CASE REPORT

Limited Peritoneal Dialysis in Congenital Polycystic Kidney Disease of Low Birth Weight Infant: A Case Report

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ABSTRACT

Neonates with congenital Polycystic Kidney Disease (PKD) are often associated with multiple organ abnormalities and result in poor prognosis. Renal Replacement Therapy (RRT) sometimes required to treat PKD patients with declined renal function. Peritoneal dialysis (PD) widely used as RRT due to several advantages. However, PD installment in neonates had never been performed in Yogyakarta, Indonesia, due to lack of neonatal tenckhoff and inaccuracy of dwelling scale. We present a neonate, preterm, with bilateral PKD and kidney failure, and needed performed RRT. After considering all disadvantages we performed PD in this neonate. This report will elaborate on all issues that ensued, and how to resolve it, to improve management kidney failure for neonates that requiring PD in Yogyakarta, Indonesia.

Keywords: Peritoneal dialysis, Neonate, Polycystic Kidney Disease

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INTRODUCTION

Polycystic Kidney Disease (PKD) is a congenital anomaly that characterized by cystic formation of the kidneys producing progressive kidney insufficiency. PKD can be isolated form, but sometimes accompanied various extrarenal manifestation (1). PKD occurred about 1:800 to 1:1000 people and responsible for 2.5% of all cases of end-stage renal disease (1). The management of PKD is focused on the prevention of progression, symptomatic treatment, dialysis, and kidney transplantation. Before kidney transplantation as the definitive therapy, Peritoneal Dialysis (PD) is the most feasible Renal Replacement Therapy (RRT) performed in neonates. Whereas the guidelines for suitable peritoneal catheter and dwell process has not been elucidated yet.

Peritoneal Dialysis installment in neonates had never been performed in Yogyakarta, Indonesia, due to lack of neonatal tenckhoff and inaccuracy of dwelling scale. There is confusion to choose appropriate PD catheter and how to deliver accurate low dwell volume needed for the neonates.

CASE REPORT

A newborn male was born at 34 weeks gestation by spontaneous vertex delivery helped by a midwife. The baby was cried immediately and only got initial resuscitation. His birth weight was 2400 grams, with no history of delayed micturition. There was no history of oligohydramnios, no risk factor from maternal and natal care for having early-onset sepsis. The patient was referred to the district hospital, due to low birth weight (LBW).

At 14 days old, the patient suffered from vomiting. The patient vomited 6 – 12 times a day, increased progressively, no expulsive vomiting, the vomit contained breast milk. The patient underwent workup for sepsis, inborn error metabolism and gastrointestinal tract obstruction. The result did not support to sepsis, nor gastrointestinal tract obstruction, but it reveals an increased creatinine level. Patient's weight decreased from 2400 grams to 1950 grams [weight/age: -3.3 standard deviation (SD)]. The patient was referred to our hospital to looking for underlying disease.

In our hospital patient was performed sepsis workup, and managed by given antibiotic. Vomiting still persist though the sepsis was resolved. We looked for etiology of increasing creatinine level. The patient underwent

abdominal ultrasonography (Fig. 1) and CT scan that showed PKD with 1.57 x 1.38 cm cyst for the largest. The right kidney size was under the fifth percentile, though the left kidney was upper 95th percentile. Renal function tests revealed signs of chronic kidney failure. The lowest glomerular filtration rate (GFR) in our patient was 6.34 ml/min/1.73m2. We concluded that the patient suffer from kidney failure that required for RRT.

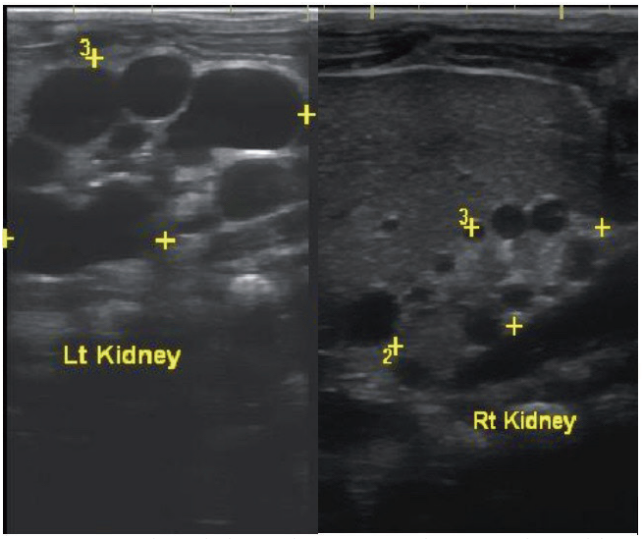

Figure 1: Result of kidney ultrasonography in 14 days old (a) Left kidney size: 5.24 x 3.3 cm (more than 95th percentile) (b) Right kidney size: 3.6 x 1.25 cm (lower than 5th percentile)

We planed to perform PD as the best option. We never done PD in neonates previously because suitable size of PD catheter for neonate was not available in our center. The option was to used iv catheter or children's tenckhof that available in our center. After discussion with a Urologist, we decided to used children's tenckhof with length 30 cm with. We were aware of the higher risk for leakage and fluid overload.

