EVALUATION OF CAPD AS RENAL REPLACEMENT THERAPY IN CHILDREN

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ABSTRACT

Objective: *To evaluate the outcome of pediatric patients treated with continuous ambulatory peritoneal dialysis (CAPD) performed by experienced pediatric urologists.* ***Material & Method:*** *A retrospective study of children with end-stage renal disease (ESRD) by peritoneal dialysis (PD) in Division of Nephrology Department of Child Health, Faculty of Medicine Airlangga University, Soetomo Hospital, Surabaya, from January 2003 to February 2012 was conducted. Children with acute kidney injury treated by PD were excluded. Data reviewed were age, sex, primary renal disease, age at start of CAPD, duration of CAPD, outcome and cause of death. Descriptive statistics were used to analyze the data.* ***Results:*** *Twenty seven cases of children with CAPD within 9-year period were included. Most patients were 11-15 years old with 62,9% being male. Chronic glomerulonephritis and nephrotic syndrome were the main primary renal diseases. Fifteen (55,6%) patients had peritonitis. The longest duration on CAPD was 53 months. Outcome of 27 children was as follows, 11 patients died (40,8%), 8 patients survived (29,6%), and another 8 were lost to follow-up (29,6%). All (100%) patients had cardiovascular abnormalities as cause of death.* ***Conclusion:*** *The outcome and mortality rate of children with CAPD remain unfavourable. This is a challenge still to be overcomed.*

Keywords: *Continuous ambulatory peritoneal dialysis, children, outcome.*

ABSTRAK

Tujuan Penelitian: *Mengevaluasi hasil keluaran pasien anak dengan continuous ambulatory peritoneal dialysis (CAPD) yang pemasangan kateternya dilakukan oleh ahli urologi anak di RSUD Dr. Soetomo.* ***Bahan & Cara:*** *Penelitian retrospektif pada anak end-stage renal disease (ESRD) dengan CAPD, dilakukan di Divisi Nefrologi Departemen Ilmu Kesehatan Anak Fakultas Kedokteran Universitas Airlangga/RSUD Dr. Soetomo Surabaya, sejak Januari 2003 sampai Februari 2012. Kriteria eksklusi meliputi anak dengan pemasangan kateter peritoneal dialysis (PD) atas indikasi gangguan ginjal akut. Data pasien didapatkan melalui rekam medik meliputi umur, jenis kelamin, kelainan ginjal primer, usia saat dipasang CAPD, durasi CAPD, keluaran dan penyebab kematian. Data dianalisis dengan statistik deskriptif.* ***Hasil Penelitian:*** *Didapatkan 27 anak dengan CAPD dalam periode 9 tahun tersebut. Sebagian besar berusia 11-15 tahun dan 62,9% adalah laki-laki. Glomerulonefritis kronik dan sindrom nefrotik merupakan penyebab tersering kelainan primer pada ginjal. Lima belas (55,6%) pasien mengalami peritonitis. Durasi CAPD terpanjang adalah 53 bulan. Hasil keluaran 27 anak dengan CAPD adalah 11 pasien meninggal dunia (40,8%), 8 pasien bertahan hidup (29,6%), dan 8 pasien lainnya tidak kontrol lagi (29,6%). Semua (100%) pasien mengalami gangguan kardiovaskular dan menyebabkan kematian.* ***Simpulan:*** *Tingkat kematian pada anak dengan CAPD masih tinggi. Pada penelitian ini, keluaran masih buruk karena masih banyaknya hambatan yang harus diatasi.*

Kata kunci: *Continuous ambulatory peritoneal dialysis, anak, keluaran.*

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INTRODUCTION

Continuous ambulatory peritoneal dialysis (CAPD) has emerged as the first-choice pediatric dialysis modality for children and adolescents with end-stage renal disease (ESRD) throughout the world since its first introduction in 1982 for children.[1-3] CAPD as renal replacement therapy

(RRT) has been used for adult patients in Indonesia since 1985 but its use in children is still limited.[4]

Indonesia has more than 88 million pediatric population of 19 years and under with increasing incidence of chronic kidney disease (CKD).[5] At Dr. Soetomo Hospital Surabaya, there has been an increasing trend of CKD children with approximately 80 patients diagnosed during 1998-2009. CAPD for children was introduced in 2003 at our institution.

Complications of CKD such as anemia and cardiovascular disease have been acknowledged in children as well. Other complications related to the peritoneal catheter such as peritonitis and exit site infections remain troublesome for the patients.[2]

OBJECTIVE

To evaluate the outcome of pediatric patients treated with continuous ambulatory peritoneal dialysis (CAPD) performed by experienced pediatric urologists in the Division of Nephrology Department of Child Health, Faculty of Medicine Airlangga University, Soetomo Hospital, Surabaya.

MATERIAL & METHOD

We conducted a retrospective study at the Division of Nephrology Department of Child Health, Faculty of Medicine University of Airlangga, Dr. Soetomo Hospital, Surabaya, Indonesia. Children with ESRD, who were on PD from January 2003 to February 2012, were included in the study. Children were excluded from the study if the PD catheter was inserted for acute kidney injury. We retrospectively reviewed patients' medical records using a standardized data collection form. Data of age, sex, gender, primary renal disease, age at CAPD onset, duration of CAPD, outcome and cause of death of the patients were collected. Descriptive statistical analysis was performed by SPSS for Windows version 13.0.

