition grafting of the aorta and vena cava to the recipient vessels [6]. Moreover, tiny and underdeveloped urethters and strong adult urinary bladder detrussor makes UCN anastomosis very difficult. Venous thrombosis, the major complication and cause for kidney rejection was reported by Buitron et al. Same authors noted that two of four “en bloc” renal transplants from pediatric donors aged less than one year were lost due to venous thrombosis [7]. Kyler et al. have good results with opposite tehniqe where distal parts of infant aorta and VCI were oversewn and anastomoses were due with proximal part of mentioned vessels [8]. UCLA Renal Transplant Registry reported that a 1-year graft survival rate after kidney transplants obtained from 276 donors younger than 3 years was less than 54 % [9]. Small infant kidneys with bad venous runoff makes transplantation of one kidney to adult insufficient. In 1967. Kelly and others have shown that only one in five individual single kidney transplanted to an adult recipient has an adequate function [10]. Kidneys > 6 cm from pediatric donors can be successfully transplanted as a single kidney concluded Uemura [11]. Sureshkumar et al. [12] suggested that pediatric donors weighing > 10 kg were suitable for single transplantation. In a retrospective study, Hyperfiltration stay a main problem with transplantation of one infant kidney [13, 14]. Vascular hyperinfiltration injury can be reduced by dividing the blood flow into both small graft kidneys. In addition, the overall survival rate is significantly higher from paired kidney compared to a single transplanted kidney [15]. Therefore, both kidneys were transplanted in one recipient as „en bloc“ transplantation. Enlargement of both kidneys after transplantation also noticed by others [14]. Another challenge for small organs is



the creation of ureterocystostomy, so Lippman believes that a bad surgical technique is a curve for urinary leakage, occur secondary to necrotic ureter caused by inadequate blood supply [16]. However, a successful transplantation of a pair of cadaveric renal kidney aged 6 months and a 4.75cm length by Huang, once again demonstrates that it is possible to extend the marginal donor limit when it relates to the size and donor's age [13].

## CONCLUSIONS

Transplantation of infantile kidneys "en bloc" in our adult recipient provided good results. This kind of transplantation is a good option for extends a number of marginal donors. "Follow-up" will show the final effect.

## REFERENCES

1. Sharma A, Fisher RA, Cotterell AH, King AL, Maluf DG, Posner MP. En bloc kidney transplantation from pediatric donors: comparable outcomes with living donor kidney transplantation. *Transplantation* 2011; 92(5): 564–9.
2. Beltran S, Kanter J, Plaza A, Pastor T, Gavela E, Avila A, et al. One-year follow-up of en bloc renal transplants from pediatric donors in adult recipients. *Transplant Proc* 2010; 42(8): 2841–4.
3. Martin LW, Gonzalez LL, West CD, Swartz RA, Sutorius DJ. Homotransplantation of both kidneys from an anencephalic monster to a 17 pound boy with Eagle-Barret syndrome. *Surgery* 1969; 66: 603–7.
4. Salehipour M, Bahador A, Nikeghbalian S, Kazemi K, Shamsaeifar AR, Ghaffaripour S, et al. En-bloc transplantation: an eligible technique for unilateral dual kidney transplantation. *Int J Organ Transplant Med* 2012; 3(3): 111–4.
5. Nghiem DD. En bloc transplantation of kidneys from donors weighing less than 15 kg into adult recipients. *J Urol.* 1991; 145(1): 14–16.
6. Amante AJ, Kahan BD. En bloc transplantation of kidneys from pediatric donors. *J Urol.* 1996; 155: 852–7.
7. Garcia Buitron J, Rodriguez-Rivera Garcia J, Chantada, Abal V, Gonzalez Martin M. [Kidney transplant with pediatric grafts from donors under a year old. The implantation technics]. *Arch Esp Urol.* 1993; 46(9): 793–7.
8. Kayler L, Blisard D, Basu A, Tan HP, McCauley J, Wu C, Marcos A, et al. Transplantation of En Bloc Pediatric Kidneys When the Proximal Vascular Cuff Is Too Short. *Transplantation.* 2007; 83(1): 104–5.
9. Bretan PN, Koyloe M, Singh K, Barba L, Ward H, Sender M, et al. Improved survival of en bloc allografts from pediatric donors. *J Urol.* 1997; 157: 1592–5.
10. Kelly WD, Lillehi RC, Aust JB. Kidney transplantation: experience at the University of Minnesota Hospital. *Surgery* 1967; 62: 704.
11. Uemura T, Liang J, Khan A, Kwon O, Ghahramani N, Wang Li, et al. Outcomes of transplantation of single pediatric renal allografts equal to or more than 6 cm in length. *Transplantation* 2010; 89(6): 710–3.
12. Sureshkumar KK, Patel AA, Arora S, Marcus RJ. When is it reasonable to split pediatric en bloc kidneys for transplantation into two adults? *Transplant Proc* 2010;42(9): 3521–3.
13. Huang CP, Ho HC, Su CK, Ou YC, Cheng CL, Yang CR. Successful Kidney Transplantation Using Paired Cadaver Kidneys Procured From a 6-month-old Brain Death Infant. *JTUA.* 2005; 16(3): 120–3.
14. Modi P, Rizvi SJ, Trivedi HL. Successful en bloc transplantation of pediatric deceased donor kidneys with grade 1 injury. *Indian Journal of Nephrology.* 2009;19(4): 167–9.
15. Gruessner RWG, Matas, AJ, Lloveras G, Fryd DS, Dunn DL, Payne, WD, et al: A comparison of single and double pediatric cadaver donor kidneys for transplantation. *Clin Transplant* 1989; 3(4): 209–14.
16. Lippman H, Jacoby K, McFarlin L, Nicastro C, Aaberg RJ, Banowsky L. Surgical complications in 50 adult renal transplant recipients of single kidneys from cadaveric donors aged 11 to 48 months. *Clin Transplant* 1992; 6: 350–6.