During dwelling process, we encountered another problem. The patient suffered from pulmonary edema. We thought the pulmonary edema caused by unrepresentative dialysate measurement. The target dwell volume was 20 ml in a time, but the reality was more than the target dwell volume. We managed to use manual measurement with accuracy of 50 ml and digital measurement, and modification with burette to overcome the fluid overload. Pulmonary edema still persist until we collaborated with physics engineer to produce manual measurement device with 20 ml accuracy (Fig. 2). It successfully work, we can more accurately measure the exchanges fluid We did not use modification of burette cause by increased of peritoneal infection. The patient was discharged after parents trained to perform dwelling procedure.

The patient visited the hospital monthly for routine check up. Dwelling volume adjusted according to body weight at the monthly visit. After three months of rutine dwelling, GFR showed a substantial increase up to 10.61

Figure 2: (a) Manual scale with accuracy 20ml; (b) Manual scale with accuracy 50ml; (c) Digital scale

ml/min/1.73m2, decrease signs of chronic kidney failure, and body weight increased to 5 kilograms (weight/age: -2.5 SD). Peritoneal Dialysis still had to continue until now, the patient was 1 year old. Kidney ultrasonography performed at the age of one year old showed normal range of kidney's size despite the cysts was persist.

DISCUSSION

The most frequent complication of isolated PKD in the newborn was renal failure that required RRT. The PKD itself was the strongest predictor in this patient, to having kidney failure condition. There are several options of RRT in neonates such as peritoneal dialysis (PD), hemodialysis (HD), and continuous RRT. Hemodialysis is less preferable to be performed in the newborn because of the requirement of a more extracorporeal blood volume. Peritoneal Dialysis has been the most feasible modality for neonates who needed to RRT. Continuous RRT was more effective than PD to reduce blood urea nitrogen (BUN) and ammonia blood level in neonates, with less complication (such as hypotension, electrolyte disturbance, technical and catheter-related complication) (2). We still choose PD to be performed in our patient, because of continuous RRT was not flexible, and can not be performed when the patient was discharged. We performed PD with children's thenckhoff. Children's thenckhoff had a higher risk of leakage, but it has not een appeared until one year after installment. There are also other reported use of alternative catheters to perform PD in LBW neonates such as suction catheter tip, plastic catheter, angiocath, neonatal chest drain, iv cannula, Wallace catheter, cook 5F catheter and Pendlebury's catheters (3).

The other problem in this patient was in PD prescription that initiated using low dwell volumes about 10 – 20 ml/kg per cycle (20 – 40 ml per cycle in this patient). There was no modality that can accurately measure only 20 – 40 ml from dialysate sac to peritoneal cavum. We already tried some modalities such as manual scale with accuracy 50 ml (usually used in children with PD) digital scale and modification with burette. There was

no reference for fluid overload when performed PD in neonates yet. We managed to collaborate with physics engineer to produce manual scale with 20 ml accuracy to overcome the fluid overload problem for the patient with minimal risk of infection.

In December 2018, there was a case series in China that introduces a innovative PD system which simple, safe, effective and suitable for neonates that need RRT. The novel PD system connected peritoneal catheter (single-lumen 14 gauge central venous catheter) with 2 – 3-way taps. One connected with the PD solution, while another port is connected with the drainage bag. That novel PD system was modified by their institution to manage low volume extracorporeal circuits and correctly sized hemodialyzer (4). This system resembles the modified burette. We did not use this system because it will increase intraperitoneal infections, remembering hygiene that is not guaranteed.

CONCLUSION

A PD installment in a neonate with renal failure is possible to be done in a limited resource setting. Neonate that suffer from renal failure can perform PD as RRT modality in limited sources. Fluid overload, accurate measurement of dialysate, and cannula catheter were important points that must be prepared before performing PD in neonates. Modification of manual device to measured low volume dialysate must be prepared well before.

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