RESULTS

Our centre has treated 27 patients, 17 (62,9%) of whom were male. Most patients were in the age range of 11-15 years with the youngest patient was 4 years old and the eldest was 15 years old at the time of commencing CAPD. Mean age was 117,4 (SD 38,6) months. The longest duration on CAPD was 53 months with mean of 17,3 (SD 14,9) months. Five (18,5%) patients had nephrotic syndrome as the primary renal disease. The characteristics of the patients are shown in Table 1.

Table 1. Characteristics of patients.

Characteristics	n (%)
Patients (n)	27 (100)
Age (years):	
- 1-5 year	4 (14,8)
- 6-10 year	9 (33,3)
- 11-15 year	14 (51,9)
Gender:	
- Male	17 (62,9)
- Female	10 (37,1)
Body weight (kg)	21,4 (9,3)*
Duration of CAPD (months)	17,3 (14,9)*
Primary renal disease:	
- Nephrotic syndrome	5 (18,5)
- Lupus nephritis	2 (7,4)
- Chronic glomerulonephritis	8 (29,6)
- Renal hypoplasia	1 (3,7)
- Renal cystic disease	2 (7,4)
- Neurogenic bladder	1 (3,7)
- Hydronephrosis	2 (7,4)
- Urolithiasis	1 (3,7)
- Unknown	6 (22 2)

* mean (SD)

Peritonitis occurred in 55,6% of patients. The overall peritonitis rate in our preliminary study in 2011 was 1 episode every 10,5 months (0,1 episode/year-at-risk).[6]

The outcome of 27 children was 11 (40,8%) patients died, 8 (29,6%) patients survived, and another 8 (29,6%) were lost to follow-up. All (100%) deceased patients had cardiovascular disorder as cause of death.

DISCUSSION

Chronic PD is an effective therapy in the management of children with ESRD. PD is one type of dialysis using peritoneum as a natural permeable membrane to regulate water and fluid balance. CAPD has the undoubted advantage of ease of use and limited cost of equipment when compared to the limited use of automated PD (APD) in developing countries due to cost constraints and technical problems. Nevertheless, it requires more patient

participation.[2]

Peritoneal dialysis has been successfully used in many developing countries but the modality is still underutilized. This is due to a variety of reasons but there are some common challenges. CAPD has been used for adult patients in Indonesia since 1985 but its use in children is still limited.[4]

This study is a retrospective descriptive data analysis from all pediatric CAPD patients in our centre. The age of our patients ranged from 4 to 15 years old, mostly in the age group of 11-15 years. Most of our patients were males, which is similar to the overall gender distribution of ESRD in our centre. A third of our patients suffered from chronic glomerulonephritis as the primary renal disease and less than a fifth had nephrotic syndrome. In many renal centers, much younger children have also been treated by dialysis and renal transplantation.[7] CAPD made possible the routine treatment of very young infants with ESRD, thereby extending the option of RRT to an entire patient population previously considered too young to be suitable for chronic treatment.[2] Our centre has been successfully instituted CAPD as RRT for children as young as 4 year old with body weight 7 kg when previously children less than 10 kg with ESRD were deemed impossible to be treated with hemodialysis as our centre's only modality of RRT before 2003. CAPD is a significant improvement in regards of chronic dialysis treatment options that can be offered for children in our centre.

Theoretically, it is possible that children with ESRD can be maintained on long term dialysis with reasonable quality of life and satisfactory symptomatic and biochemical control of their uremia. Morbidity is chiefly related to the infective and mechanical complications of CAPD, and the long term problem is kidney transplantation.[7] In this study, the longest duration on CAPD was 53 months with mean duration of 17,3 months. During CAPD, the patients were being routinely followed-up and treated for any complications. The duration of CAPD in our centre was shorter than the patients in the developed countries. Low socioeconomic status, high rate of infection and cardiovascular disorder were attributed to the short CAPD duration in our centre.[2]

The success of the current chronic PD practice is in part reflected by the pharmacological treatment required to cope with complications of end-stage renal failure throughout the course of dialysis. The major causes of treatment failure with chronic PD were recurrent episodes of peritonitis, or ultrafiltration failure, or both.[8] This study found that most patients experienced various complications of ESRD and CAPD that ended in their death. Complications in these patients included anemia, cardiovascular disorder, and peritonitis. Anemia of renal disease as the complication of ESRD has been difficult to be treat mainly because the cost constraints. All patients in our centre are under government insurance for poor people and the cost for erythropoietin is not covered by this insurance. Therefore the hemoglobin level has been lower than the target hemoglobin for children with ESRD and further compromises the cardiovascular function. Hence, heart failure was the ultimate cause of death in all patients in our centre. Our peritonitis rate is considerably higher than the South Asian countries' published rate of 1 episode for every 19 to 71 patient-months.[9] One of the possible reason is that patients may not be well-educated and compliant. A hot humid climate and poor hygienic conditions increase the risk for peritonitis as well.[10]

CONCLUSION

The mortality rate is still high among children on CAPD despite its high effectiveness reported in children with ESRD. In our study, the outcome was still unfavorable due to the many obstacles remain to be faced.

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