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Letter to the Editor

Unilateral or bilateral early nephrectomy in infants with autosomal recessive polycystic kidney disease? Weighing risks and benefits

Dear Editor,

We read with great interest the article by Overman RE and colleagues [1] describing their experience in performing early nephrectomies in neonates with symptomatic autosomal recessive polycystic kidney disease (ARPKD) diagnosed prenatally or at birth. The authors compared two series of patients undergoing initial unilateral or concomitant bilateral nephrectomy, and evaluated early outcomes relative to the type of initial operation performed. In the overall cohort of patients, they did not find any difference in the duration of mechanical ventilation or days to peritoneal dialysis (PD) catheter use between the two operative approaches, when full feeds were attained, and in the mortality rate within the first year of life. Moreover, 4 patients initially treated with unilateral nephrectomy ultimately required removal of both kidneys after a median time of 25 days between their first and second nephrectomies. Thus, according to the authors' experience, clinical outcomes might be optimized by early concomitant bilateral nephrectomy.

This article focuses on a tricky topic that is still a matter of debate. In ARPKD, unilateral or bilateral nephrectomy may represent a therapeutic approach to ameliorate respiratory impairment, nutritional complications, and also to facilitate PD initiation. The opportunity to perform a unilateral nephrectomy, thus preserving residual renal function and/or kidney blood pressure regulation, or a bilateral nephrectomy, to better improve symptoms of abdominal encumbrance, is however difficult to define *a priori* [2].

In giving their suggestion to proceed with early bilateral nephrectomy, the authors have used early hard outcome measures, mostly associated with intensive care unit length of stay. However, things could be analyzed differently using other outcome measures aimed at evaluating the kidney replacement therapy (KRT) course, such as rate of complications during KRT, physical growth and development, and the chance of receiving a pre-emptive transplantation.

Complete resolution of abdominal distension represents the most important advantage of a bilateral nephrectomy, allowing for the best pulmonary expansion and diaphragmatic excursion. As demonstrated by Overman's paper, most infants with ARPKD can be weaned off the ventilator soon after a bilateral approach. Moreover, the absence of abdominal encumbrance makes PD treatments easier and permits to maximize nutritional tolerance and caloric support, thus allowing satisfactory growth. Infants with chronic lung disease (bronchopulmonary dysplasia or lung hypoplasia) require a caloric intake of at least 140–160 kcal/kg/day as a result of increased work of breathing. The desired nutritional needs are even higher when the infant is receiving chronic PD. Alternatively, the state of anuria and the absence of systemic blood pressure renal control – due to a decrease in both sympathetic nerve firing and peripheral plasma renin activity – represent the main drawbacks of bilateral nephrectomy. In recent studies, very young age, sustained hypotension, and bilateral nephrectomy due to ARPKD resulted in substantial risk factors for hypotension and acute ischemic optic neuropathy (AION), a dramatic cause of sudden blindness, whose incidence is about 1% in PD children [3,4]. After bilateral nephrectomy, the initial course of PD in infants may be also associated with a higher risk of peritonitis and peritoneal leakage [5]. These complications might lead in turn to both ultrafiltration and peritoneal membrane failure, thus impacting on future dialysis (and options) in these small children [6].

Unilateral nephrectomy for infants with severe perinatal ARPKD has been described as rescue therapy in 4 cases so far (Table 1) [7–9]. The therapeutic intent of this procedure is to provide more abdominal space while preserving some degree of renal function. In this way, end stage kidney disease may then be delayed until the child is older and larger, when better results from dialysis and transplantation would be expected. However, the clinical course of these infants can be complicated by the phenomenon of rapid enlargement of the remaining kidney, which can be unpredictable. Such rapid renal expansion often requires subsequent contralateral nephrectomy. Conversely, preserving one kidney might significantly contribute to maintaining an adequate control of arterial blood pressure and an efficient diuresis to maintain the fluid balance, allowing for the possibility to receive a preemptive renal transplantation [9]. An adequate renal control of blood pressure is also essential immediately after renal transplantation as donor kidneys lack the ability to autoregulate their blood flow, meaning reduced perfusion may augment ischemic injury and influence the early alloimmune response [10].

In summary, there is still no consensus for an early unilateral or a concomitant bilateral nephrectomy in severe ARPKD. The decision-making process should rely not only on early perioperative outcomes but should also take into account that these fragile patients will have a lifetime of KRT ahead of them. A personalized surgical approach and clinical management based on a multidisciplinary care team are essential to prevent medium- and long-term complications.

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Table 1
Main characteristics, treatment and outcome of patients with neonatal ARPKD who underwent unilateral nephrectomy.

Author	Gender	Gestational age (weeks)	Birth weight (kg)	Prenatal diagnosis	Neonatal ventilation	Age at nephrectomy (months)	Side of nephrectomy	Reason for unilateral nephrectomy	KRT	Complications during KRT	Dialysis course (months)	Outcome
Arbeiter et al. Pt. 1	F	36	2.4	Yes	Yes	0.2	left	Respiratory failure	CVVH	Bleeding	0.2	Dead
Bean et al. Pt. 1	M	36	2.1	Yes	Yes	18	left	Feeding Intolerance	NO	-	-	Waiting list for Ktx. Good growth
Bean et al. Pt. 2	F	33	1.9	Yes	Yes	1.2	left	Respiratory failure and feeding Intolerance	NO	-	-	Waiting list for Ktx. Good growth
Shukla et al. Pt. 1	M	32	N.A.	Yes	Yes	8	left	Feeding Intolerance	NO	-	-	Pre-emptive living donor KTx

N.A. = not available; KRT = kidney replacement therapy; KTx = kidney transplantation.

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